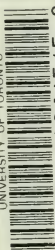


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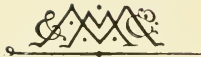




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FIBROIDS AND ALLIED TUMOURS



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FIBROIDS AND ALLIED TUMOURS

(MYOMA AND ADENOMYOMA)

THEIR PATHOLOGY, CLINICAL FEATURES
AND SURGICAL TREATMENT

BY

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EXAMINER TO THE ROYAL COLLEGES OF PHYSICIANS AND SURGEONS
LATE EXAMINER IN MIDWIFERY AND DISEASES OF WOMEN TO THE UNIVERSITY OF LONDON

WITH AN INTRODUCTORY NOTICE BY

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WITH 316 ILLUSTRATIONS INCLUDING 37 COLOURED PLATES

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To the Memory
OF
MY PARENTS





PREFACE

IN his Harveian Oration at the Royal College of Physicians in 1912 the late Sir James Goodhart spoke somewhat pathetically of "the passing of morbid anatomy." In this monograph on "Fibroids" and Allied Tumours I have tried to show that morbid anatomy is not entirely a lost science. Other authors have written treatises, some more extensive and more ambitious than my own, on the same section of pathology, and it might be said with some plausibility that the subject was already overdone. My view is that the work of every observer is worth recording, since it is calculated to bring new facts to light, or, at least, to emphasise points which have not yet received due recognition. When first I joined the Staff of the Samaritan Hospital my senior colleagues, notably Mr. Alban Doran, gave me access to as much pathological material as I was able to deal with, and to these gentlemen my grateful thanks are due for rare opportunities for the study of morbid processes connected with the female genitalia. This work is an attempt to show that these opportunities have not been entirely lost, and it is hoped that it will be helpful as a book of reference to other workers in gynaecology. No apology is needed for dwelling fully on the problems connected with Adenomyoma; these structures have scarcely received the attention from British writers

which is their due, and an *extrauterine* origin for some of these 'growths' needs emphasising.

The book is divided into three Parts. Part I. deals with Myoma, Part II. with Adenomyoma, whilst Part III. has been devoted to a detailed description of the various operations for the removal of these tumours; to the treatment, surgical and otherwise, of Complications; and to the After-treatment of Abdominal and Vaginal Operations. I hold, as an Article of Belief, that no one should undertake the Surgery of the Pelvis unless he has the requisite knowledge and experience to deal with Intestinal and other Complications, and have therefore devoted the last chapter of this work to the technique of such operations on the intestines and ureters as may become necessary during a difficult hysterectomy.

Many of the illustrations in the operative section were drawn by Dr. Dupuy from sketches he made when present during my operations; for others I am indebted to Drs. Howard Kelly and Thomas S. Cullen. To the latter author also I express my great indebtedness for kind permission to use various illustrations of morbid growths. But for Dr. Cullen's unstinted generosity in allowing me to make a free use of his excellent illustrations of Adenomyoma these growths would have been but poorly depicted. Where illustrations have been borrowed, permission to do so has been obtained,¹ and the source has been noted in the legends; whilst wherever no acknowledgment is made the illustrations are original and represent specimens in my own collection or drawings of my operations.

For staining sections to demonstrate plasma-cells I am indebted to my House Surgeon, Mr. C. J. Marshall,

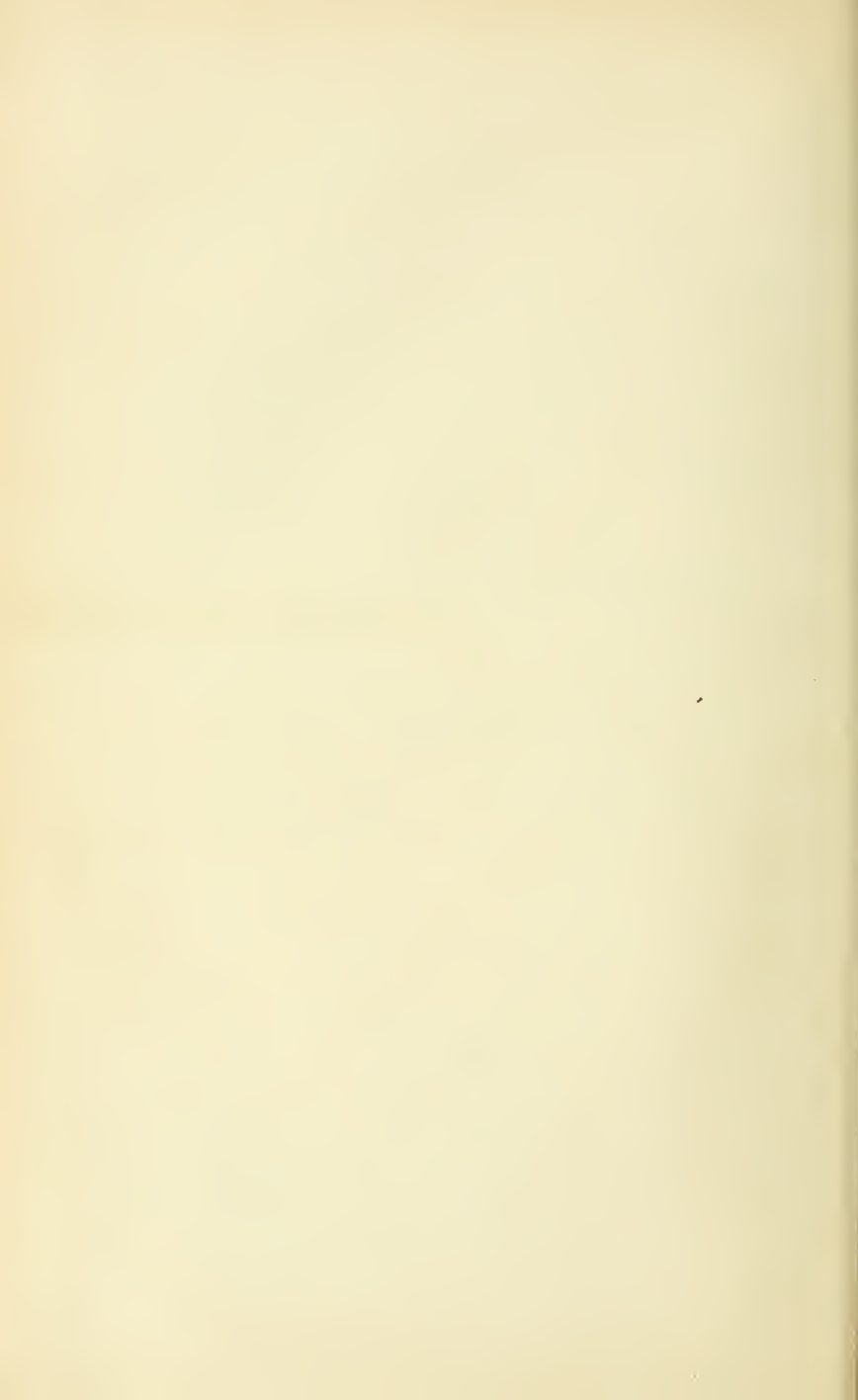
¹ In the case of some Continental illustrations this was impossible owing to the War.

M.D., F.R.C.S.; and for reading the proof-sheets my hearty thanks are due to Mr. Alban Doran, Dr. William Cecil Bosanquet, and Mr. Clifford White. To the artists Dr. Dupuy, Messrs. Shiells, Sewell, and Ford my best thanks are due for their hearty collaboration.

I cannot sufficiently express my gratitude to the Publishers, Messrs. Macmillan & Co., for their generosity in allowing me to use so many coloured plates, and for their unvarying courtesies and patience in all my dealings with them.

CUTHBERT LOCKYER.

HARLEY STREET, LONDON, W.,
1918.



INTRODUCTORY NOTICE

WHEN I joined the Staff of the Samaritan Free Hospital in the year 1877 the pathology of uterine myoma was imperfectly understood, the treatment largely empirical, and the operative mortality a scandal. I had the pleasure of working with Dr. Cuthbert Lockyer, as a colleague, for over twenty years, and am therefore in a position to testify to his zeal in the study of the pathology of uterine fibroids at first hand, to his experience as an operator, and to his impartial and judicious criticism of the opinions and methods of others. Without Dr. Lockyer as a *vates sacer* the valuable records preserved in this volume would have been lost. This chronicle of fibroid disease of the uterus, as observed in the Samaritan and other hospitals with which the author has been associated, will be of high service to the profession in the study of a disease which is of special importance, not because, like many other maladies, it is of interest as a rarity, but, on the contrary, because it is the most frequent of all new growths to which women are subject, and therefore almost as familiar to the physician and general practitioner as to the gynaecologist.

ALBAN DORAN,

Consulting Surgeon to the Samaritan Free Hospital.

1918.



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PART I
MYOMA

CHAPTER I

MYOMA

Myomas of the Female Genitalia.—These tumours are commonly known as fibroids or fibromyomas; their usual situation is in the walls of the uterus, but they may arise from the muscular tissue of the round ligaments, from that of the ovarian ligaments, or in that of the broad ligaments and of the vagina.

Aetiology and Histogenesis.—The causation of myoma is obscure. Ribbert's view is that the germs of the growth are deposited in the connective tissues during foetal life, and that they are subsequently stimulated to active development by some excitant such as hyperaemia.

The histogenesis, like the aetiology, is also a matter of pure speculation. Virchow regarded each muscle-cell in the uterus as capable of generating a myoma. Cohnheim's theory of embryonic 'rests' has been applied to myoma, and corresponds with the view of Ribbert.

Some investigators claim to have shown that these growths spring from the adventitia and media of the vessel-walls. Opitz, on the other hand, is of opinion that myomas arise, not from the muscle-fibres, but from the connective tissue, by a process of metaplasia. He argues that as the connective tissue is the undifferentiated representative of the mesenchyme, from which both the muscle-cells and the stroma of the mucous membrane have been differentiated,

it is easy to understand that under certain conditions (in later life) this faculty of muscle-forming metaplasia is again assumed, and circumscribed nodes of fresh myomatous tissue are laid down which form the nuclei of subsequent tumours. Opitz claims to have traced the gradation from connective tissue to muscle in serial sections of small myomas.

The question of the part played by heredity in tumour-formation generally, is again a matter of dispute. It is certainly striking how "fibroids run in families." A patient of my own is one of five sisters, four of whom have had uterine myoma, and the fifth refuses investigation but is thought to be similarly afflicted.

Since myomas obtrude themselves during sexual life, it is only natural to infer that 'ovarian activity' has a good deal to do with their growth, and the influence of ovarian hormones on the development of myomas is confirmed by the clinical results of oöphorectomy. I have in my own collection a uterine myoma the size of a bantam's egg which was removed some years after oöphorectomy had been performed for the same tumour at a time when it was so bulky as to cause considerable abdominal enlargement.¹ If further support were needed to prove the effects of the ovaries on the growth of fibroids, the frequency of gross anatomical changes in the ovaries themselves in cases of uterine myoma might be mentioned.

Histology.—Myomas are formed of two mesoblastic structures—muscle-bundles and fibrous tissue; the former are arranged transversely and longitudinally and are bound together by the latter.

The smallest myomas are composed entirely of muscle. Cullen says that when they attain a diameter of 1 cm. fibrous tissue can be seen.

Myomas of microscopical size have no capsule (see Fig. 1), but a lymphatic cleavage (Fig. 2, Plate I.) soon makes

¹ See also third paragraph, page 228.



FIG. 2

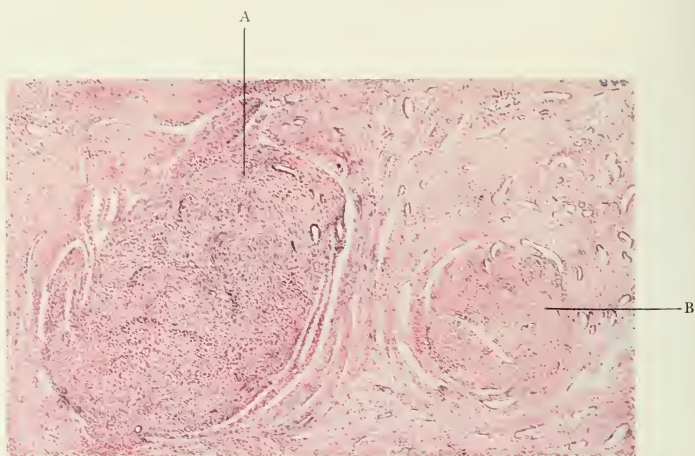


FIGURE 2. A & B. Two microscopic myomas composed of muscle-fibres only. Note the peripheral clefts by which the tiny growths are partly separated from the adjacent muscle.

1 in. obj. 3 eyepiece.

FIG. 3

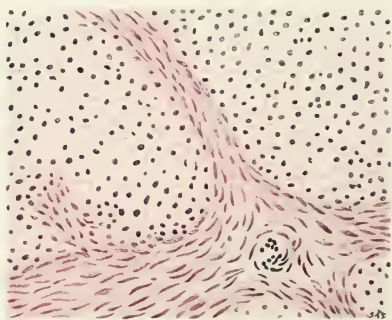


FIGURE 3. Showing the muscle-fibres of a myoma in longitudinal and transverse section.

$\frac{1}{6}$ in. obj. 3 eyepiece.

its appearance between the tiny growth and the surrounding muscle, and the identity of the new growth is easily made out, even when it is only the size of a pin's head, by the deep staining of the muscle-nuclei, which are far more numerous and more closely packed together in the growth than in the surrounding muscle.

Large myomas always show hyaline degeneration ; small ones often do the same.

Individual muscle-cells are spindle-shaped ; their nuclei are long, narrow, and rounded at their ends. A muscle-fibre when cut transversely through its centre appears as a spherical mass of protoplasm with a central round nucleus ; when obliquely cut, the cell is oval with an ovoid nucleus (Fig. 3, Plate I.) ; when cut near its end, the cell appears as a clear mass of cytoplasm devoid of a nucleus.

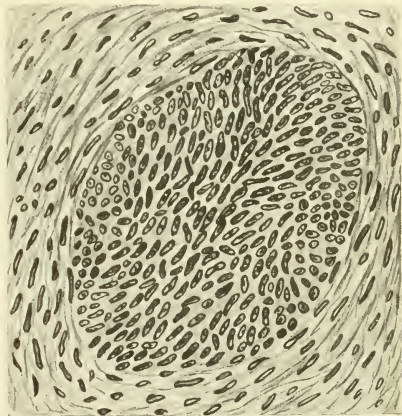


FIG. 1.—Early or 'seedling' myoma composed entirely of muscle-cells.

A muscle-cell has no definite size in length and thickness. Mallory states that the slowest-growing fibres are the most slender, and he classifies the 'fibroids' of the clinician under the pathological grouping of *Leiomyoblastomas* (*Leiomyomas*).¹

Leiomyomas are tumours of mesenchymal origin ; the cells tend to differentiate into smooth muscle-cells ; these growths occur not only in the uterus, but in the gastrointestinal tract, on blood-vessels, in the prostate, and elsewhere.

¹ Mallory, *Principles of Pathologic Histology*, page 305.

Leiomyomas generally grow slowly, but exceptionally they take on rapid growth, and the nuclei of the cells then show mitotic figures, which is a sign of malignancy.

The distinguishing feature between a leiomyoma-cell and a fibroma-cell is the presence in the cuticle of the former of longitudinal striations known as myoglia-fibrils, and to these the deep acidophile staining-properties of the muscle-cell are due. At the extremity of the cell these myoglia-fibrils fuse to form a single coarse fibril which

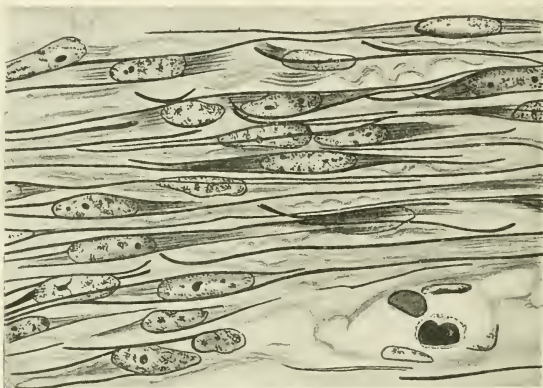


FIG. 4.—Showing a section of a leiomyoma. The myoglia-fibrils are relatively coarse. (Mallory, *Principles of Pathologic Histology*, p. 305. By permission.)

terminates the cell. (See Fig. 4 in text, also Figs. 5 and 6, Plate II., after Mallory, of myoma-cell, fibroma-cell, and fibro-sarcoma cell.)

The difficulty of distinguishing histologically whether certain myomas are malignant or not is well known, and is best appreciated by those who have worked longest at this subject. I have seen metastatic deposits in the lungs and in the pelvic cellular tissues which would pass muster as innocent fibromyomas. There is no doubt that there are some cases in which the histologist, unaided by the clinician, is incapable of giving a reliable prognosis on the question

FIG. 5

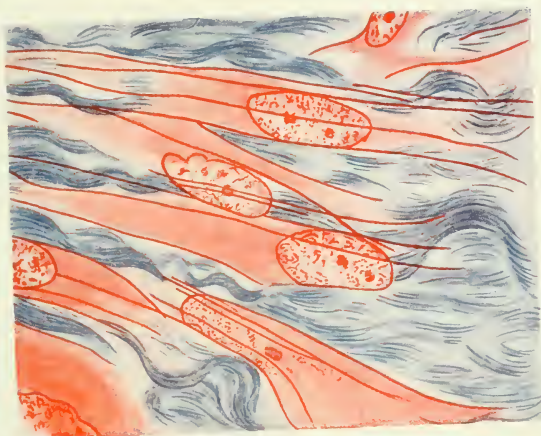


FIGURE 5. Showing a section of a fibrosarcoma. The cells are viewed flatwise. The fibroglia-fibrils are stained red, the collagen-fibrils blue. (*Mallory Principles of Pathologic Histology*, p. 279, by permission).

FIG. 6

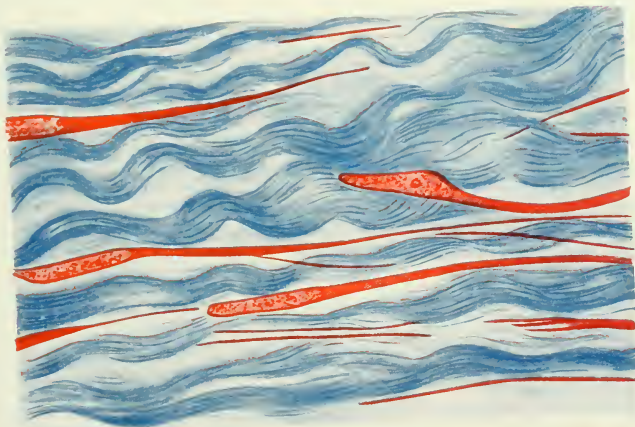


FIGURE 6. Showing a section of a Fibroma. Note the few cells and many collagen-fibrils. (*Mallory Principles of Pathologic Histology*, p. 278, by permission).



of malignancy. There are, however, two points on which stress must be laid—(1) the clinical and microscopic evidence of rapid growth, and (2) the presence of mitosis in the nuclei of the muscle-cells.

If a tumour be growing slowly, there is time for the type-cell to develop, but in rapid growth the myoglia-fibrils may only be formed to a slight extent. In such cases the cells never reach the spindle shape, but may be spherical and sometimes multinucleated. The histological difficulties are often increased by degenerative changes.

A marked histological feature of myomas is their limited blood-supply. Large blood-vessels and lymphatics are found in their capsules, but in the interstices of the growth the vessels are few and small; the resulting inadequacy of nutrition leads early to hyaline degeneration and also to fibrosis. The latter change is due to the fact that the fibroblast is a hardier cell than the myoma-cell, and goes on proliferating after the myoma-cell has succumbed to malnutrition.

ANATOMY

In size, number, and shape myomas are extremely variable. A 'seedling' myoma is a microscopic object (see Fig. 7) which cannot be detected by the naked eye or by touch. These tiny growths are round or spherical in shape, and their histological features have already been described.

As soon as they attain a size sufficient to render them visible, they stand out as pale whitish bodies, which contrast sharply with the pink uterine tissue by which they are surrounded. When they arise in the uterus they are invariably intramural in position. At the start these growths show a very intimate connection with the surrounding muscle at one or two points, but there is generally a line of cleavage, suggesting the presence of lymphatic channels or capillary blood-vessels (see Fig. 2, Plate I.).

The attached portion is spoken of as the 'pedicle.' There is probably no other class of tumours in the body which affords such facilities of studying their development from 'seeds' to maturity as does a uterine myoma.

As the germinal myoma grows, it acquires a 'capsule,' *i.e.* it becomes more and more definitely distinct from the muscle-tissue of the wall of the uterus, and comes to lie in a loose cellular connective-tissue bed which is characterised by its rich blood- and lymph-supply. This arrangement allows of their being easily shelled out, a facility of which

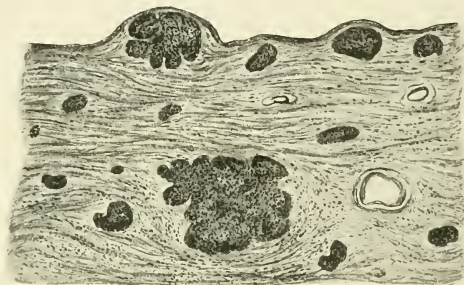


FIG. 7.—Multiple seedling myomas in the wall of the uterus.

the surgeon avails himself in myomectomy. From such a minute origin myomas may attain to a phenomenal size (180 lbs., Hunter ; 89 lbs., Cullen ; 47 lbs., Doran). The naked-eye appearances of a healthy myoma are best studied in a freshly-cut section through an interstitial growth.

As soon as the uterus is divided, the pink muscle-tissue surrounding the growth retracts, and the surface of the growth is extruded to a variable degree, standing out with a slight convexity, and presenting a whitish surface composed of interlacing whorls which have been likened to a cross-section through a ball of cotton-thread. This white surface shows no sign of blood-vessels cut across, and, as will be shown later, the myomatous parenchyma is com-

paratively avascular. The source of nutrition is discovered by examining the layers of the capsule in immediate contact with the growth. Here we find the open mouths of vessels cut at various angles, some obliquely, some transversely, and others longitudinally. The blood-supply is therefore mainly peripheral, and only small vessels reach the interior of a myoma (see Fig. 8).

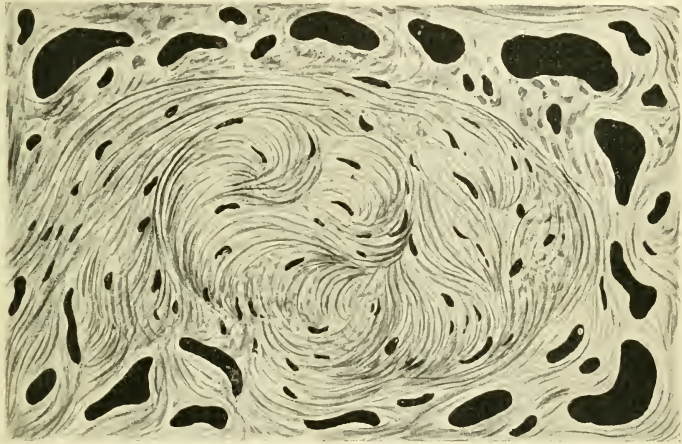


FIG. 8.—Showing a small myoma with the blood-vessels injected. Note the large size of the peripheral vessels and the smaller size of those in the centre of the myoma. (Modified from Ribbert.)

The relationship of fibrous tissue to muscle, as regards both relative amount and arrangement, is well seen in Figure 9, Plate III.

Position and Classification.—Myomas may be classified as corporeal, intraligamentary, and cervical; such a division is mainly clinical.

More commonly they are classified according to their position in relation to the uterine wall; thus we have interstitial, subserous, and submucous myomas. Bayle in 1802 appears to have been the first to classify myomas thus

Pedunculated subserous myomas acquire great freedom of movement, though not so great as that of ovarian cysts, and as in the case of the latter, the pedicle may become twisted (Fig. 12), leading to strangulation of the growth and



FIG. 10.—Showing (A) sessile subserous and (B) pedunculated subserous myomas. The right appendages have been removed, the left were not taken away. The patient had been treated by X-rays; twelve sittings produced no abatement of menorrhagia, and the tumour increased in size. The right ovary was atrophic, the left one was normal in size and appearance.

changes secondary thereto; complete separation from the parent uterus may occur, and a fresh blood-supply from the omentum and other sources may suffice to keep the myoma alive.

Subserous myomas do not as a rule affect the size and



Fig. 12. Subserous myomas, one of which shows torsion of its thin pedicle.

shape of the uterus. A common form for these growths to assume—especially the single ones—is that of a kidney with

its long axis lying transversely and its concavity overlapping the fundus (Fig. 13).

Subserous myomas may be lobulated or smooth. The smaller ones are usually smooth, the larger are often rough and mulberry-shaped (see Fig. 62, page 55). They frequently

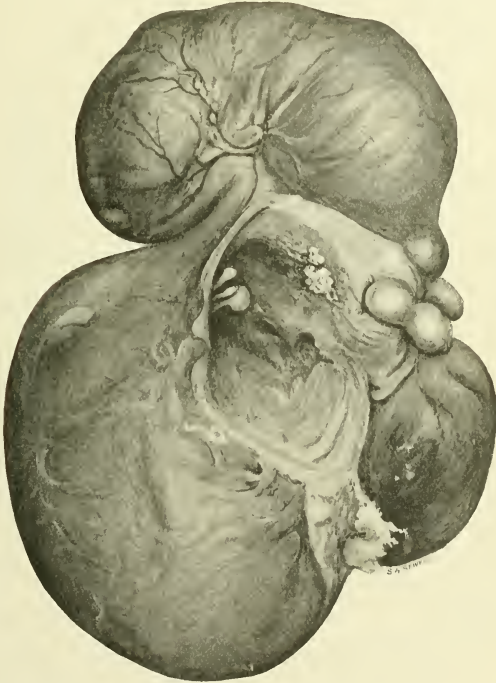


FIG. 13.—A sessile subserous myoma adapting itself to the shape of the underlying uterine body. The under surface of the tumour being concave, a reniform shape is produced.

present large veins on their surface, and these are often continuous with omental vessels (see Figs. 62 and 63, pages 55 and 56). These growths are generally hard, they contain scarcely any muscle, but consist almost entirely of badly-nourished fibrous tissue. When they depend upon an extrauterine source for their blood-supply, they are termed

'parasitic.' Subserous myomas may be single, but they are



FIG. 14.—Multiple subserous myomas producing a 'potato-bed' group of tumours. *A*, Fundus and uterine cornu; *B*, Central cyst, produced by liquefaction of a hyaline area.

often multiple, producing a congeries of tumours ('potato-bed'), the like of which is not to be found elsewhere in

the human body (see Fig. 14). As a general rule their

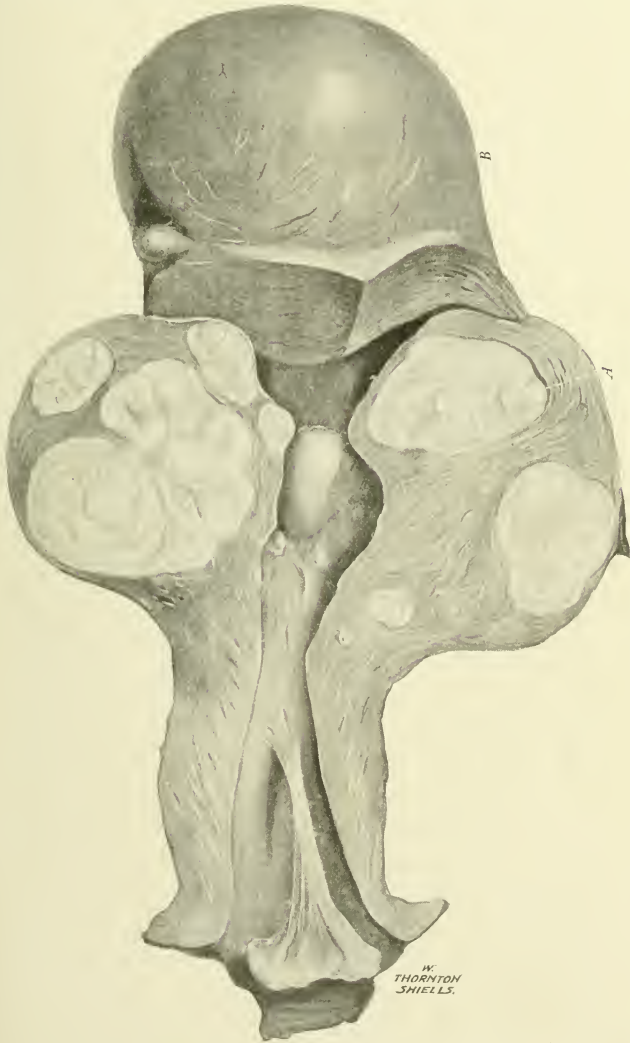


FIG. 15.—*A*, Interstitial myomas; *B*, Sessile subserous myoma. A mucous polypus lay in the cervix and vagina. A submucous sessile myoma is seen in the cavity of the uterus.

size will be found to vary inversely with their number.

Owing to their defective blood-supply, these growths are particularly prone to show every type of retrograde change, for the full details of which the reader is referred to the section, "Secondary Changes in Myoma," Part I. chapter iv. page 44.

Interstitial Myoma.—These tumours remain where they arise, *i.e.* in the muscle-wall of the uterus. They influence the size and shape of the organ to a very marked degree; the cavity is expanded or elongated; the muscularis itself, and often the mucosa as well, are both hypertrophied. The growths can be easily shelled out of a definite bed owing to a loose connection with the uterine wall, through the intervention of a very vascular connective-tissue capsule (see "Myomectomy," Part III. chapter i. page 477).

In spite of integrity of the capsule, these tumours are very liable to hyaline degeneration and the other changes which follow in its train, including calcification after the climacteric (see Fig. 69, Plate XIV. opposite page 61, and Fig. 124, page 113).

An interstitial myoma which grows uniformly in all directions will result in what has been termed a 'cup and ball' myoma. The expanded cavity receives the submucous segment of the growth like a 'cup,' and the serous coat covers the remainder of the 'ball' (see Fig. 16, page 15).

Submucous Myoma.—When a myoma develops in the muscle-layers just under the mucosa, it pushes the latter towards the cavity of the uterus. As the tumour increases in size, the mucous membrane becomes atrophic and thinned by stretching and by the effects of pressure; this is most marked over the summit or most advanced part of the growth, where it may be found reduced to a homogeneous band. When the lower pole of the myoma has suffered extrusion into the vagina, the surface-epithelium may undergo metaplasia, and assume the features of squamous epithelium, even to keratinisation. Figure 17, Plate IV.,

FIG. 17

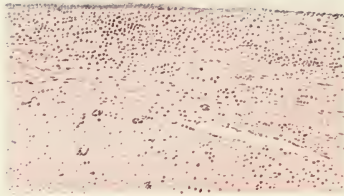


FIGURE 17. Section through the peripheral layers of an intra uterine submucous myoma. The epithelium has become flattened out on the summit of the growth.

FIG. 18

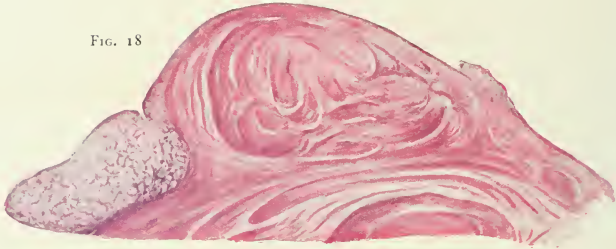


FIGURE 18. Sessile submucous myoma, showing marked hypertrophy and hyperplasia of the mucous membrane at the margins, and flattening of the epithelium on the surface of the growth.

FIG. 24

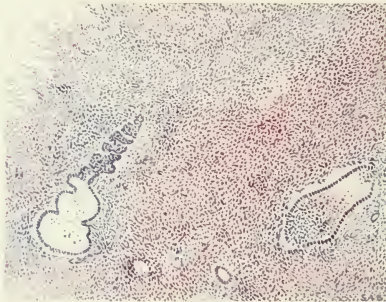


FIGURE 24. Shows the microscopic character of one of the many fimbriated polypi seen in figure 21 page 18. The inset shows the polyp as seen by naked eye on the slide.

shows the surface of an intrauterine submucous growth with the endometrium represented by a single layer of low cubical epithelium, which in part has been flattened out almost past recognition, the cellular divisions being lost.

In the recesses or fornices formed between the margins of the growth and the adjacent uterine wall, the mucous



FIG. 16.—An example of the 'cup and ball' myoma. This type of growth often fits the pelvis tightly, and is difficult to elevate prior to removal.

membrane is wont to be hypertrophied and may become definitely polypoidal. This excessive overgrowth is well shown in Figure 18, Plate IV.

The tendency of uterine contractions is to express a submucous myoma out of its original bed into the uterine cavity; in this process the growth passes through the sessile stage (where it lies partly in its muscular capsule and partly covered by mucosa only) and gradually becomes pedunculated.

In the smaller growths the pedicle may become reduced to a thin axis of fibrous tissue containing blood-vessels, and this may very occasionally become detached and the tumour be expelled spontaneously (see Fig. 25, Plate V.).

The large submucous myomas always maintain a broad



FIG. 19.—Large submucous myoma with a broad attachment to the fundus and back of the uterus. The lower pole of the growth lay low in the vagina. The cervix has been widely opened up.

attachment, and even when their lower pole reaches into the vagina, they are still quite sessile (see Fig. 19). When the attachment is very wide, the uterus fails to expel the growth, and the cavity then becomes stretched over it and the growth is moulded to the shape of the cavity itself.

I once removed a submucous myoma which had dilated the external os to the fullest extent, so that the diameter of the cervical canal measured 4 inches, and yet there was no extrusion. The growth was cystic, and the lower pole which presented in the dilated os was mistaken for the bag



FIG. 20.—Uterus removed by vaginal hysterectomy for post-climacteric haemorrhage. It shows two submucous myomas and a small interstitial nodule.

of foetal membranes ; and as the fundus was at the umbilical level, the case was thought to be one of premature labour at the fifth month.

Submucous myomas may be single ; on the other hand they may be multiple (see Figs. 20, 21, 22), or so numerous as to become faceted by mutual pressure (see Fig. 23) ; more

often only one nodule becomes submucous. Sometimes an interstitial growth in the posterior wall will project both ways—outwardly and towards the cavity. If sloughing of



FIG. 21.—Showing cavity of uterus and canal of cervix widely opened up by submucous myomas, and a collection of 'adenofibromas.' The latter are considered by some authors to be submucous adenomyomas. The uterus has been divided in the sagittal direction. The right half is seen in Fig. 22, this being the left half. C, C indicate the lips of the widely expanded cervix. Operator: Hamilton Whiteford.

the submucous portion occurs, and the surgeon attempts to remove the growth by morcellation, there is serious risk of perforation of the thin external uterine wall, which invests the

interstitial portion. This is what occurred with the specimen shown in Figure 139, Plate XXXIV., opposite page 145.

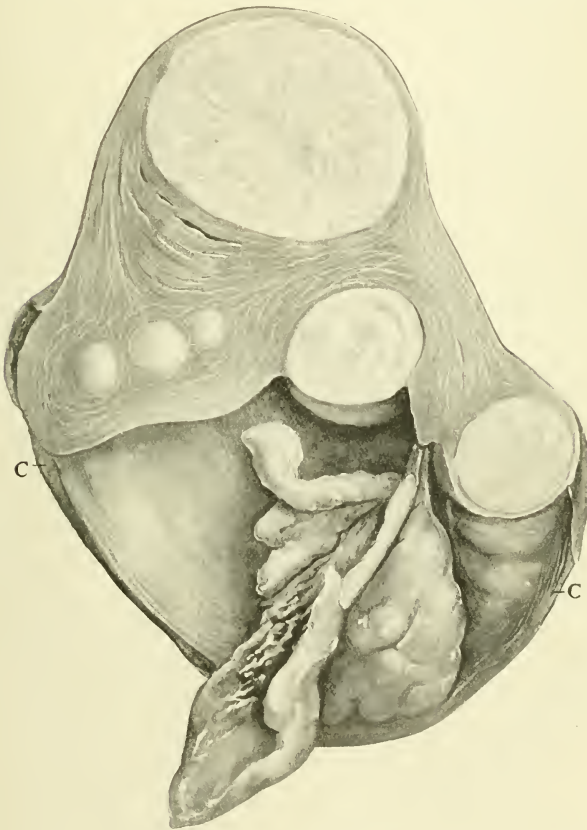


FIG. 22.—Showing the right half of uterus, of which Fig. 21 is the left. The open space to the left is that part of the expanded body and cervix which was filled with the cluster of polypi seen in Fig. 21. C, C=expanded cervix. (For the histology of the polypi see Fig. 24, Plate IV., opposite page 15.) Operator: Hamilton Whiteford.

Pedunculated submucous myomas are usually single; they may be attached to any part of the wall of the cavity; if they arise in the fundus the stalk is often long and thin.

The growth itself is usually pear-shaped with the obtuse end downwards. It is completely invested by epithelium derived from the mucosa.

Submucous myomas, whether sessile or pedunculated,



FIG. 23.—Multiple submucous myomas, faceted by mutual pressure.
(From Eden and Lockyer's *Gynaecology for Students and Practitioners*, 1916.)

may contain tubular gland-spaces, which are no doubt derivatives of the gland-tubules of the endometrium. The usual term *erroneously* applied to them is 'fibroadenoma' (see Fig. 24, Plate IV., opposite page 15).

Submucous growths are liable to the same secondary changes as the other varieties. From their liability

FIG. 25

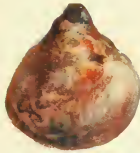


FIGURE 25. A small submucous myoma which was expelled spontaneously.

FIG. 26



FIGURE 26. Showing a submucous myoma, the lower pole of which has become compressed, congested, and thrombosed from pressure of the lower uterine segment and upper part of the cervical canal.

to extrusion, strangulation, and exposure, they are much more prone to necrosis and infection than are the subserous and interstitial growths (see Figs. 25 and 26, Plate V.). Sloughing, gangrene, and putrefaction are conditions which are practically confined to the submucous variety of myoma.



FIG. 27.—Showing a large submucous myoma arising from the posterior lip of the cervix. The growth lay in the vagina. The uterus was acutely retroflexed.

Partially extruded submucous myomas may resemble the inverted fundus, and the latter has more than once been amputated under the impression that it was a polypoid myomatous growth (see "Diagnosis," page 199).

Submucous myomas vary in size from that of a small cherry to that of a six months' gestation. During menstrua-

tion there is a periodic dilatation of the cervical canal, and polypoidal myomas may then descend and present at the external os. The growth recedes later. The term



FIG. 28.—Showing total inversion of the uterus and vagina by a submucous myoma of large size. (After Robert Barnes.)

‘intermittent polypus’ has been employed to describe this phenomenon.

Whilst most submucous myomas arise in the body of the uterus, they are sometimes cervical in their origin. Figure 27 shows a growth of this kind which lay in the

vagina; it was attached by a broad base to the posterior lip of the cervix. There was a pedunculated submucous myoma at the right cornu, and the uterine body was acutely retroflexed and lay low in the pouch of Douglas, with only the posterior fornix intervening between it and the growth in the vagina.

Submucous myoma may cause partial and even total inversion of the uterus. The figure (28), after Barnes, shows that a growth of this kind may even drag the whole vagina outside the vulva.

Retroperitoneal Myoma.—When a myoma arises from the side of the uterus it may extend into the folds of the broad ligament and become an intraligamentary myoma (see Fig. 41, page 41). In the same way a myoma starting from the back or front of the uterus, below the peritoneal reflection, may develop in the cellular tissues and ultimately open up the leaves of the broad ligaments, although not intraligamentary in position at the start. Such growths, when lateral, displace the uterus to the opposite side, and from their cramped position and inability to ascend, they are wont to cause marked pressure-symptoms. The attachment of intraligamentary myomas to the uterus is sometimes very attenuated, and they may even become entirely separated.

Cervical Myoma.—Cervical myoma is an interesting and rare variety of retroperitoneal myoma; it totals about 8 per cent of all uterine myomas.

The term 'true cervical myomas' has been given to those which remain interstitial, *i.e.* surrounded by a capsule of cervical wall; they then assume striking clinical features. A tumour of this kind will elevate the body of the uterus, which is otherwise uninfluenced by the growth, so that the normal-sized *corpus uteri* rides on the top of the large egg-shaped cervical growth, like an adrenal on the summit of the kidney (see Fig. 29). The cervical canal is enormously

elongated, and the external os is drawn up and expanded to form a slit of variable shape and size. The os may be

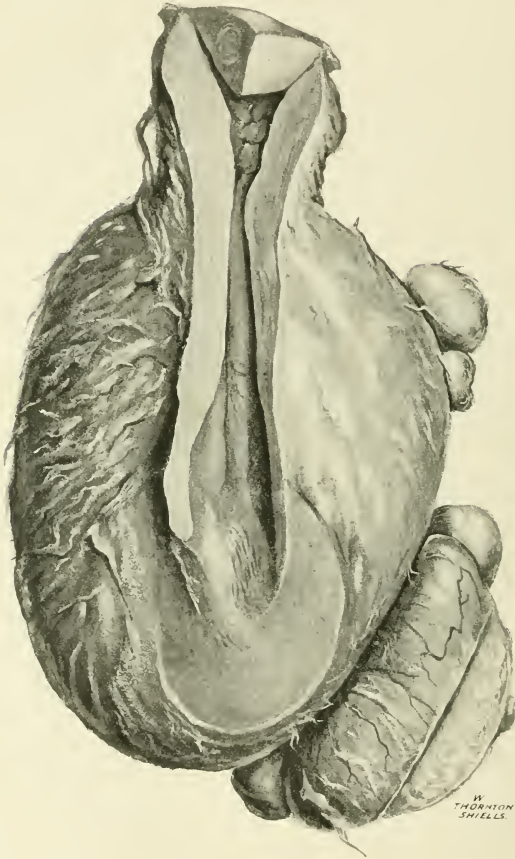


FIG. 29. — True cervical myoma, showing elongation of the cervical canal, expansion of the cervix, and obliteration of the *portio*. There are secondary nodules projecting into the left broad ligament; the lower of these displaced the ureter upwards. The duct lay between the two tumour-masses. The uterus has been opened up from the front, and the tumour is seen to occupy exclusively the posterior wall of the cervix.

opened up with the lower submucous pole of the growth

presenting through it. These growths are situated, as a rule, in the *posterior* wall of the cervix (see Figs. 29 and 30),

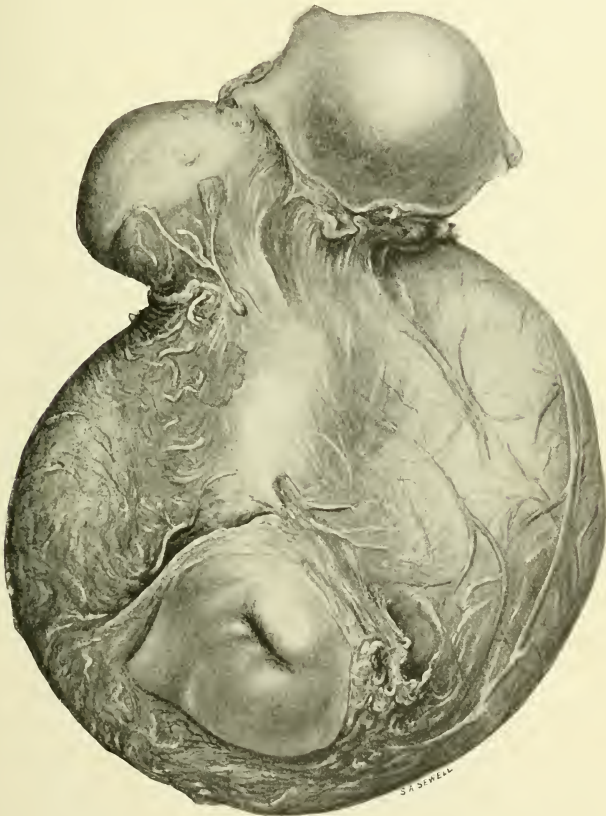


FIG. 30.—Myoma of posterior wall of cervix, which caused retention of urine. There are two other myomas—one in the body of the uterus; the other in the right broad ligament, and attached to the right side of the uterine body.

and their anterior aspect is covered in the mesial line by the mucous membrane of the cervical canal.

Myomas which arise from the superficial muscular strata of the cervix and grow out into the cellular tissues

are more common than the true interstitial variety of cervical myoma, but they are far less frequently met with than their homologues, the subserous corporeal growth.

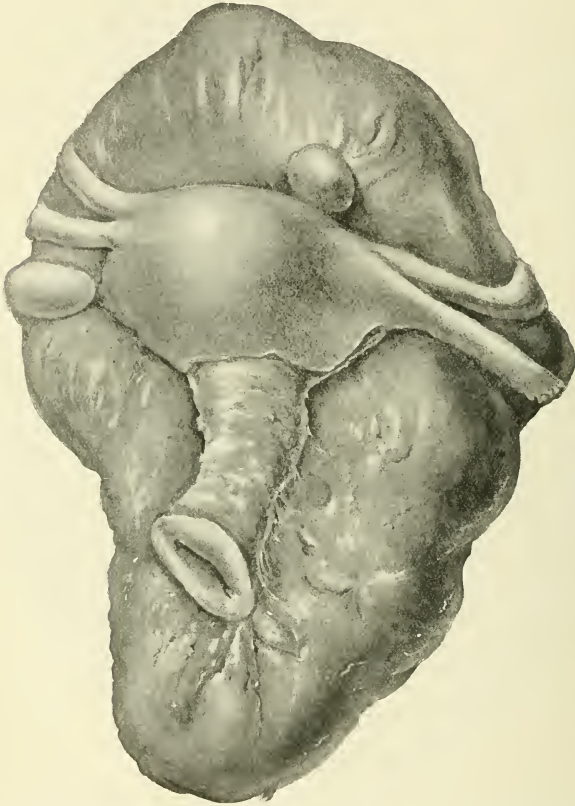


FIG. 31.—Showing a myoma of the anterior cervical wall which has reached large dimensions and elevated the peritoneum in front of the uterus. Such growths may be termed pseudo-cervical to distinguish them from the *true* interstitial variety. The appendages encircle the tumour. The right ovary is missing. (After G. Schickele, *Zeitschr. f. Geb. u. Gyn.*, 1914, Band lxxv. H. 3, Fig. 7a, page 693.)

Secondary nodules may sometimes arise from the periphery of a true cervical myoma and project into the

paracervical connective tissues (see Fig. 29). Such growths are uncommon.

Figures 31 and 32 show an unusual type of myoma. The growths arise from the *anterior* wall of both cervix and

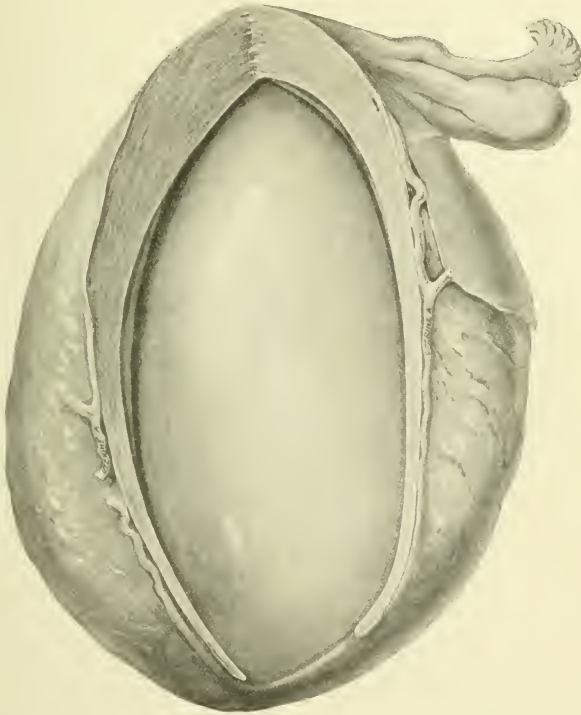


FIG. 32.—Myoma of the anterior wall of the corpus and cervix uteri (pseudo-cervical). There is no displacement of the uterine arteries. The uterus is opened from behind. (After G. Schickele, *Zeitschr. f. Geb. u. Gyn.*, 1914, Band lxxv. H. 3, Fig. 8, page 694.)

body; consequently the lumen of the corpus as well as that of the cervix is influenced by the tumours. Such growths are *not true cervical myomas*, but they present the same operative difficulties (see "Hysterectomy," page 495) as do retroperitoneal growths confined entirely to the cervix.

Schickele draws attention to the displacement of the uterine arteries in these growths (see Fig. 33). The displacement of the large vessels occurs alike in growths which involve the anterior and those which spring

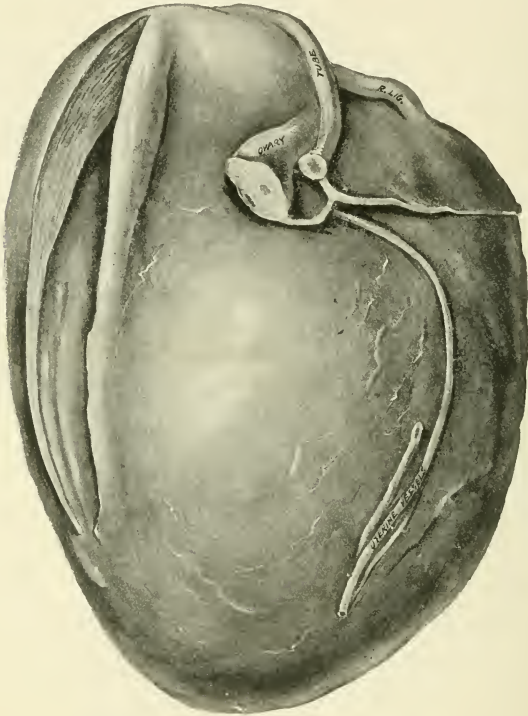


FIG. 33.—Large myoma of the anterior wall of the cervix and body of the uterus. Displacement forwards of the right uterine vessels. Uterus opened from behind. (After G. Schickele, *Zeitschr. f. Geb. u. Gyn.*, 1914, Band lxxv. H. 3, Fig. 7, page 692.)

from the posterior walls of the cervix. Displacement upwards of the ureters does not occur in solitary cervical myomas unless secondary nodes develop (see Fig. 29, page 24).

In the case from which the specimen (Fig. 29) was taken

I had to pick up the ureter, take it out of a crevice between the tumour-masses, and draw it outwards, before I could enucleate the secondary nodule which is seen at the lower pole of the growth. For the fuller consideration of cervical myoma see pages 206-216, and Operation, page 495.

When a retroperitoneal tumour grows from the lower segment of the body of the uterus, where the peritoneum is only loosely attached, it raises the peritoneal fold during its growth underneath; in this way myomas in the posterior wall may displace the peritoneum of the pouch of Douglas, whilst those which arise anteriorly will stretch and elevate the utero-vesical fold and dislocate the bladder.

When the growth springs more from the side of the anterior or posterior wall, it will expand the layers of the broad ligament, and may ascend so far as to open up the mesocolon of the sigmoid flexure on the left, and come to lie under the caecum on the right side of the pelvis.¹

It will be clear from what has already been said that the normal anatomical relations of the uterus can be completely upset by myoma. In addition to displacement to one or other side and elevation of the body by retroperitoneal growths, the entire uterus may undergo partial or nearly complete axial rotation,² and, moreover, retroflexion of the body may be a direct anatomical result of a myoma situated in the fundus or posterior wall. In large growths it is common to find the lymphatics and blood-vessels of the broad ligaments extensively dilated, leading to troublesome haemorrhage during enucleation. In cases where a tumour is fed by omental vessels, these structures enlarge in correspondence with the degree of their vicarious function.³

¹ For the clinical importance of retroperitoneal growths see "Myoma and Pregnancy," Chapter VIII. page 132.

² See Appendix II. page 562, also pages 77 and 179.

³ For the anatomical changes accompanying visceral displacements and adhesions see Chapters VI. and VII. pages 104 and 120.

CHAPTER II

EXTRAUTERINE MYOMA

Myoma of the Round Ligament.— Many cases of myoma of the round ligament are recorded in the literature. The earliest I can find is that of Walther, recorded by Virchow. Walther described a whitish-yellow “stone” removed from the right round ligament of a woman aged 36 years; he regarded it as a calcareous myoma, and this explanation was accepted by Virchow.¹

The next cases on record are two of Spencer Wells in 1865.² The diagnosis of an epiplocele was made in the first case, and of a tumour of the lymphatic glands in the second. In both instances after operation the tumours were regarded as “fibromata” of the round ligament; the one was the size of an orange and the other the size of a bean. This was the first time that growths of the round ligament had been removed by operation.³

Myomas of the round ligament make their appearance at the height of sexual activity, *i.e.* between 20 and 40 years.⁴ Of 76 growths of the round ligament (12 recorded by Sanger and 54 by Emanuel) 15 were grouped as myomas or fibromyomas; some of these were associated with herniae of the canal of Nuck. In Hecker’s case the ovary and a solid tumour of the round ligament (weighing 320 grammes) were in the hernial sac. In Von Hausemann’s case the tumour

¹ *Die Krankhaften Geschwulste*, Bd. iii. S. 222.

² *Brit. Med. Jour.*, 1865, November 4, page 484.

³ Emanuel, *Zeitschr. f. Geb. u. Gyn.*, 1903, Bd. xlviii. S. 383.

⁴ H. R. Spencer found that they are mostly discovered after 40 (*Trans. Obst. Soc. Lond.*, 1904, xlvi. 26).

was sausage-shaped—in length 20 cm. : it ran into the right parametrium to its union with the deep aspect of a loop of the depressed round ligament. In Weber's case¹ the round ligament lay in a hernial sac, and on it was an almond-shaped fibromyoma. Kauffmann in 1901 demonstrated bilateral tumours of the round ligaments : that on the right side was the size of a hen's egg and lay in the wall of a hernial sac containing omentum ; both growths were composed of smooth muscle-fibres. Heydemann² described a myoma in the upper third of the right labium majus, which was attached to the *ligamentum teres* (round ligament). V. Mars³ described a large tumour, of the size of an ostrich's egg, lying above the right canal of Nuck, adherent from the iliac spine, across the linea alba, to the middle of Poupart's ligament on the opposite side ; from its topography, and from the muscular structure of the growth, it is accepted by Mars and Emanuel as having arisen from the right round ligament. Guinard⁴ mentions a myoma the size of an almond, springing from the round ligament at the external ring, and states that the small growths are pure myomas and the larger are fibromyomas. Reboul⁵ found a fibromyoma of the right roundligament attached to a hydrocele of the *processus vaginalis peritonei*. C. Martin described a case of myoma of the round ligament in the *British Gyn. Journ.* iii. 747 (mentioned by Frommel) ; and a tumour described by Fürst⁶ as the size of a duck's egg, and as arising from the *left* round ligament, was proved by Sänger to be a fibromyoma. E. Witte⁷ described a particularly interesting tumour arising from the *left* round ligament. It was a nodular mass the size of a goose's egg. Microscopically it was found to consist of a central hæmorrhagic soft part, which was surrounded by smooth muscle, connective tissue, and masses and strands of lipomatous tissue.

¹ *Monatsschr. f. Geb. u. Gyn.*, 1899, Bd. ix. S. 591.

² *Deutsche Zeitschr. f. Chir.*, 1895, Bd. xli. S. 425.

³ *Monatsschr. f. Geb. u. Gyn.*, 1900, Bd. xii. S. 1, Bd. xiv. S. 787.

⁴ *Revue de Chir.*, 1898, pages 63, 131, 239.

⁵ *Bull. Soc. Anat.*, 1888, page 747.

⁶ *Zentr. f. Gyn.*, 1885, S. 478.

⁷ *Zentr. f. Gyn.*, 1894, S. 823.

Of considerable interest in connection with myoma of the round ligament are the rare cases of haematoma of this structure, since the walls of these blood-cysts are composed of muscle. It might be argued that these are cases of haemorrhagic cystic myoma; on the other hand, the haematoma may be primary and the muscular hyperplasia secondary, *i.e.* the result of irritation; finally, these blood-tumours may originally have been 'adenomyomas' which have degenerated.¹ Cullen, in writing on the latter subject, appears to favour this view, on the ground that adenomyoma enlarges and bleeds during menstruation, and that when not circumscribed by pressure, the cystic portions are prone to enlarge to any extent.

Lymphangiectatic intraperitoneal myomas of the round ligament have been reported by Leopold, Prang, and Amann, and possibly Vassmer's case belongs to this class.²

Gubaroff³ described an unusual cyst of the round ligament, which was diagnosed as parovarian, but the round ligament ended in it by a fan-shaped termination. It reached to a handbreadth above the navel. Vassmer criticises this case, since it was not confirmed *post operationem*. Emanuel regarded the cyst as lymphangiectatic, because its wall was lined by endothelium.

Malignancy in Growths of the Round Ligaments.—F. Weber⁴ records the case of a spinster, aged 25 years, who came with a tumour which had been noticed for three years, and which was the size of a child's head. It was attached to the deep aspect of the anterior abdominal wall at its lower part (over Poupert's ligament). It was irregular—partly cystic, partly solid. There was a thick soft pedicle reaching to the left cornu of the uterus, the sole representative of a round ligament. The cystic part proved to be a myosarcoma; the cysts were filled with necrotic *débris*

¹ See also Part II. page 313.

² Emanuel, *Zeitschr. f. Geb. u. Gyn.*, 1903, Bd. xlvi. S. 383.

³ *Zentr. f. Gyn.*, 1899, No. 15, S. 409.

⁴ *Monatsschr. f. Gyn.* Bd. ix. S. 591.

and contained pseudo-cysts. A. Martin described a case of fibrosarcoma of the right round ligament. The tumour was the size of a child's head.

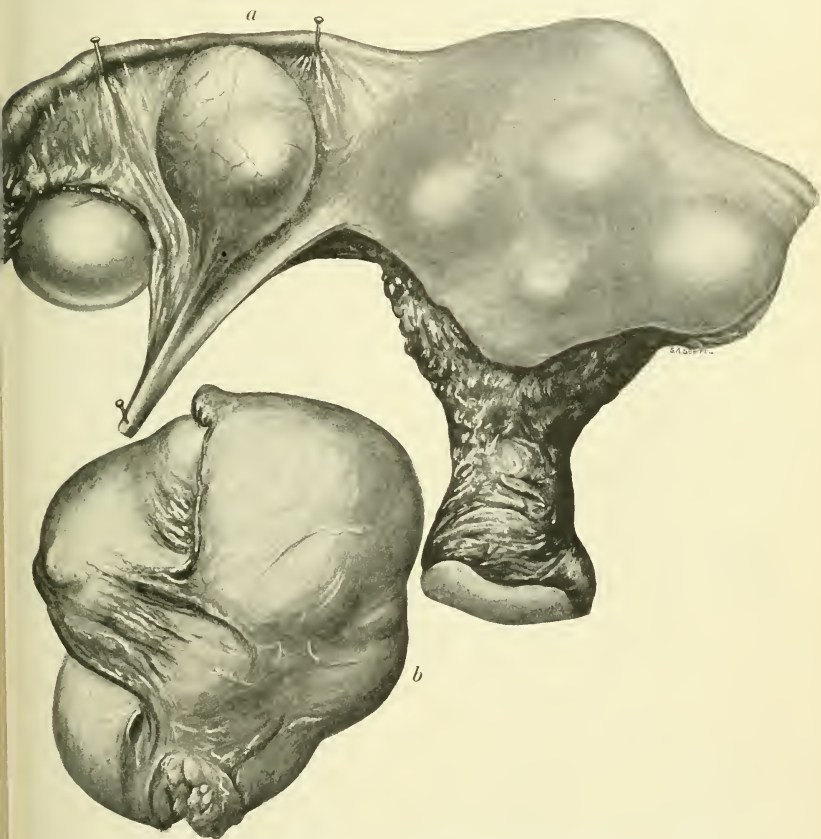


FIG. 34.—Showing a small myoma (*a*) attached to the right round ligament of a uterus removed *per vaginam*, and (*b*) a myoma which lay in the recto-vaginal septum.

Figures 34, 35, and 36 show myomas developing from the muscularis of the round ligaments.

The specimen in Figure 34 was removed by vaginal hysterectomy; it shows the body of the uterus to contain

multiple interstitial myomas becoming subserous, and two extrauterine myomas in addition—one, the size of a pigeon's egg, is springing from the round ligament of the right side. The ligament is shown flattened out; this flattening was produced by the pinning out of the appendages, which was necessary to show the proper relations. The right ovary lies behind out of sight, but alongside the round-ligament

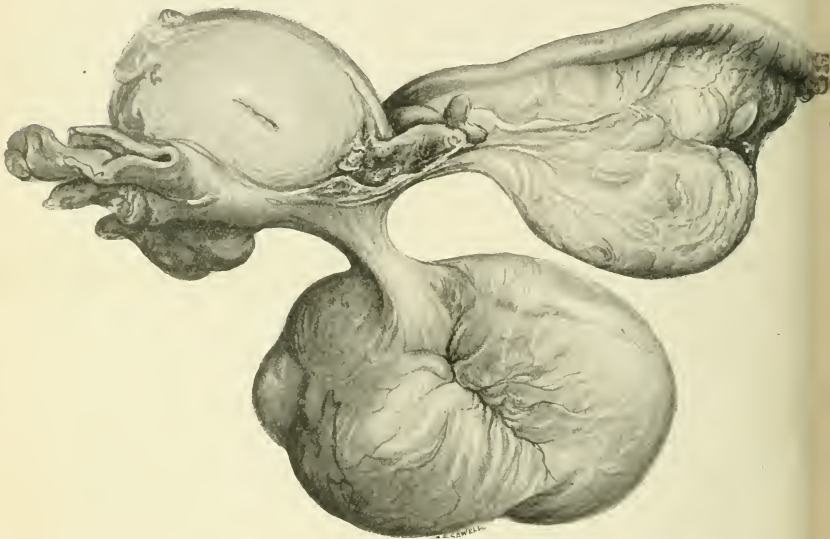


FIG. 35.—Showing a pedunculated myoma arising from the left round ligament. The uterus shows one of Alban Doran's 'high amputations.'

tumour there is seen a small fimbrial cyst with the pedicle of the infundibulo-pelvic fold retracted over its upper border. The tumour, which is lying free by the side of the cervix, lay in the paravaginal tissues beneath the pouch of Douglas, and displaced the cervix to the left. It bulged so much through the upper half of the vaginal wall that the cervix was not easily reached.

In my experience these tumours are rare, and have been confined either to the proximal end, or to that part

of the round ligament which lies in the canal of Nuck ; when they arise in the latter situation it is very difficult to demonstrate their relationship, and many clinicians speak of this class of neoplasm as arising from the musculature of the abdominal parietes, whilst others regard them as fibromas, and claim that they originate in the fascial

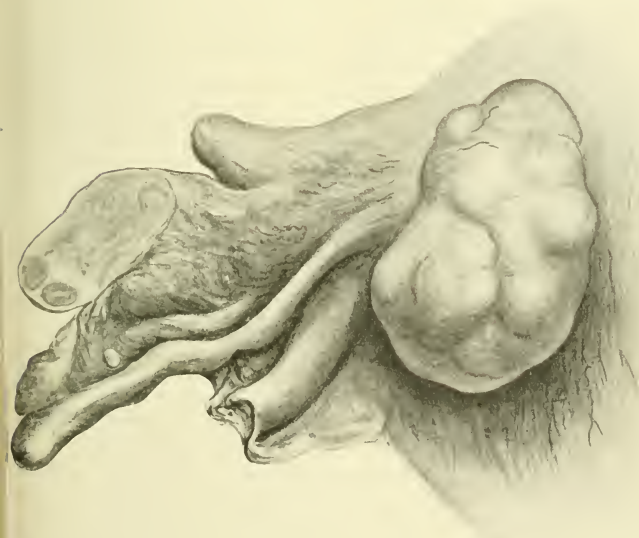


FIG. 36.—Showing a myoma arising from the right round ligament close to its attachment to the uterine cornu. The uterus contained a large interstitial growth.¹

aponeuroses of the flat abdominal muscles. Having demonstrated unstriped muscle in these growths, and having found a fibro-muscular cord resembling the round ligament flattened out, running into one of them, I feel myself in a position to confirm the view that the segment of the round ligament in the canal of Nuck is a site of origin for myoma.

¹ For a valuable account of fibromyoma arising from the intra-abdominal portion of the round ligament, see H. R. Spencer, *Trans. Obst. Soc. Lond.*, 1904, vol. xlvi. pages 26-51.

Of the three cases of myoma in the canal of Nuck which I have seen and examined at the Samaritan Hospital, one was the size of a hen's egg (see Fig. 37), the second was the size of a small Tangierine orange, and the third was as large as a walnut.

Myoma of the Fallopian Tubes.—Solid tumours of the oviducts are rare. The only case of tubal myoma which

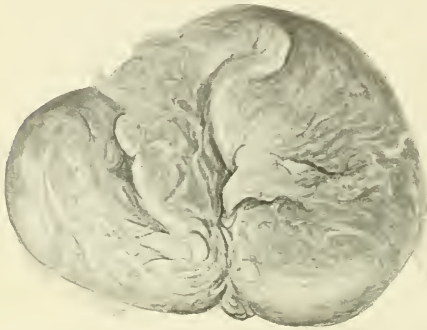


FIG. 37.—Showing a myoma removed from the distal end of the round ligament and lying in the canal of Nuck.

I have seen,¹ was one in which the two myomatous nodules on the right tube were diagnosed as moniliform tuberculous salpingitis. The growths were quite small (2 cm. and 1 cm. respectively in diameter); they were both in a state of hyaline degeneration, and the larger of the two contained calcareous deposit (see Fig. 38).

Figure 39, Plate VI., page 45, is a section taken from the larger of the two growths. It shows the presence of a few gland-tubules lined by columnar epithelium, entitling the growth to be classed as a cornual adenomyoma, and the muscle-tissue shows hyaline degeneration. The smaller tumour was devoid of glands; there are a few well-preserved capillaries present. The tube from which these two growths were taken was not removed, so that the continuity of gland-tissue with mucosa could not be traced; but it should be stated that the larger tumour corresponded to the interstitial part of the tube, whilst the smaller was distinctly tubal: both growths were sessile, there was no pedicle; the diagram shows the relation of the parts.

¹ Since this was written I have obtained another, and larger specimen of tubal myoma.

In over 1400 cases of myoma, Cullen only once found a myoma springing from the muscularis of the tube. In this case the patient was 70 years of age. The uterus

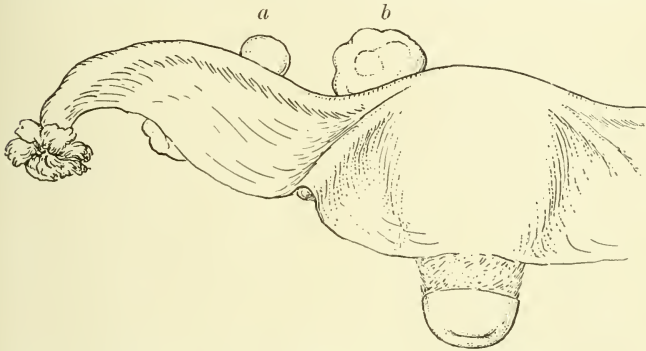


FIG. 38.—Showing small myoma (*a*) and an adenomyoma (*b*) of right Fallopian tube, diagnosed as nodular tuberculous salpingitis.

measured $2.5 \times 3 \times 6$ cm., had a small pedunculated myoma springing from its outer surface, and contained several polypi.

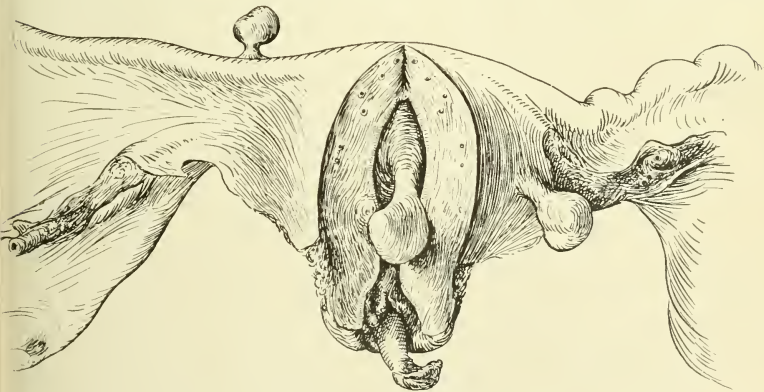


FIG. 40.—Showing a pedunculated myoma growing from the right Fallopian tube. (From Kelly and Cullen, *Myoma of the Uterus*, Fig. 237, p. 340. By permission.)

On the right side was a parovarian cyst 20 cm. in diameter ; on the left the ovary measured $3 \times 3.5 \times 6$ cm. Arising from the upper surface of the right tube near the uterus was a

well-defined myoma $7 \times 8 \times 10$ mm. For further reference to tubal myomas see Appendix I. page 559.

Myoma of the Utero-Ovarian Ligament.—I have occasionally detected a small tumour of this kind on the ovarian ligament. Doran published a drawing of a well-defined case in “Myoma of the Uterus, etc.”¹ The same observer removed by operation a fibroma of the ovarian ligament weighing over 16 lbs.² The uterus was small and free from myomatous growths. Kelly and Cullen³ noted in their total of 1674 myomas of the uterus only five cases where the tumour sprang from the ovarian ligament, and “all were associated with uterine myomas.” The largest was only 4.5 cm. in diameter.

Myoma of the Broad Ligament.—The origin of myoma from the attenuated muscle-sheath in the broad ligament is very difficult to prove. True uterine myomas in this situation are sometimes only attached to the uterus by a thin band of muscle-tissue, and it may be argued that this attenuation may lead to complete separation of the growth from its site of origin in the uterus. I have myself shelled out a myoma, from the left broad ligament, which had no apparent attachment to the uterus. It was the size of an orange, and when removed, the ovary, Fallopian tube, and round ligament were intact.

Myoma of the Recto-Vaginal Septum.—Figure 34, page 33, shows an extrauterine myoma placed in the drawing to represent as nearly as possible its clinical relationship to the broad ligament and cervix. The illustration represents the actual size of the specimen. The cervix was deflected to the left by the growth; the latter lay in a cellular bed between the posterior vaginal wall and the rectum, and extended into the base of the right broad ligament. It was

¹ *Trans. Obst. Soc.* vol. xxx., 1888, Plate I. figure 2, and page 419; see also *Trans. Path. Soc.* vol. xxxviii. page 245.

² *Brit. Med. Journ.*, 1889, vol. i. page 1287, with after history in *Trans. Obst. Soc.* vol. xxxviii. page 201.

³ *Loc. cit.* page 358 and figures 250-252.

very adherent in places, and its enucleation was consequently difficult. Histologically it was a fibromyoma.

Myoma of the Vaginal Wall.—Myomas in this situation are rare. Cullen mentions one case only. In this instance (Case 1558) the uterus contained numerous myomas, and widespread sarcomatous metastases were detected in numerous situations; “situated in the posterior vaginal wall and loosely embedded in the tissue was a myoma 2×4 cm. This shelled out with ease.” Williamson, in his *Obstetrical and Gynaecological Specimens*, in St. Bartholomew’s Hospital Museum,¹ describes specimen 3029 as “A small Fibromyoma the size of a walnut, removed from the *anterior* wall of the vagina.” I have met with only one case of vaginal myoma: the patient was a fat Jewess, 52 years of age, who was sent to the Great Northern Hospital with the diagnosis of cancer of the body of the uterus. The predominant symptom was metrorrhagia. In the right fornix and some distance from the cervix was a sessile submucous growth which shelled out quite easily. It measured 2×2 cm., and was reported by Ernest H. Shaw, the pathologist, to be a “simple myoma”; the uterus was curetted and found not to be the seat of malignant disease.

Robert Barnes exhibited a “fibrous tumour,” the size of a large orange, which he removed from the anterior wall of the vagina. Its attachment began just above the *meatus urinarius*, extending along the course of the anterior wall, but leaving a space of an inch quite clear below the *os uteri*. Its lower pole protruded outside the vulva. It was removed by the galvano-cautery. There is an indifferent drawing of this specimen in the *Transactions of the Obstetrical Society*, which is not worth reproduction.²

Simple solid mesoblastic tumours of the vulva and *introitus vaginae* are usually devoid of muscle and should be classed as fibromas.

¹ Williamson and Jamison, 1909. Adlard and Son.

² *Trans. Obstet. Soc. Lond.* vol. xiv., 1873, page 308.

CHAPTER III

CHANGES IN NEIGHBOURING ORGANS

The Fallopian Tubes.—In the majority of cases the anatomical relations of the tubes are unaltered, but when the myoma extends outwards into the broad ligament, the corresponding tube is stretched over the top of the growth, just as it is in the case of a broad-ligament cyst (see Fig. 41). In this way the tube may elongate to double its normal length.

Cullen figures a case where a tube, normal in its outer half, apparently ran into a cornual myoma; the continuation of the oviduct from thence to the uterus was not traced. The origin of the tube is sometimes widely separated from those of the round ligament and of the ovarian ligament, by myomas arising in and expanding the fundus.

A sessile subserous growth situated at the cornu may upset the adnexal relations at this point (see Fig. 42).

Case 10,817 in Kelly and Cullen's series showed a uterus containing several small myomata. The right tube and ovary were normal, the left ovary was absent, and the left tube was represented by a mere remnant of the normal tube.¹

The round ligaments are usually found to be hypertrophied, and are often lengthened in cases of large intra-ligamentary myoma; they form a characteristic anatomical picture, as they traverse the top and front of the tumour,

¹ For gross lesions of the tubes see Chapter VI, page 104.

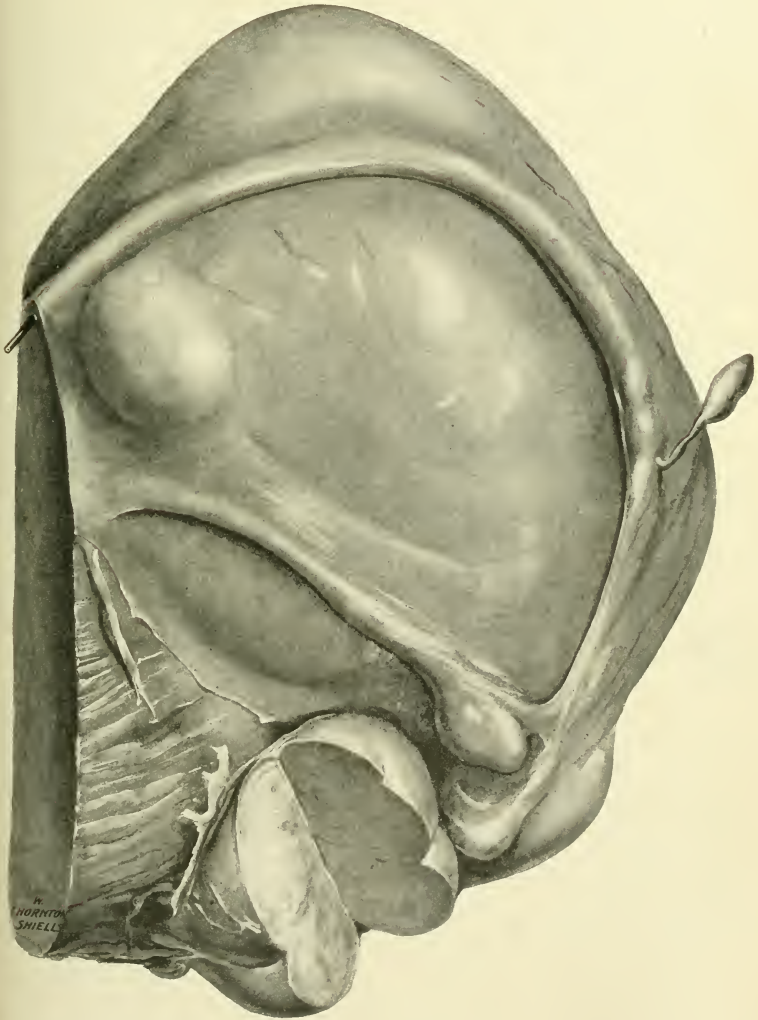


FIG. 41.—Showing the Fallopian tube (with a pointer in its lumen). The tube is stretched over an intraligamentary myoma. The ligament of the ovary is seen to be almost twice its normal length. This is the upper aspect of the cystic myoma shown in Fig. 58, Plate XI., opposite page 50.

from the cornu to the internal abdominal ring. When the uterus is much displaced, one round ligament may be seen reaching from one side of the pelvis to the other, whilst its fellow is out of sight (see Figs. 286 and 287, pages 494 and 495). The position of the round ligaments is a good indication of the presence, and amount, of axial torsion of the uterine body.¹

The Ovaries.—These organs are frequently found to be

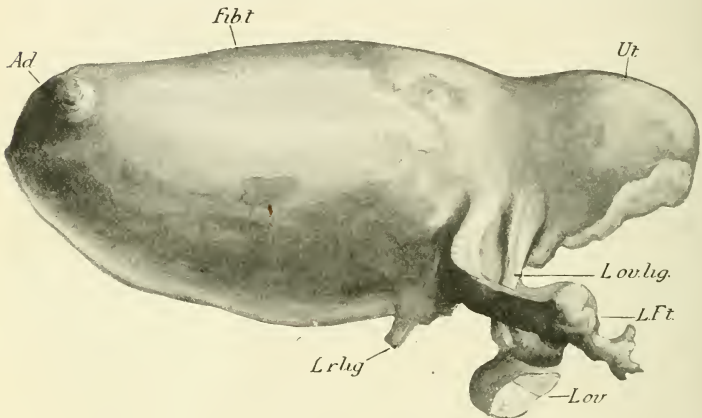


FIG. 42.—A cornual myoma showing abnormal relations of appendages.
(Doran and Lockyer, *Trans. Obst. Soc. Lond.*, 1901.)

Ut.=Uterus; Fib.t.=myoma; Ad.=adhesions; L.r.lig.=left round ligament; L.ov.=left ovary;
L.Ft.=left Fallopian tube; L.ov.lig.=left ovarian ligament.

enlarged in cases of uterine myoma, and of 934 cases examined by Cullen the ovaries were normal in only 438.²

There is no evidence, so far as I know, to show that enlargement, when demonstrable, is due to hyperplasia or a definite increase of active ovarian tissue. In many instances it is no doubt accounted for by oedematous infiltration. Total absence of the left ovary was found associated with a small uterine myoma in one case recorded by Cullen.

The position of the ovaries is liable to great variation

¹ For myoma of the round ligaments see "Extrauterine Myoma," page 30.

² For gross lesions of the ovaries see Chapter VI. page 109.

in the different types of myomas. They may be dragged down owing to retroflexion of the uterus caused by an interstitial fundal growth, or by a subserous tumour springing from the back of the uterus. They may be compressed between two lobes of one and the same growth; definite fusion of a myoma and an adjacent ovary is mentioned by Kelly and Cullen. Again, these organs may be raised above the pelvic brim by large intraligamentary growths, and they may come to lie in the antero-posterior axis of the body in torsion of the uterus (Fig. 287, page 495). An example of a peculiar cornual myoma distorting the relation of the appendages is seen in Figure 42, which shows the left round ligament arising apparently from the myoma, on the same aspect (posterior) as the ovarian ligament.

Broad Ligaments and Vessels.—The broad ligaments are opened up by myomas extending outwards from the sides of the uterus, and by myomatous tumours arising from the fibro-muscular tissue in the ligaments themselves. In the case of large tumours, the separation of the folds may be so complete that the mesosalpinx disappears, and the Fallopian tube lies in the peritoneal capsule of the growth in actual contact with its surface, just as does the round ligament (Fig. 41).

The vessels—uterine and ovarian—in the broad ligaments, being the channels of nutrition to the myomatous uterus, are frequently found to be much increased in size, and in axial rotation of the uterus, the uterine vessels lie in front of, or behind, their normal position (see Fig. 33, page 28). The lymphatics are frequently found dilated, and the cellular tissues infiltrated, by oedema in cases of large fibro-myoma.

CHAPTER IV

SECONDARY CHANGES IN MYOMA

LARGELY owing to the disparity between the size of myomas and their blood-supply, these tumours are extremely liable to degenerative changes, which may be enumerated as follows :—

1. Atrophy.
2. Hyaline Degeneration.
3. Cystic Degeneration.
4. Calcareous Degeneration.
5. Fatty Degeneration.
6. Necrobiosis.

To these must be added :

7. A. Circulatory Changes :
 1. Oedema and Lymphangiectasis.
 2. Axial Rotation leading to—
 - (a) Congestion.
 - (b) Interstitial Haemorrhage.
 - (c) Necrosis.
 - (d) Detachment of Tumour.
8. B. Angiomatous or Telangiectatic Changes.
9. C. Infective Changes leading to—
 - (a) Inflammation.
 - (b) Suppuration (localised abscess).
 - (c) Gangrene and Sloughing.

FIG. 39

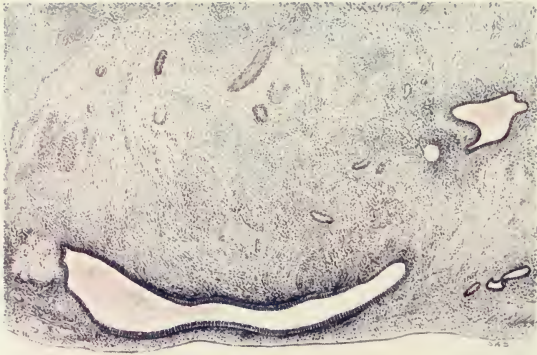


FIGURE 39. Shows section of the larger and more proximal tumour seen in figure 38. This may be classed as an adenomyoma, but the smaller tubal growth was a pure myoma.

FIG. 43



FIGURE 43. Advanced hyaline degeneration in a myoma treated by X Rays. The yellow areas are muscle-fibres which have escaped destruction. (*Van Gieson's stain.*)

And finally :

10. D. Malignant Changes :

- | | | | | |
|-------------|---|----------------------|-----|------------|
| | { | malignant leiomyoma. | (a) | of muscle. |
| (a) Sarcoma | | | | |
- (b) Perithelioma.
(c) Endothelioma.

1. **Atrophy.**—This is a change to which further allusion will be made in the reference to oöphorectomy (see page 227), which was for some years practised for the treatment of myoma, at a time when the mortality for hysterectomy was something like 20 per cent.

With the cessation of the ovarian function after the climacteric, a certain number of myomas undergo spontaneous atrophy and consequent reduction in size, and instances have been recorded of the total clinical disappearance of these growths. We have no knowledge as to the proportion of the cases in which this occurs, but I agree with Eden in thinking that it is probably much rarer than was formerly supposed, and that it must not be regarded as an ordinary, but as an exceptional sequence of the menopause. There is no doubt, however, that marked atrophy of myomas has followed total oöphorectomy in many cases (see page 228).

The influence of X-rays in producing atrophic changes and shrinkage in myomas is very variable. I have seen a myoma in a woman of 45 years become half as large again after twelve sittings and during five months' observation. Figure 43, Plate VI., shows advanced hyaline degeneration in a myoma which had been treated by X-rays over a period of several years, and which became reduced in size but had to be removed for ovarian complications and adhesions. Experience with several other cases has made me sceptical as to the ability of X-rays to produce permanent atrophy in myoma (see pages 243-244).

2. **Hyaline Degeneration.**—This is the first change to take place in a myoma as the result of malnutrition. It is excessively common in every type, wherever situated—in fact the majority of myomas show this change.

The consistence of myomas which have undergone hyaline degeneration is very variable. Tumours which are extensively involved may be hard or soft, pulpy or succulent. The so-called *myxomatous change* is best regarded as the liquefactive stage of hyaline degeneration, since the ‘mucinoid’ fluid does not give all the tests of mucin and is very different from pseudo-mucin. Hyalin gives no definite chemical tests; it is a substance which even in its physical or histological characters is very variable, but before liquefaction commences a hyaline area appears as homogeneous material, devoid of nuclei and staining deeply with eosin.

The distribution of hyalin is very variable indeed. In some cases it would seem that the fibrous tissue is the first to be attacked, and islands of muscle-bundles are left with their characters preserved. In such isolated muscle-bundles the cells are seen to be swollen and they may fuse together, while their nuclei become broken up into granular fragments of cytoplasm, and ultimately disappear. The nuclei are the most resistant part of the muscle-cell, and sometimes they may be seen stained with logwood, in a red homogeneous hyaline area, as the last representatives of the muscle-bundles which have disappeared (see Fig. 44, Plate VII.).

In other instances the hyaline change appears to start in the muscle-bundles themselves, the fibrous tissue being the last to become affected. Cullen gives an illustration of this type of distribution.¹

As a rule the vessel-walls resist this change to the very last, so that blood-vessels may be seen lying in spaces where liquefaction has completely destroyed the surrounding tissue (Fig. 45, Plate VII.). But there are

¹ Fig. 68, *Myoma of Uterus*, Kelly and Cullen.

FIG. 44

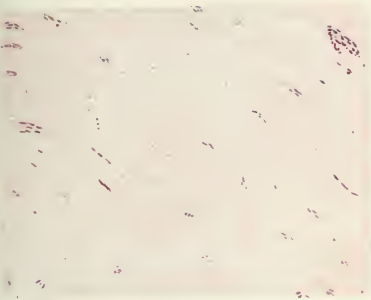


FIGURE 44. Extensive hyaline degeneration in a myoma treated by X Rays. There are indications of a few fragmentary muscle-bundles, but often only the nuclei of the muscle-cells remain.

FIG. 46

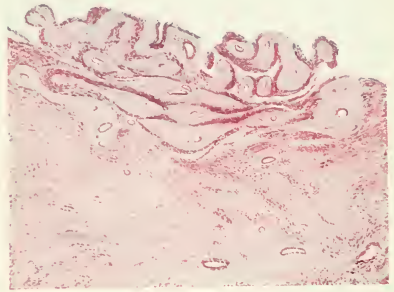


FIGURE 46. Showing hyaline change most marked in the blood-vessels.

FIG. 45

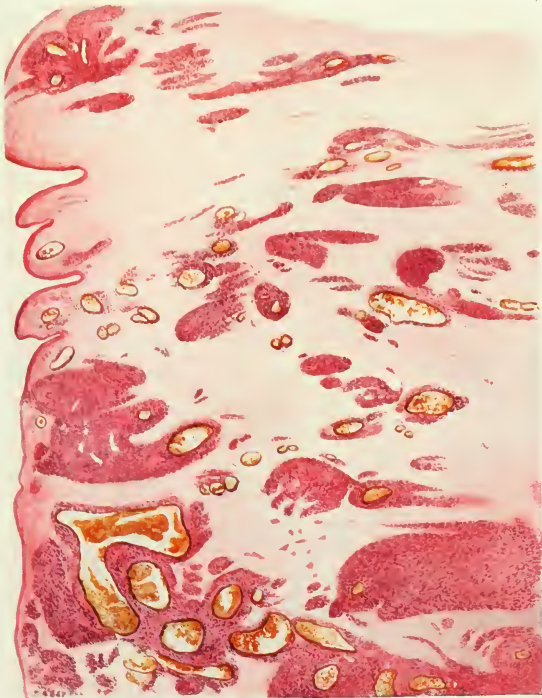


FIGURE 45. Hyaline liquefaction. The blood-vessels, and the tissues around them, have resisted the degenerative process, and appear as islands in a lake.

FIG. 47

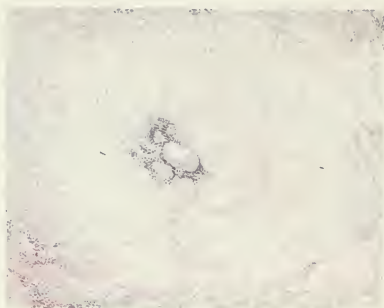


FIGURE 47. Polypus, showing hyaline degeneration. Notice the zone of nuclei around a vessel from which the cells are nourished. This growth was detached during labour, and was regarded as placental tissue.

FIG. 48

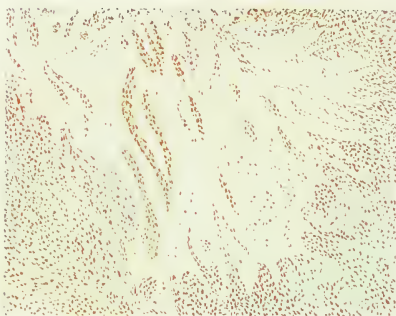


FIGURE 48. Showing irregular hyaline liquefaction, the type that produces a ragged cyst.

FIG. 49

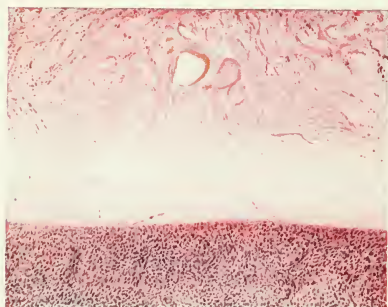


FIGURE 49. Showing abrupt line of hyaline change.

occasional exceptions, and Figure 46, Plate VII., shows myomatous tissue in which the change seems to have started as a blood-vascular degeneration and to have spread from the vessel-walls into the tissues.

Hyaline change is found in very small microscopical myomas as well as in the largest growths : it is seen in polypi (see Fig. 47, Plate VIII.) ; in fact, hardly any myomatous growth is exempt, if careful search is made. On the other hand, before liquefaction sets in, hyaline areas are not often recognisable to the naked eye, unless other changes, such as red degeneration, or necrosis, lead to its detection.

To the naked eye, a hyaline area presents a whitish-yellow appearance, but the whorled aspect of the growth is not destroyed. Cullen says he has seen such an area resembling fat ; and this I have also noticed. Any colour seen macroscopically in a hyaline area is due to blood-changes,¹ which are quite common at the periphery of the degeneration. The transition from the solid homogeneous hyaline tissue to areas of liquefaction affords the most strikingly beautiful pictures in histological research. Sometimes the demarcation from healthy tissue to liquefaction is abrupt, and cyst-walls with tense homogeneous linings are formed ; more commonly the liquefaction is gradual, and the tissues become less and less dense, more and more rarefied, until nothing is left but the blank space occupied by the fluid (see Fig. 48, Plate VIII.). In these cases the cysts have ragged walls, with here and there a blood-vessel, cut transversely, lying unsupported. Wherever a vessel is seen, there is a bit of adjacent nucleated tissue in its neighbourhood, still clinging to life, and subsisting from the fact of its proximity to the source of nutrition. Figures 43, Plate VI., and 44, Plate VII., show hyaline degeneration in a myoma which shrank while under treatment by X-rays. Figure 43 shows the Van Gieson's stain, which reveals a slight fibrillary

¹ Such as thrombosis and extravasations (see Plate XI., opposite page 50).

structure in the hyaline area ; there are only a few muscle-bundles or discrete myoma-cells left—these are stained yellow. In Figure 44 there is one muscle-bundle seen in the right-hand upper corner of the drawing, but most of the muscle-tissue is represented by nuclei only. In Figure 49, Plate VIII., the degeneration is quite abrupt—the myomatous tissue bounds a hyaline area in which the filmy collagen-fibrils still persist and carry a few blood-vessels where they are thickest. In the clear unstained area there are a number of cell-nuclei to indicate the pre-existing tissue.

In Figure 50, Plate IX., the liquefaction has been even more complete, and the tiny cyst is empty of solid contents. The curious arrangement of the muscle-bundles (transverse and longitudinal layers) as seen in Figure 51, Plate IX., is peculiar. There is of course no endothelial lining to this degeneration-cyst, it being merely a space bored out of solid tissue by colliquative necrosis.

Figure 52, Plate IX., shows a liquefactive hyaline area in a myomatous polypus. Two vessels are seen lying free in a space, which no doubt they spanned as a vascular trabecula. The albuminous contents have remained *in situ* and are stained a faint pink.

Figure 53, Plate X., shows liquefaction and oedema following hyaline degeneration—the section was obtained from a *soft* myoma ; the fibrous-tissue elements have suffered most and the muscle-bundles are quite unsupported by any binding structure. Figures 54 and 55, Plate X., show hyaline degeneration in a *hard* myoma ; the labyrinthine network of hyaline tissue in Figure 55 surrounds spaces which were originally occupied by muscle-bundles, but are now filled by cells which under a high power are very suggestive of malignancy. In my own experience it has often been the case that malignant (myosarcomatous) changes originate in the vicinity of hyaline areas. The coats of the large vessel form the healthiest part of the section.

FIG. 50



FIGURE 50. Showing natural size of a small cyst in a myoma. The microscopic appearances are seen in Figure 51.

FIG. 51

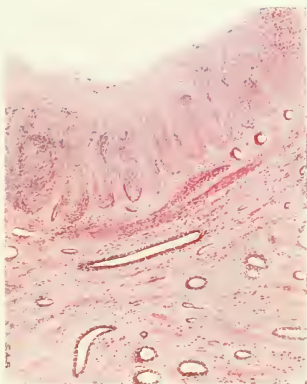


FIGURE 51. Abrupt hyaline liquefaction producing a cyst with a dense homogeneous wall. 1 in. obj. 2 eyepiece. Note the curious arrangement of the muscle-bundles.

FIG. 52

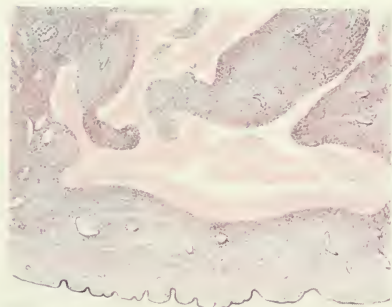


FIGURE 52. Showing a hyaline liquefactive area in a polypoid submucous myoma. 2 in. obj. 2 eyepiece.

FIG. 53

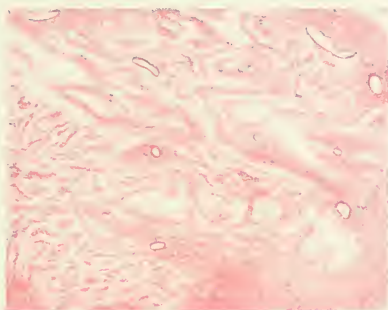


FIGURE 53. Showing diffuse liquefaction in a soft myoma. 2 in. obj. 2 eyepiece.

FIG. 54

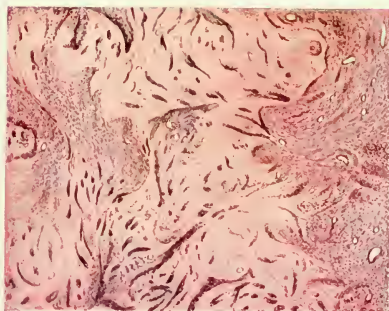


FIGURE 54. Showing hyaline degeneration in a hard myoma. There was no sign of liquefaction. 2 in. obj. 2 eyepiece.

FIG. 55

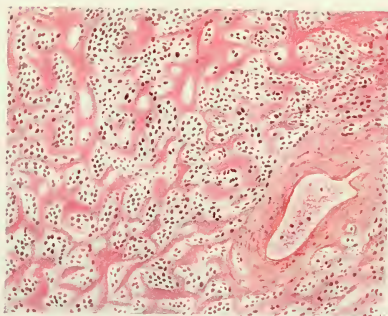


FIGURE 55. Showing hyaline degeneration in a hard myoma. The trabecular arrangement of the hyaline tissue is very striking. The intervening muscle-cells appeared 'very suspicious' under a high power. 2 in. obj. 2 eyepiece.

3. **Cystic Degeneration.**—From what has already been stated, it will be seen that cystic change is nearly always preceded by hyaline degeneration. As the result of liquefaction of the hyaline deposit, cysts are formed which vary in size and shape according to the extent of the hyaline areas. The cavities thus produced are not true cysts, that is to say, they have no endothelial lining. Their walls are composed of hyaline tissue which has not as yet undergone liquefaction. The spaces enlarge by the spread of the liquefaction and by the breaking down of trabeculae between small cysts.

Reference has already been made to the irregular distribution of hyaline degeneration in myoma—how it sometimes spreads in a trabecular manner throughout the tumour, whilst in other cases large continuous, or concrete, areas of hyaline change are met with. Sometimes the degeneration is seen only in patches; in rarer instances it seems to involve the whole tumour simultaneously. This variation in distribution of hyaline degeneration will account for the different types of cystic change which the subsequent liquefaction produces. In Figure 56 we see the results produced when liquefaction follows on diffuse trabecular hyaline change which has affected a whole tumour. We then have a congeries of tiny cysts, which, when their trabeculae give way, will produce large cystic spaces.

Figure 57 shows an advanced stage of the same process. The specimen is a submucous myoma removed by vaginal myomectomy. It shows multiple cysts which have fused together owing to liquefaction extending to, and destroying, the intervening septa. The walls are smooth internally, owing to the pressure of the fluid within the cysts—a pressure which no doubt was considerable, and due in large measure to the contractions of the uterus, since there was full dilatation of the cervix before the removal of the growth. In the preceding Figure (56), the finer trabeculae not being destroyed completely, the walls of the spaces are ragged or fringed.

Figure 58, Plate XI., is another example of diffuse liquefaction of a hyaline myoma. It is a beautiful example of the fusion of tiny cysts to form larger ones. The tumour is a broad-ligament myoma, the external view of which was

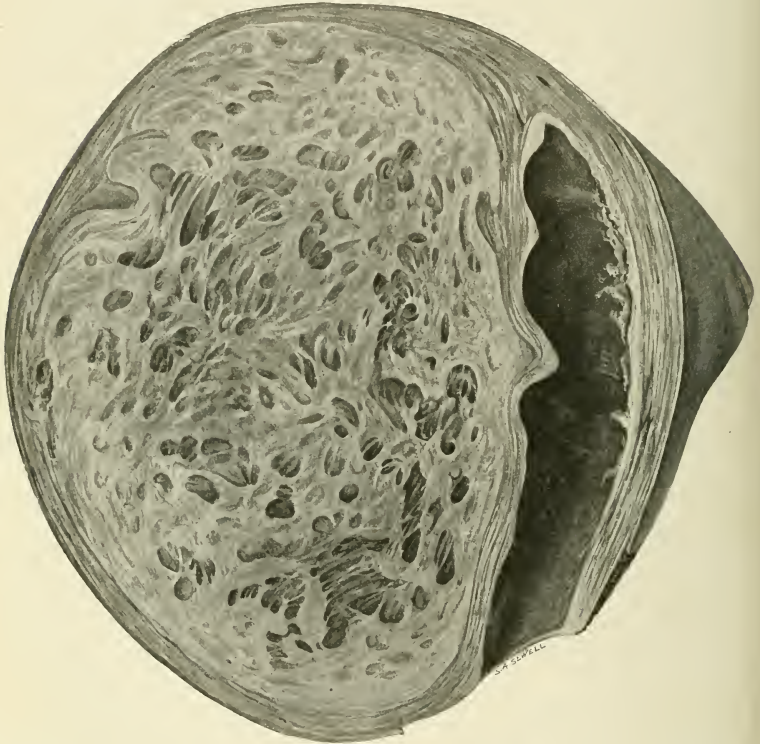


FIG. 56.—Showing a soft interstitial myoma of the posterior uterine wall. The growth is undergoing multiple cystic change as a result of trabecular hyaline degeneration.

shown in Figure 41, page 41. It will be seen that three-fourths of the growth have become cystic, whilst the soft remainder retains the characteristics of hyaline tissue. The fine trabecular arrangement is well seen. On cutting the tumour in half, the cysts collapsed, owing to the escape of their thin blood-stained contents. This caused the cut

FIG. 58



FIGURE 58. Showing an intraligamentary soft myoma, three-fourths of which have become cystic. The microscopic section of the solid one-fourth is seen in Figure 59. There is no doubt that in process of time the intracystic trabeculae would have been absorbed, and the result would have been a single large cyst with ragged walls.

surface to become deeply concave, so that the centre of the growth subsided for nearly one inch below the peripheral

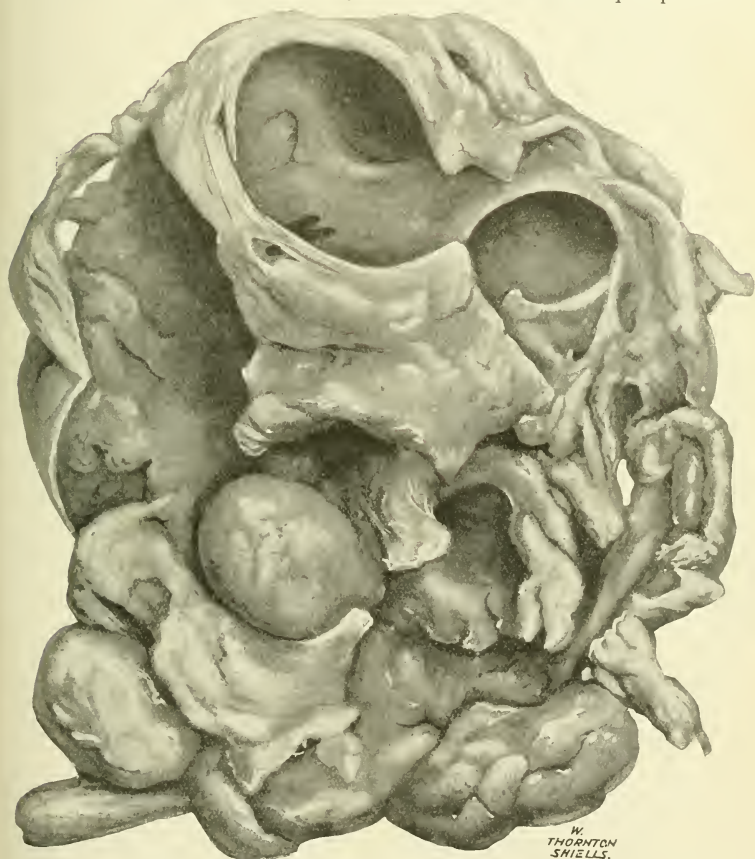


FIG. 57.—Showing a cystic submucous myoma removed by vaginal myomectomy through a fully dilated cervix. The case was diagnosed as one of pregnancy at $5\frac{1}{2}$ months. Two years later hysterectomy was performed for the cervical myoma seen in Figure 153, page 208. See also page 201.

margin. On immersion in glycerine the cysts filled up again, just as a sponge does in water, and the growth then presented the appearance seen in the drawing.

This specimen brings out another characteristic point in cystic degeneration, viz. its effect on the blood-vessels, some of which become thrombosed, whilst allowing of the escape of blood-pigment which stains the contents of a number of the cysts. A microscopic section taken through the solid



FIG. 60.—An intramural myoma which has undergone diffuse uniform hyaline change, succeeded by diffuse liquefaction. This process would have terminated in the formation of a large unilocular cyst with *smooth* walls.

area of this growth shows the reason for this part being soft. It is composed of a number of microscopic cystic spaces, whilst the fibro-muscular tissue, which has escaped the cystic change, is very cellular (see Fig. 59, Plate XII., page 58).



FIG. 61.—Showing an intraligamentary myoma which has undergone complete cystic change. The tension of the blood-fluid has reduced the capsule of uterine muscle to a thin shell.

This is the kind of change to which the name 'myxomatous' has been applied, but I have already given reasons for discarding this term, and for regarding the cystic change as due to liquefaction following on diffuse hyaline change.

Figure 60 shows a myoma which is undergoing a type of liquefaction which is even more diffuse than any of the preceding. Trabeculae are not even seen. The lighter areas show hyaline tissue in which the liquefactive process is not so far advanced. The ultimate result would have been that the entire tumour would have become one large cystic cavity, with smooth walls, no solid elements of the tumour being left. The manner in which the muscular capsule (composed of uterine wall) has escaped the change is strikingly shown in the drawing. Figure 61 shows a specimen in which this complete cystic change has taken place, producing a thin-walled cyst which contained fluid looking like blood, but which showed no tendency to coagulate after standing for many months. The fluid was entirely devoid of leucocytes and fibrin ferment. Figure 150, page 192, under the heading "Diagnosis," shows a similar cystic myoma.

It is far more usual to meet with localised cystic formation than to find the liquefaction so diffused as it is seen in the foregoing illustrations. Subserous, and especially perhaps subserous pedunculated, myomas are the types of growths which afford the best examples of discrete cysts. Even here the formation of the larger cystic spaces is produced by the fusion of smaller cysts. This is clearly seen in Figure 62, which shows amongst other interesting pathological conditions a pedunculated cystic myoma opened up to demonstrate multiple cystic spaces intercommunicating through the breaking down of intervening septa. The same trabecular arrangement is seen in the wall of the larger cyst in Figure 63.

From the presence of these trabeculae it would seem clear that the latter cyst was the result of the fusion of many

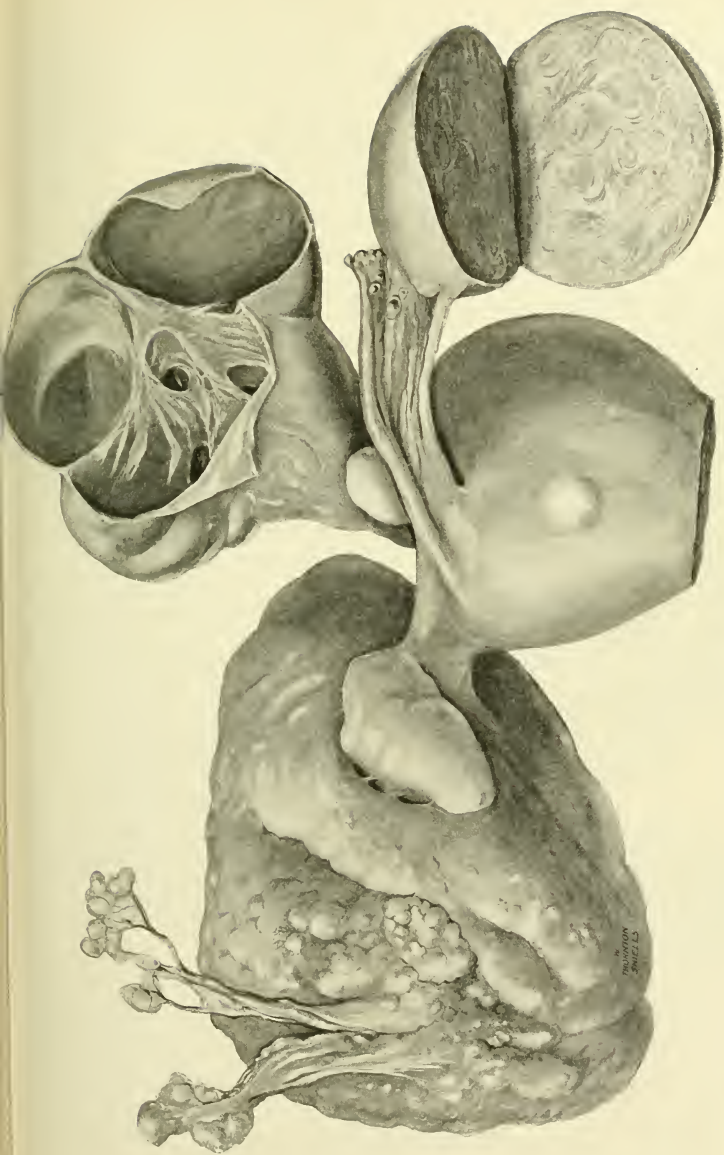


FIG. 62.—Showing a uterus removed by 'high amputation' (Alban Doran), and presenting a parasitic pedunculated myoma with typical mulberry surface. Also a cystic pedunculated myoma which shows multiple trabeculae, which are breaking down. The adnexal tumour on the right is an ovarian fibroma.

smaller ones. This drawing shows also another feature already alluded to, viz. the presence of thrombosed vessels

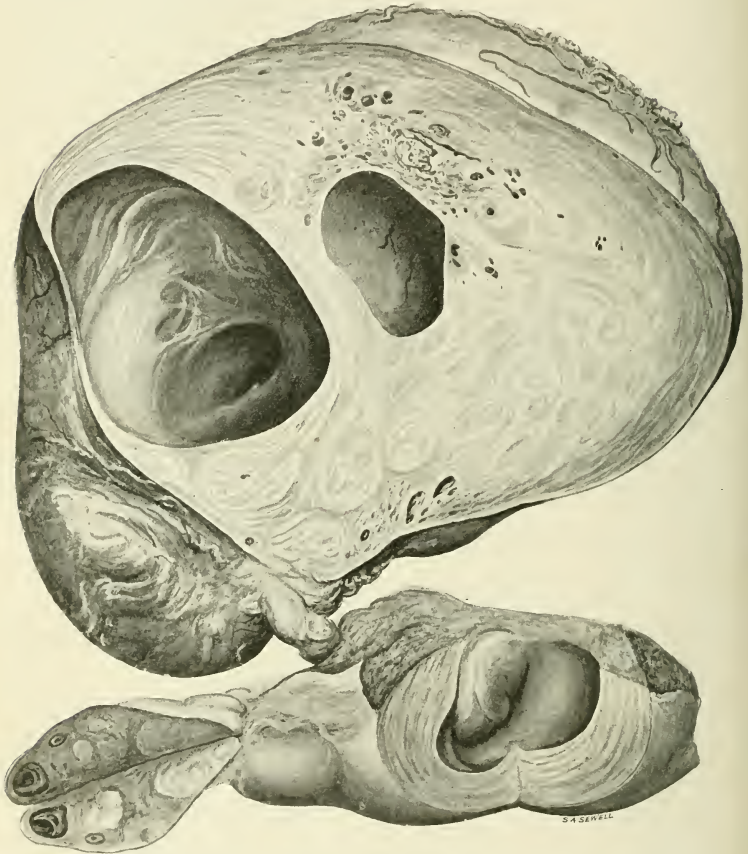


FIG. 63.—Showing a uterus removed by 'high amputation' (Alban Doran). There is a pedunculated myoma containing two cysts. The upper and larger cyst presents the remains of a trabecular arrangement showing that many small cysts have fused to form one large cyst. The lower and smaller cyst is partly surrounded by multiple thrombosed vessels, many of which showed commencing peritheliomatous change (see Fig. 97, Plate XXVI, page 87).

in the neighbourhood of these cystic spaces. The marked tendency of these badly-nourished pedunculated growths to

hyaline change has already been mentioned. It is due to this fact that cystic changes are likewise seen in these tumours.

Another example of a discrete cyst is seen in Figure 64.

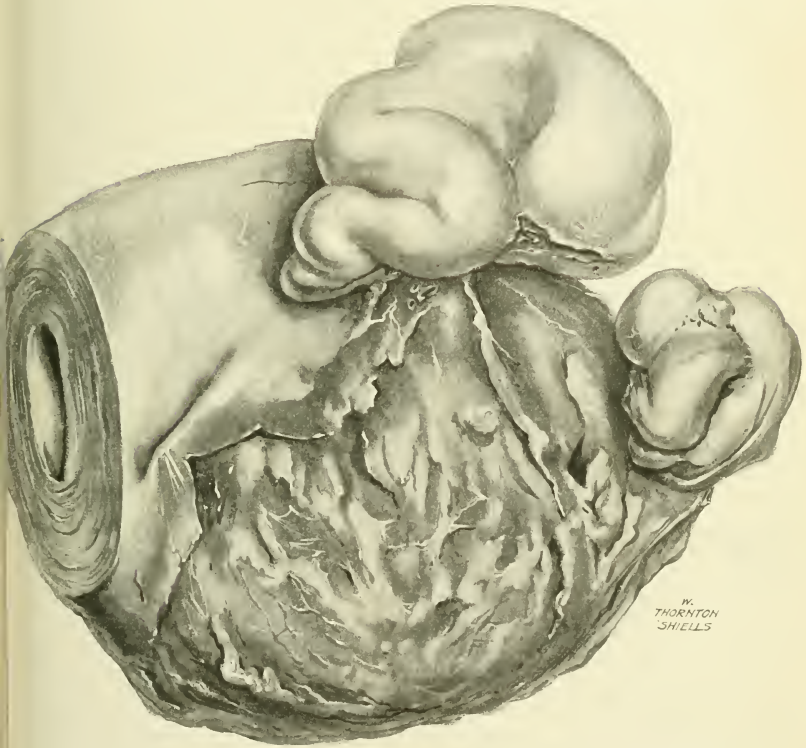


FIG. 64.—Showing a discrete smooth-walled cyst in the centre of the subserous portion of a uterine myoma. The tubal condition is a hydrosalpinx.

It shows the subserous portion of a myoma with a central cystic core.

The fluid contents of cysts produced by liquefaction of hyaline areas vary considerably. The liquid is commonly straw-coloured and highly albuminous. It may coagulate spontaneously, but that which is obtained from the larger

cysts remains fluid. It is not uncommon to find the fluid coloured by blood-pigment, so that it may be turbid, greenish-brown, red or reddish-brown.

Cystic degeneration is not always due solely to liquefaction of hyaline areas. It follows red necrosis, and when one meets with extensive cystic change such as that seen in Figure 61, page 53, where the contents resembled fluid blood, it is hard to say what were the antecedent conditions, especially as thrombosis of peripheral vessels is present in both hyaline liquefactive areas and in red necrosis. The presence of fat-globules in the muscular wall of the cyst would favour preceding necrobiosis.

We may conclude that the majority of cysts found in myomas are pseudo-cysts of the nature described above. Far less frequently we meet with true cystic spaces lined with endothelium. In my investigations I have never found any of large size; they have all been due to dilated lymphatics, and are most commonly seen in association with oedema. Probably the lymphangiectasis is a concomitant of oedema; at any rate I have not found it apart from that condition. See Figure 65, Plate XII., which shows dilated lymph-channels in the hyaline area; other portions of the field were oedematous.

4. **Calcareous Degeneration.**—Cullen gives an interesting *résumé* of investigations by Litten¹ and Klotz² as to the manner in which calcium salts are deposited. After injecting copper sulphate into the circulation of rabbits, Litten found a deposit of calcium salts in the renal tubules. The chemical nature of the process was worked out by Klotz. He found that preceding the deposition of calcium salts, fatty changes occur in the tissues; then soapy substances are formed, which unite with the albumens of the dead cells to form soap-albumens. These form insoluble double

¹ Litten, *Zeitschr. f. klin. Med.*, 1879, i. 131.

² Klotz, *Journ. Exp. Med.*, 1905, vii. 633, 675.

FIG. 59

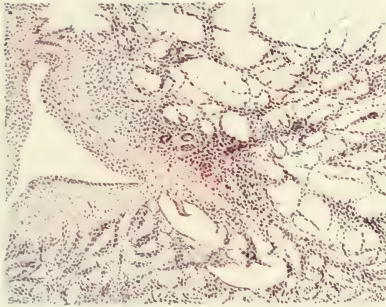


FIGURE 59. Showing the histological feature of the soft solid portion of the tumour seen in figure 58, plate XI. Probably many of these spaces were filled with fat in the recent state.

$\frac{2}{3}$ in. obj. 2 eyepiece.

FIG. 65

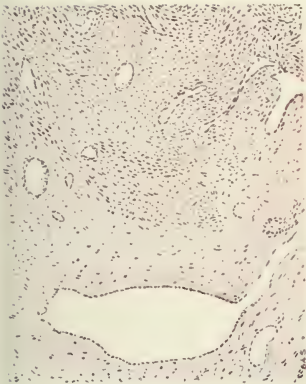


FIGURE 65. Showing a small cyst lined by endothelium. The cyst lies in a hyaline area. There are many dilated lymphatics present.

$\frac{2}{3}$ in. obj. 2 eyepiece.

FIG. 66



FIGURE 66. Showing calcareous nodules in a hyaline area.

FIG. 67

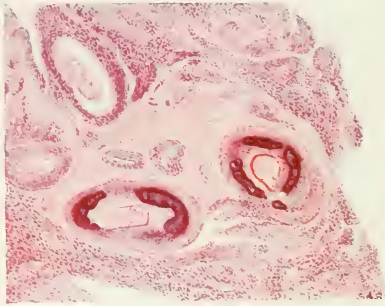


FIGURE 67. Showing calcareous deposits in the arterial coats.

FIG. 68



FIGURE 68. Showing a thin shell of calcareous degeneration around a myoma which has undergone red necrosis.

calcium soaps with calcium derived from the blood ; finally, by combining with CO_2 and PO_4 , carbonates and phosphates of lime are deposited as insoluble salts in the dead tissues. Cullen further points out that lime-salts have been found around the points where electrodes have been introduced into a myomatous tumour.

Calcareous degeneration in myoma may affect the periphery of the growth only, producing a shell-like investment (see Fig. 68, Plate XIII.), or the deposit may be diffused throughout the whole substance of the tumour, producing the so-called 'womb stone.' The deposit of lime-salts is fairly common after the menopause, but it may also occur during the period of fertility.

The chalky areas, as seen through the peritoneal coat of the tumour, appear as yellowish craggy nodules, and are easily recognised, when near the surface, by their stony hardness (see Fig. 124 B, page 113).

Small calcareous points are frequently seen in hyaline areas (see Fig. 66, Plate XII.) ; the lime-salts stain deeply with haematoxylin. In a few instances I have seen deposits within the arteries contained in myomatous tissue (Fig. 67, Plate XIII.). In Figure 68, Plate XIII., there is a ring of calcified tissue intervening between the myoma and the uterine wall. Hyaline, fatty, and calcareous changes follow each other in this order, the presence of fatty (lipoid) substances being essential to the deposit of lime-salts.

Subserous, interstitial, and submucous myomas may become partially or wholly calcareous ; in the subserous variety the calcified growth may be found entirely separated from the uterus. I discovered one such, adherent to the parietes close to the umbilicus and embedded in omentum ; and in another case the calcified tumour was adherent to the back of the left broad ligament underneath an endotheliomatous ovary.

Clinically speaking, calcareous myomas are generally

of little importance ; nevertheless they are not altogether safe from infection and other changes, as a case recorded by Carter shows (see "Infection of Myoma," page 81). Further, they may cause trouble also in other ways, as shown by John Bland-Sutton in his essay on *Fibroids of the Uterus*. In this instructive little book is mentioned a case, recorded by Arnott, of a spinster aged 72 years, who, after a fall, was seized with severe abdominal pain, and died thirty-four hours after the accident. It was found that a coil of small bowel had been perforated as it lay between the parietes and a large calcareous myoma ; extravasation of faeces and fatal peritonitis resulted. Bland-Sutton also mentions a case of his own, in which retention of urine resulted from a calcified subserous myoma becoming impacted in the pelvis ; the calcareous state of the growth had probably but little to do with the symptoms, unless, by increasing the weight of the tumour, it favoured its descent into the pelvis.

The removal of calcareous myomas *per vaginam* sometimes presents considerable difficulty. In the *Transactions of the Obstetrical Society of London*,¹ Wynn Williams records a case of an intramural calcareous tumour impeding labour. It consisted of "ordinary fibrous tissue and fine granular matter." The patient was a primipara, aged 45 ; she made a good recovery. Portions of the tumour lying in advance of the child's head were extracted by a cephalotribe ; the child was then delivered by hooks, and the remaining portion of the growth removed from a "pouch like a watch-pocket in the lower segment of the uterus. This procedure was necessary before the removal of the placenta, to the passage of which it formed an impediment."

Calcified myomas of the submucous type may be expelled either by a process of sloughing or by dilatation of the cervix. In a case in which I operated for supposed nodular tuberculous salpingitis, the nodule on the cornual

¹ Vol. xvii. pages 172-174, 1875.

FIG. 69

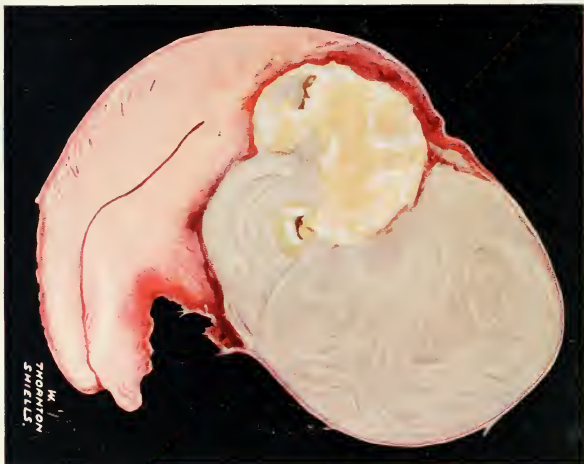


FIGURE 69. Showing a calcareous nodule in a fundal myoma. It must be assumed that the calcified area represents the oldest part of the myoma.

FIG. 70

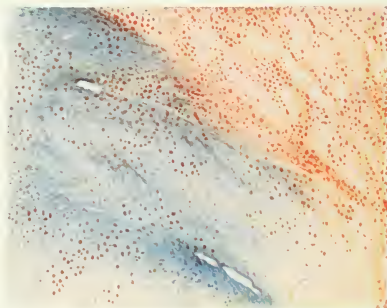


FIGURE 70. Fat-globules stained golden red by Sudan III. The globules run in the direction of the muscle-bundles. From a case of 'Red degeneration.' Section prepared by GORDON LEY. $\frac{1}{4}$ in. obj. 2 eyepiece.

end of the Fallopian tube proved to be a small calcareous myoma (see Fig. 38, p. 37).

Figure 69, Plate XIV., shows a solid calcareous nodule in a fundal myoma removed from a patient, aged 54 years, by vaginal hysterectomy.

Calcification in a myoma can be detected by the employment of X-rays.

5. **Fatty Degeneration.**—The majority of myomas, large and small, show hyaline change; the same cannot be said of fatty degeneration: there is a big jump, so to speak, in the sequence of happenings, between hyaline and fatty change. What concomitant factors are brought into play at this point? It would seem to be a local cause which determines the fatty change, since it may be confined to but one tumour in a group of myomas, and, moreover, to a single area in the growth affected.

Defective blood-supply produced by local thrombosis suggests itself. Lorrain Smith and Fletcher Shaw speak of thrombosis as *delaying* the absorption of fat, and in certain instances at all events, *i.e.* where thrombosis is evident, it is fair to assume that it has been the cause of the impaired nutrition which has resulted in the *deposition* of fat. Fatty degeneration of myoma is an invariable accompaniment of necrosis.

Lipoid, either in the form of lipoid-fat or lipoid-soap, is a product derived from the muscle-fibres, which first become granular, then hyaline, and finally fatty; thus we speak of granular and hyaline *degeneration* and fatty *necrosis*. It is probable that this constitutes the natural sequence of events, so that we should not expect to find a muscle-fibre becoming fatty in the absence of granular or hyaline change.

For the study of the fatty stage in the degeneration of myoma the fresh tissue should be taken, frozen sections made, and stained with Sudan III. The tinctorial properties of this stain are very striking; the fat-droplets are picked

out as deep orange, or sunset-red, globules. The sections are mounted in Farrant's solution.

Leith Murray, who made an ethereal extract of the lipoids of several necrotic myomas, found that the lipid substance was "yellow, fairly firm at room temperature, and had a melting point above 36.5° C."

The macroscopic appearance of fat in a myoma is variable, being influenced by associated conditions due to changes in the blood. The cut surface of a fatty myoma may be pale yellowish in colour, but it is often tinted by soluble blood-pigment. The normal whorled appearance may be obscured and the surface may be homogeneous (Fig. 71, Plate XV.).

The consistence will vary with the degree of degeneration; the more fat laid down, the softer the tissue becomes. Engorged vessels may, or may not, be seen.

Microscopically, many of the changes already mentioned under "Hyaline Degeneration" will be found, and it may be taken for granted that these are antecedents. We thus have:

1. Irregular and scanty nuclear staining.
2. Granular and hyaline change.
3. Fat-globules running in the original direction of the muscle-fibres (see Fig. 70, Plate XIV.).
4. Fat within wandering phagocytes, both outside and inside lymphatics.
5. Signs of vascular degeneration, engorgement, thrombosis, and fibrin deposited in the vessels.

For a further consideration of this subject the reader is referred to the section dealing with "Red Degeneration," page 66.

The finding of fat, however, is not always a sign of degeneration in a myoma; it is also present in certain rare cases of vital but depraved activity, and constitutes by its presence a distinctive neoplasm, called by those who accept this view *lipomyoma* or *fibro-lipomyoma*, whilst more cautious

FIG. 71

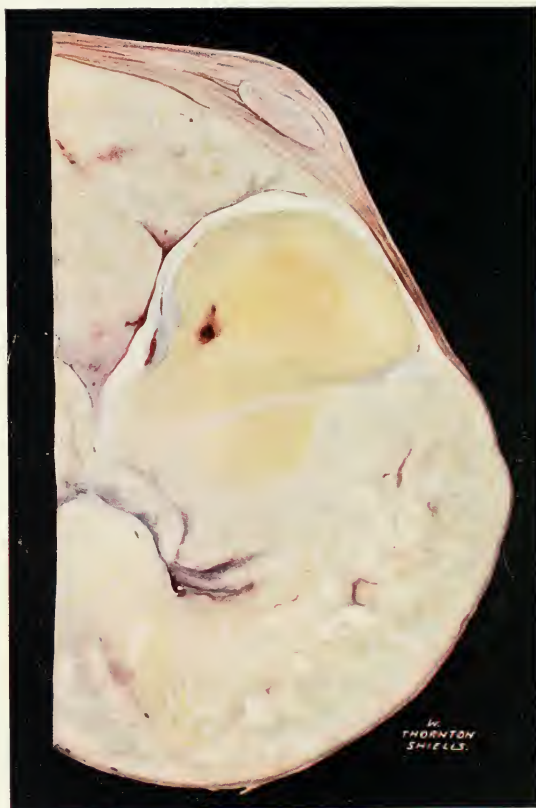


FIGURE 71. Cut surface of Maxwell & Ley's tumour, illustrating a lipomyoma, or lipomatosis of a myomatous tumour.

authorities prefer the nomenclature *lipomatosis* as descriptive of the condition.

An example of this rare 'tumour' was recently removed from a patient at the London Hospital by the late Drummond Maxwell, and an account of it has been published in the *Transactions of the Royal Society of Medicine* by Gordon Ley.¹ These gentlemen have kindly given me permission to include this specimen in my account of myoma, and it is placed here under "Fatty Degeneration" solely for purposes of convenience.

"The specimen was removed from a parous woman, aged 54, on August 15, 1913. Her menopause had occurred six years previously; but for the last year haemorrhage had recurred, and at the date of operation she was losing blood during twenty-one days in every month. She had no pain. The tumour gave the physical signs of a fibroid uterus. The patient was not a fat woman.

"*Macroscopic Appearances of Specimen.*—The specimen is a uterus removed by subtotal hysterectomy. It measures 13 cm. in length by 12 cm. from cornu to cornu. A rounded tumour measuring 12 cm. in diameter lies in the muscular tissue of the posterior wall, widening and lengthening the uterine cavity (see Fig. 71, Plate XV.). The endometrium is smooth. On section the tumour is composed of closely set, rounded nodules, ranging from 1 to 3 cm. in diameter. The smallest of these are white and have the typical appearance of fibromyomas; those of intermediate size are white, with yellow streaks running through them; the largest are yellow and homogeneous. The nodules are separated by strands of pinkish vascular tissue. The tumour is sharply demarcated from the surrounding muscle. Sections were taken and stained with Ehrlich's haematoxylin and eosin, and with Weigert's iron-haematoxylin and Van Gieson. Other pieces were frozen,

¹ Vol. vii. No. 4 (*Obst. and Gyn. Sect.*), pages 150-153.

and sections stained with Sudan III. and Ehrlich's haematoxylin (see Figs. 72, 73, 74, Plate XVI.).

“*Microscopic Appearances.*—The sections show a fibromuscular tissue consisting of narrow bundles of muscle separated by coarse strands of collagen fibres. This tissue is only seen in parts of the section. For the most part the section is made up of fat envelopes separated by narrow strands of collagen fibre and occasionally by broader strands of collagen fibre and muscle.

“The nuclei of the muscle-cells are stained clearly throughout the section and the muscle-fibres are uniform in size and shape. The collagen stroma is in parts slightly oedematous. In sections stained by Sudan III. and haematoxylin, each fat envelope is seen to be filled by one large globule of fat. A flattened nucleus can be seen in the periphery of many of the envelopes. There are no granules or globules of fat in the cells of the tissue between the envelopes.

“*Remarks.*—The macroscopic and microscopic appearances of the tumour are those of a fibromyoma containing fat. The fat is present in the form of large globules each of which distends a cell. These cells are in the form of signet rings, the appearance of the fatty tissue being similar to that of normal lipomatous connective tissue.

“Fine granules of fat, such as are characteristic of fatty degeneration (see Fig. 70, Plate XIV.¹), are present neither in the muscle- nor in the connective-tissue cells, nor is there evidence of any other degeneration of the cell-elements.

“There is, therefore, no evidence that the lipomatous tissue is an expression of fatty degeneration such as is frequently seen in degeneration of fibromyoma, especially in calcareous impregnation and in haemorrhagic necrosis.

“The tumour is either a fibro-myo-lipoma or a fibromyoma with fatty metamorphosis of the fibrous stroma.

“The absence of young fat granule cells, and more

¹ Reference inserted by Author.

FIG. 72

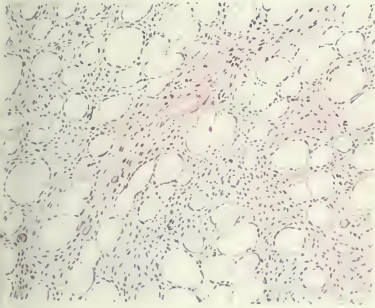


FIG. 73

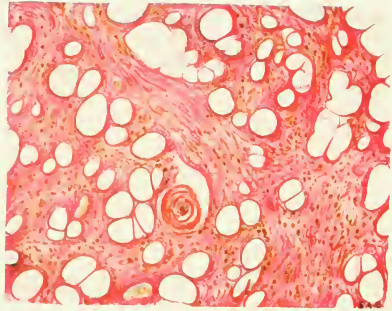


FIGURE 72. Showing Maxwell & Ley's fatty myoma stained by hæmatoxylin and eosin.

$\frac{2}{3}$ in. obj. 3 eyepiece.

FIGURE 73. Showing Maxwell & Ley's fatty myoma stained by Van Gieson's method.

$\frac{2}{3}$ in. obj. 3 eyepiece.

FIG. 74



FIGURE 74. Showing Maxwell & Ley's fatty myoma stained by Sudan III.

$\frac{2}{3}$ in. obj. 3 eyepiece.

FIG. 75



FIGURE 75. Shows a sagittal section of the specimen seen in Figure 74, page 67. The yellow fatty areas in the cervix are seen. The whorled arrangement of the fibromuscular strata is in part preserved.

especially the distribution of the lipomatous tissue, are strongly in favour of the latter interpretation."¹

Whilst writing this monograph on Myoma I had the good fortune to remove a myomatous uterus which illustrates much the same condition as that shown in the case of Drummond Maxwell and Gordon Ley.

The patient was aged 51 years. She had borne one child twenty-nine years ago. The late G. E. Herman removed a polypus from the uterus five years previously, after which the patient was quite well until 1911. Uterine haemorrhage again set in three years ago; and it was for this that I was consulted in May 1914. The loss was very frequent and profuse. The kidneys and ureters were examined for calculus by X-rays with a negative result. There was a mobile mass in the right iliac and lumbar region, and also a tumour diagnosed as a myoma of the left broad ligament. The operation was difficult because of an embedded myoma, which spread itself out in the left broad ligament, and was unusually adherent to the cellular tissues. The specimen (Fig. 78, page 67) was the shape of a dumb-bell or cottage loaf, *i.e.* there was a corporeal rounded growth, united by the isthmus of the uterus to another spherical growth which lay in the posterior wall of the cervix. The latter was of very soft consistence, and was densely adherent to its cellular bed in the broad ligament.

On section, after hardening in Kaiserling-Pick's solution, it showed a yellowish surface which became concave instead of convex. It was quite soft (excepting for its capsule) even after hardening for fourteen days in preservative. The cut surface had not entirely lost its whorled appearance (see Fig. 75, Plate XVII.). Sections were made by freezing, and stained with Sudan III. Figures 76 and 77, Plate XVIII., show large fat-globules within muscle-fibres, the latter

¹ The fatty metamorphosis occurred in the muscle-cells in my specimen, but the large globules of fat are quite different from the fine granules seen in ordinary fat-necrosis.—AUTHOR.

retaining their nuclei. Figure 78 shows the tumour as it appeared directly after the operation. Figure 75, Plate XVII., shows a sagittal section of the same after hardening in preservative. As already stated, examples of fatty metamorphosis of fibrous tissue or of muscle are exceedingly rare in uterine growths. There is a fatty uterine tumour in St. Bartholomew's Hospital Museum, described by Sir James Paget; another in the Royal College of Surgeons of England, removed by Albert Carless; and Cullen also reports a case from the Johns Hopkins Hospital. The difference between fatty metamorphosis and fatty degeneration is best appreciated by comparing Figure 70, Plate XIV., with Figure 76, Plate XVIII.

6. Necrosis. Necrobiosis (Red Degeneration).— Areas of *necrosis* are not uncommon in myoma; they are found in association with hyaline degeneration, the latter probably corresponding to the cloudy swelling seen in other tissues of the body as the initial stage of death of the part. Necrotic patches are liable to occur in subserous, interstitial, and submucous myomas. Necrosis is common in submucous growths, where it is liable to pass into gangrene as the result of infection of the dead tissue by saprophytic organisms derived from the genital tract. Necrotic areas assume various colourings dependent upon the blood-vascular changes in their neighbourhood; they may be yellow, grey, grey-brown, greyish-purple, magenta-red, or mahogany-red.

Necrosis is to be found, according to Tracey, in 5 per cent of myomas removed by operation.

The central parts of a myoma, being the most remote from its blood-supply, are most prone to undergo necrotic change, and from the centre the area of tissue-death spreads towards the periphery. The demarcation is often quite sharp (see Fig. 134, page 142), or it may be indefinite (Fig. 137, Plate XXXIII., page 142), being surrounded by a kind of penumbra or halo where the changes are not so intense.

FIG. 76

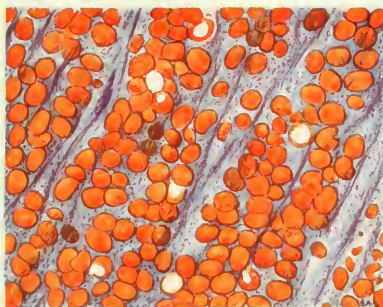


FIGURE 76. Showing large fat-globules lying in columns corresponding to the original direction of the muscle-bundles.

$\frac{2}{3}$ in. obj. 3 eyepiece.

The section was taken from the cervical myoma seen in figure 75, plate XVII.

FIG. 77

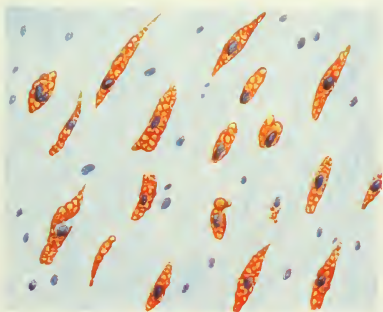


FIGURE 77. Showing fatty globules within fragments of muscle-fibres. The nuclei of the cells still persist. $\frac{1}{2}$ in. obj. 2 eyepiece.

The section was taken from the cervical myoma seen in figure 75. Figures 76 and 77 were stained with Sudan III.



FIG. 78.—Showing corporeal and cervical myomas. The cervical growth lies in the posterior wall. It was soft and on section proved to be fatty. (See Plates XVII. and XVIII.)

The term 'necrobiosis' has long been used to describe *partial* destruction or death of the tissues, in contradistinction to 'necrosis' or total death. It has received a narrow application by gynaecologists of late years, the tendency being to employ it to designate one particular form of necrosis which has claimed the special attention of clinicians because of its frequent association with pregnancy and the puerperal state. It is also often spoken of as 'red degeneration.'

With regard to the suitability of the term 'necrobiosis' as descriptive of red myomas, it may be said that there is clinical evidence to suggest that some of these tumours do recover their lost vitality, and hence their degeneration can only have been partial. On the other hand, there is ample clinical and pathological proof that they frequently undergo liquefaction and total necrosis, *i.e.* that they behave in the same way as necrotic myomas in general. It seems illogical therefore to regard the term 'necrobiosis' as synonymous with 'red degeneration'; necrobiosis is only a passing phase in a degenerative process leading on to actual death in the case of some myomas, and stopping short of it in others, the question of the colour of the tumour being a side-issue.

Microscopically, the stage at which degeneration has arrived is estimated by the number and appearance of the cell-nuclei, and by the behaviour of the cytoplasm when submitted to certain stains; when such a test is applied to red myomas, it cannot be said that they show any distinctive difference as compared with other necrotic forms, so that in a series of slides illustrating necrosis, it is impossible to pick out an example of red degeneration, say, from a white, or a yellow. The microscopic features enumerated under "Fatty Degeneration," page 62, will hold good irrespective of the colour which the tissue happens to possess. Histologically, therefore, red myomas have no special characteristics by which they can be dis-

tinguished ; in other words, they do not represent a definite *pathological type*. This statement need not detract from the importance which this 'red degeneration' has assumed from the clinical standpoint. Its frequent association with pregnancy is well known, and will be further referred to ("Pregnancy with Myoma," page 137). It is not confined to myoma in the gravid uterus, but apart from pregnancy it is relatively uncommon. Figure 79, Plate XIX., shows a myoma in a state of total red necrosis, removed from a nulliparous spinster, aged 36 years.

Myomas in a state of 'red degeneration' are of comparatively soft consistence. On cut section they resemble raw or partly cooked beef-steak ; they give off a peculiar fishy odour ; dilated and thrombosed vessels may sometimes be seen in the capsules surrounding the growths, and more occasionally in their interior.

The colour of these tumours is due to the tissues being stained by soluble blood-pigments.¹ Leith Murray attributes the diffusion of blood-pigments to the laking of the corpuscles produced by lipoid substances (see "Fatty Degeneration," page 61). The nature of the pigment is still unknown. Taylor has demonstrated oxyhaemoglobin bands, but Fletcher Shaw has failed to find any granular deposit of haemosiderin, and Leith Murray found no free iron in the stained tissues. The question arises, What is the source of the laked blood ? does it proceed from extravasations, or from blood within degenerated vessels, or from both ?

The fact that extravasation of blood is not an essential microscopic feature in sections of these red growths—although it may in some instances be present in relatively small amount, strongly supports Murray's view that "the site of the haemolysis lies within the degenerated vessel itself." It may be mentioned that in such blood-extravasations as do occur in red myoma no observer, so far

¹ H. Leith Murray, *Journ. Obst. and Gyn. Brit. Emp.*, 1910, vol. xvii, pages 534-546.

as I know, has ever described the presence of antihæmolytic blood-crystals (cholesterin, etc.), which tends to show that the hæmolysis is going on in blood outside as well as inside the vessels.

The point to be insisted upon is the one which Leith Murray makes, viz. that extravasations are neither frequent enough nor sufficiently extensive ever to provide sufficient soluble pigment to stain a whole area, even if, as he thinks, hæmolysis occurs here also.

The question of thrombosis is another matter of controversy. Conflicting observations have been made as to its relation to 'red degeneration.' Lorrain Smith and Fletcher Shaw described a non-inflammatory thrombosis, and they say that they "were unable to discover anything to contradict the hypothesis that the condition [red degeneration] is associated with thrombosis throughout." They will not allow that the thrombi are the result of inflammation or of stasis, but prefer to leave the question of the causation of thrombosis obscure, hinting that during pregnancy it may be due to pressure (? short of actual stasis), and in the puerperium, to increased coagulability of the blood. Leith Murray is not prepared to admit that the thrombosis is primary. Whereas Lorrain Smith and Fletcher Shaw appear to take the view that the primary change is thrombosis (cause unknown), Murray suggests a *primary hæmolysis* which induces a secondary deposit of fibrin in vessel-walls already partly degenerated.

Even as to the *site* of the thrombosis, both macro- and microscopic observations show a large discrepancy. Fletcher Shaw found it throughout the whole vascular system of the tumours. Stevens found it throughout the veins of the capsule, whilst Taylor denies its existence in the majority of cases, and Fairbairn found it absent in the capsules.

The exact importance of thrombosis in red degeneration, and the stage at which it occurs in the sequence

of changes, must therefore for the present be left *sub judice*. But after a careful study of Leith Murray's work and a survey of all the facts, one is led to the conclusion that *haemolysis and not thrombosis* is the predominant change, and the term "Necrosis with Haemolysis" which he suggests by way of nomenclature seems particularly apt and suitable.

Another question of interest in relation to the presence of fat in necrotic myomas is whether the red variety differs from the other types of necrosis in the *amount* of fat which is present. Lorrain Smith and Fletcher Shaw speak of "an increase of fat in the reddened tissue"; their estimation would seem to be based on the finding of fat-crystals by examining slides by polarised light. Leith Murray, on the other hand, extracted the lipoid and weighed it, after which he subsequently drew conclusions from correlated staining methods as to which lipoid was fatty and which was soapy. Murray found that in a yellow growth there was most fat, 20 grammes of tissue yielding .346 gramme of lipoid, whilst the red variety ran it close with .269 gramme in the same weight of tissue. In the white necrosis the results were .149 gramme and .224 gramme respectively in two tumours. Murray states that in the yellow and red varieties the lipoid was largely fatty, in the white necrosis it was soapy.

This observer has also thrown some light on the causation of the variability of colour seen in necrotic myomas. He found that with lipoid sufficient for complete haemolysis the laking of the corpuscles produced a bright red colour in the fluid ('red degeneration'). On the addition of more lipoid, a brownish-black deposit appears, and the supernatant fluid becomes absolutely clear without a trace of colour.

In the study of the microscopic appearances of necrotic myomas I have utilised the collection of the late J. H. Targett in conjunction with those of my own. Some of Targett's slides were variously labelled "fibroid in pregnancy," "red degeneration," "necrotic fibroid extruded

after delivery," and so on, and but for the label it would be impossible to pick out the 'red degeneration' from the rest, so close is the similarity. In one slide there is brown pigmentation of the tissues, which may be regarded as due to a permanent colour-fixation of the parts by the laked blood; the logwood and eosin have not influenced it, but this feature is confined to this one slide only. It is interesting to find that Murray also alludes to the similarity of the structural histological changes in necrosis, whatever the *coloration* of the dead or dying tissues may have been.

If therefore we attempt to summarise the colour-question of necrotic myomas according to the light thrown upon it by Leith Murray, we have :

<i>Red degeneration</i>	}	=	{	Lipoid fat just sufficient to produce perfect haemolysis.
<i>Brown, or brownish-black, grey, etc.</i>	}	=	{	Lipoid fat in moderate excess.
<i>Yellow necrosis</i>	}	=	{	Lipoid fat in excess sufficient to bleach:
<i>White necrosis</i>	}	=	{	Lipoid soap insufficient to produce haemolysis, the latter being restrained by blood-plasma.

Why is the staining of the tissues, due to the haemolytic property of lipoid, more frequently demonstrated during pregnancy than at other times? No one who has examined a large series of myomas over a long series of years will dispute this fact. Despite the similarity in the microscopic characters of the differently coloured necroses, it is most excusable and natural for clinicians to associate 'red degeneration' almost exclusively with pregnancy. Not only is this change more common in the gravid state, but it is also generally complete. If pregnancy has proceeded far enough, the entire tumour is wont to be uniformly stained with blood-pigment, whereas in the absence of gestation or in the first half of pregnancy the change is, *as a rule*, only

Fig. 79

FIGURE 79. Shows total red necrosis of a myoma in a nulliparous uterus. Removed from a tuberculous spinster aged 36 years. The predominating clinical feature was extreme tenderness over the tumour.

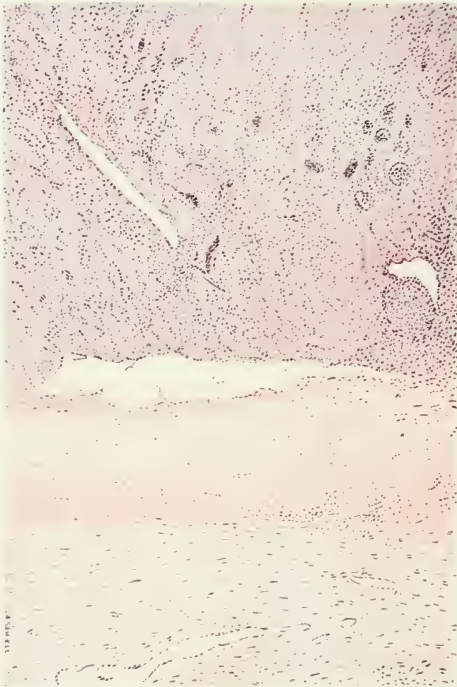


Fig. 80

B

FIGURE 80. Section of a myoma, showing (A) area of necrosis (B) zone of hyaline degeneration

A

FIG. 81



FIGURE 81. Showing almost total red necrosis of a non-gravid uterus. The periphery of the tumour shows a zone of calcareous degeneration. Both ovaries were the seats of lutein haematomas. Total hysterectomy and removal of diseased appendages had been advised five years before the radical operation was performed and after the patient had been a chronic invalid for nine years.

FIG. 82

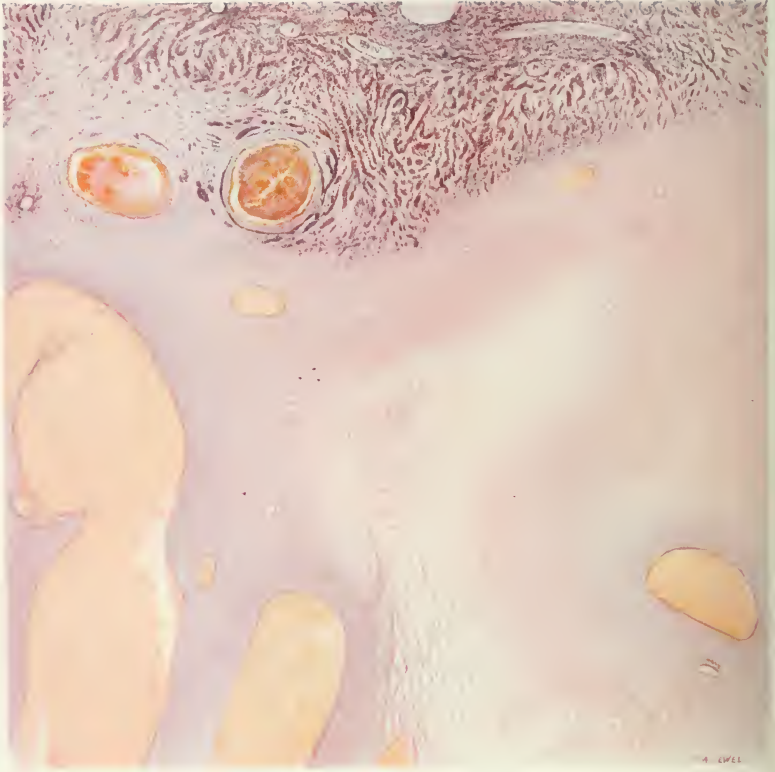


FIGURE 82. Showing advanced red necrosis and thrombosed vessels.
 $\frac{2}{3}$ in. obj. 3 eyepiece.

partial. (Figs. 79, Plate XIX., and 81, Plate XX., however, show exceptions to this statement.)

Leith Murray tells us that blood-plasma has a restraining influence on the haemolytic action of the lipoid substances ; but may we not go further, and on combined clinical and pathological grounds, infer that pregnancy exerts a control on the 'restraining influence' of the blood-plasma in relation to haemolysis ?

The clinician expects to find 'red degeneration' *commencing* in a myoma, if removed from the walls of the uterus during the first half of pregnancy, and *total* 'red degeneration' of the tumour, if removed at term. It has been said that this change does not occur in solid mesoblastic growths of the ovary. I have an exception to the rule in my collection.

Figure 80, Plate XIX., shows the margin of a necrotic area (*A*) in a myoma showing hyaline degeneration (*B*).

Figures 82, Plate XXI., and 83, Plate XXII., show red necrosis with vessels thrombosed.

Figure 84, Plate XXII., shows the microscopic appearance of yellow necrosis. This is the same specimen as seen in Figure 139, Plate XXXIV., opposite page 145.

Figure 85 shows necrotic areas in a cornual myoma ; the natural colour was a dirty yellowish-brown. The drawing is from a coronal section of the specimen shown in Figure 42, page 42, illustrating abnormal relation of the appendages. No pathogenic organisms were found in the necrotic tissues, and yet 'fever' and pain were the prevailing symptoms.

Lorrain Smith and Fletcher Shaw have investigated red myomas from the bacteriological standpoint. In one case, masses of staphylococci were found in the blood-vessels which lay in the periphery of the tumour, and also active leucocytosis around the vessels. In another, diplococci were seen in spaces round the vessels. These were two isolated cases ; no bacteria were found in any of the other tumours examined. John Bland-Sutton mentions a case

of his own in which Hastings Somerville obtained a pure culture of *staphylococcus pyogenes aureus*. When red myomas become infected, they are capable of producing acute toxic symptoms, but fortunately, as a rule, they are sterile.

Independently of infection these red myomas may undergo cyst-formation from liquefaction, in a way similar to that described under "Hyaline Degeneration." The cyst-contents in these cases are usually chocolate-coloured from the presence of blood-pigments. Such 'blood-cysts' are not found during pregnancy.

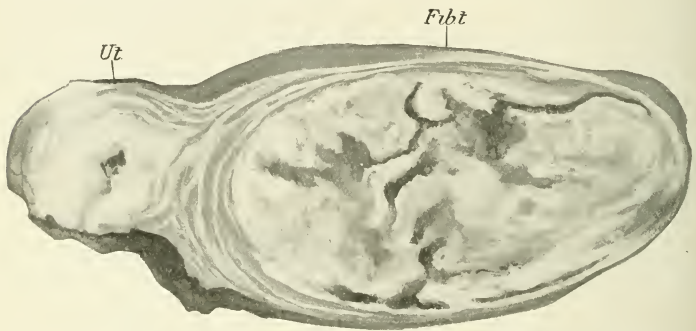


FIG. 85.—Showing a case of sloughing myoma of the left uterine cornu. The section is made through the tumour and the uterus; it shows the great proportionate size of the tumour and the breaking down of its substance. (Doran and Lockyer, *l.s.c.* page 42.)

Ut. = uterus; *Fib.t.* = necrotic myoma.

7. **Circulatory Changes in Myoma.—Oedema.**—The term 'oedematous myoma' has been far too extensively used; if a myoma is soft and exudes fluid on section, some clinicians at once write it down as an oedematous myoma, but more often than not the change is one of liquefaction following on hyaline degeneration (the so-called 'mucoid or myxomatous' change). True oedema is not at all common; at any rate, it is less usually seen than liquefaction following hyaline degeneration, but of course it may occur in a hyaline myoma.

The oedematous uterus when removed feels semi-fluctuant, suggesting the gravid organ. On section much

FIG. 83

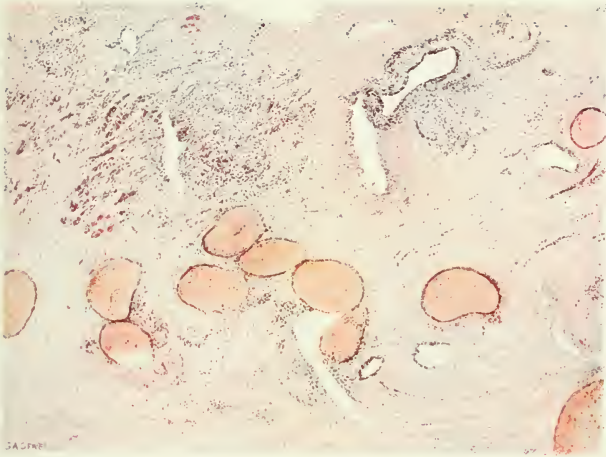


FIGURE 83. Showing red necrosis and thrombosed blood-vessels.
2 in. obj. 2 eyepiece.

FIG. 84

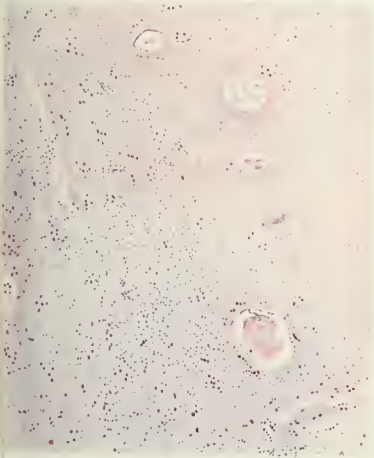


FIGURE 84. Showing the microscopic appearance of a myoma in a state of yellow necrosis ($\times 105$)

FIG. 86

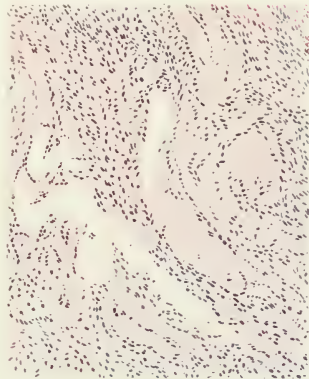


FIGURE 86. Showing a soft oedematous myoma with the muscle-bundles separated by a flocculent deposit, which has been fixed by Kaiserling's fluid. Oedematous infiltration is associated with dilatation of lymph-channels.

$\frac{3}{4}$ in. obj. 3 eyepiece.

serum escapes, and on removing a cut tumour from Kaiserling's solution, its surface is seen to have become concave, and furrows may appear between the cut lobes.

The fluid which exudes on section is typical 'oedema fluid'; it contains but little albumen, thus contrasting with the highly albuminous fluid which results from liquefaction of hyalin. Microscopically (see Fig. 86, Plate XXII.), this serum is seen as a flocculent or granular material, separating the muscle-bundles asunder, and under a higher power it can be seen that the muscle-fibres are swollen, due to intracellular transudation. These swollen muscle-fibres are particularly striking in transverse section; some are without nuclei, perhaps as the result of maceration.

In oedematous myomas the lymphatic channels are dilated, and hyaline change is generally to be found, the latter being in no sense due to the oedema, but merely a coincidence. It is the myoma impacted in the pelvis which becomes oedematous, the oedema being due to compression, sufficient to produce slight circulatory disturbance.

Closely connected, as we have stated, with oedema is a dilated state of the lymphatics or lymphangiectasis. The dilatation of the lymph-channels is probably, if not always, the result of some mechanical compression undergone by the tumour. It may be that oedema is a secondary condition, consequent on the transudation of lymph from the engorged lymphatics. At any rate, dilated lymphatics can be found unaccompanied by oedema, but I have not found the latter in the absence of dilated lymph-channels.

Figure 87, Plate XXIII., shows a cystic lymph-space and several dilated lymphatics in a hyaline myoma which shows no evidence of oedema.

Dilatation of the lymph-spaces is sometimes an accompaniment of telangiectasis of the blood-vessels (see "Telangiectasis," page 77).

Axial Rotation.—A freely mobile pedunculated myoma

lying in the abdominal cavity may undergo rotation of its pedicle (Fig. 12, page 10, and Fig. 63, page 56); and if the tumour is large and the twist extreme, it may also influence the body of the uterus, causing it to rotate upon the cervix. The rotation of the stalk of a myoma is usually only partial, owing to its thickness. If the twist is incomplete, and has been gradually produced, the tumours may not show any gross change. Fig. 12, page 10, is an example of this. The naked-eye appearance of the two growths, each of which has a twisted pedicle, is normal as regards colour, and shows the typical whorled appearance of a hard myoma. I have met with three cases in my operative practice where definite stasis was manifest, the tumours in two cases being adherent and the third lying free in the peritoneal cavity; in each instance the tumour was of a dark plum-colour. If the subserous tumours have undergone hyaline and cystic change before torsion, the cysts become filled with chocolate-brown or greenish-brown fluid.

Microscopically, telangiectatic areas are to be found together with interstitial haemorrhage, hyaline areas, and liquefaction.

Torsion of a myoma is far less likely to produce acute symptoms¹ than is torsion of an ovarian cyst, but these twisted growths may cause pain and rise of temperature, due to the contraction of adhesions. They also may become infected, break down, and suppurate. As already stated, these growths may become separated from the uterus and lie free in the peritoneum.

In Figures 62 and 63, pages 55 and 56, can be seen some omental veins at the top of the tumours, showing that the growth was getting a supply of blood from omental vessels. To such myomas Kelly and Cullen give the name "parasitic."

Torsion of the myomatous *uterus* may also be produced by multiple, sessile, and interstitial myomas, to the whole mass

¹ See Appendix II., also pages 77 and 179.

FIG. 87



FIGURE 87. Showing that dilated lymphatics are not necessarily associated with œdema.
 $\frac{2}{3}$ in. obj. 2 eyepiece.

FIG. 88



FIGURE 88. Showing an adeniferous myomatous polypus with engorged blood-vessels due to stasis. This condition is spoken of as "telangiectasis" but there is no new formation of vessels. (From Eden & Lockyer's *Gynaecology for Students and Practitioners*, 1916.)

of which the cervix is related as a pedicle. This condition is partial only, but in certain cases it has produced haematometra. Kelly and Cullen figure the case of Bastianelli of Rome, where torsion caused spontaneous amputation of the myomatous body from the cervix uteri; this is probably unique. The amount of torsion usually met with is through the fourth part of a circle, so that the appendages come to lie back and front; torsion carried farther than this is rare. In a case of T. W. Eden's the twist took place through 180 degrees, the right and left appendages having exchanged sides. In this case the adnexal structures on both sides were extremely engorged by stasis.¹

8. **Telangiectasis.**—This change in myoma is placed under the heading of "Degenerations," mainly for the sake of convenience. True angiomyoma is extremely rare, and space does not permit of giving this type of growth a separate heading. Moreover, in my own experience telangiectasis has only been very partial in its distribution, occurring in limited areas in myoma undergoing necrosis, hyaline degeneration, or cystic change, and in perithelioma. Considered as a concomitant of degeneration, the best example afforded of this condition of dilated vessels is to be found in tumours which have suffered from mechanical obstruction of their blood-supply. Notably is this the case with myomatous polypi, the lower poles of which are often in a state of 'telangiectasis.' The same applies to some subserous myomas with twisted pedicles.

I have also found this change in myomas, portions of which have become sarcomatous, but apart from sarcoma and perithelioma, this excessive vascularity has always been associated with some interference with the blood-supply of the tumour, and has been associated with necrosis, 'red degeneration,' or hyaline and cystic degeneration.

¹ For further reference to Torsion of the Myomatous Uterus see Appendix II., also page 179.

In this connection 'telangiectatic' areas are quite a common condition. Cullen has had the good fortune to examine a tumour which he justly claims to be an angiomyoma, and in his description and figuring of this growth, it is interesting to note that it presented areas of cyst-formation and that, microscopically, the myomatous tissue was in a state of hyaline degeneration.

That we should occasionally find such rich naevoid tissue in close connection with tissues which are apparently starving for want of proper blood-supply, is curious. It is possible that in areas which are frequently regarded as 'telangiectatic,' no new vessels have been formed, but that the *capillaries of the part have been brought into evidence by engorgement and thrombosis due to stasis* (Fig. 88, Plate XXIII.). I have found exactly the same 'telangiectatic' condition in the most dependent parts of the cervix and vaginal wall in the case of an old procidentia uteri, as are to be seen in 'telangiectatic' myomatous polypi, *i.e.* dilated capillaries and fully-formed vessels filled with blood.

In Figure 89, Plate XXIV., is seen an extremely vascular area taken from the deep parts of a 'fibro-cystic' tumour of the uterus removed by my colleague, Alban Doran, December 1903 (see Fig. 63, page 56). The histology of this tumour has been a continual puzzle: portions of it resemble an endothelioma, whilst other parts are typically shown in the figure to be angiomatous. There is scarcely any sign of hyaline change; the myoglia fibrils take the eosin stain well; in fact the tissue in which the numerous capillaries and fully-formed vessels lie is quite healthy. That the tumour was clinically innocent was proved by the patient being in good health seven years after operation.

'Telangiectatic' areas stand out prominently when tumours are hardened in Kaiserling's solution. Figure 90 is an example. It shows a uterus which contains multiple interstitial myomas. Two nodules in the fundus (split open



FIG. 89

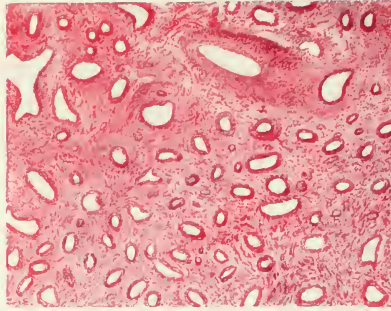


FIGURE 89. Showing angiomatous area of specimen shown in figure 63, page 56. The small new vessels have fully-formed walls.
 $\frac{2}{3}$ in. obj. 2 eyepiece.

FIG. 91

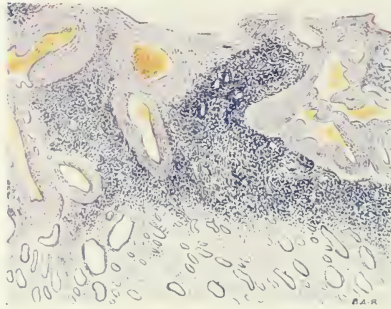


FIGURE 91. Showing new formation of vessels in both the blood-vascular and lymphatic systems. The thick-walled large vessels illustrate the former and the tiny thin-walled vessels the latter.
 $\frac{2}{3}$ in. obj. 2 eyepiece.

FIG. 92

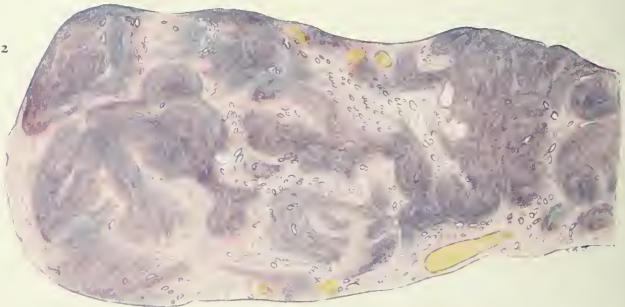


FIGURE 92. Same section as seen above, showing small endothelial lymph-spaces in hyaline areas (X 4).

to show as four) show dark areas of 'telangiectatic' change. Figure 91, Plate XXIV., shows a 'telangiectatic' condition associated with a lymphangiectatic development in a myoma.

In Figure 92, Plate XXIV., is seen the microscopic slide (magnified four times) from which Figure 91 was drawn ; it

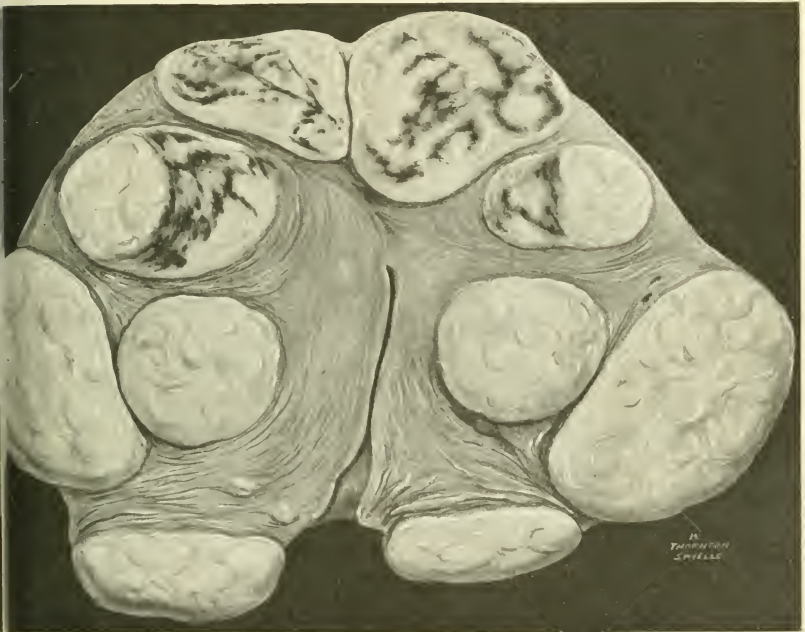


FIG. 90.—Showing 'telangiectatic' areas in myomas. The colour has been preserved by fixation by Kaiserling-Pick's method of preservation.

shows the small lymph-channels, in pale connective-tissue areas of the growth, where hyaline change was marked.

9. **Infection of Myoma.**—Myomas are liable to infection from three sources. The usual channel by which infection gains access is the vagina and uterine cavity ; therefore this complication is most commonly met with in submucous growths. A second source is also the result of an ascending

infection which has now reached the abdominal ostium of the tubes, and the myoma thus becomes infected from below and from above. The third source is the bowel, through the adherent peritoneal coat. Myomas may also be infected through the blood, and Cullen¹ mentions the case of an interstitial myoma, globular in shape and 7 cm. in diameter, which was very soft and putty-like on section, smear-preparations from which showed tubercle bacilli. The parts of a myoma lying in the pelvis are far more liable to infection than those higher up, owing to the frequency with which tubo-ovarian inflammation is associated with myoma.

Suppuration.—Abscess-formation in myoma is very rare; it has been found in interstitial, subserous, and intraligamentary growths. In the case of interstitial growths the infection is from the endometrium; in subserous from the bowel, large or small; and in the intraligamentary probably from the rectum, or secondary to ovarian abscess and pus-tubes. My personal experience of suppuration in myoma is confined to three cases. In Figure 93 is seen an intraligamentary myoma, large portions of which are sarcomatous, others calcareous, whilst, between the sarcoma-tissue and the calcareous myoma-tissue is a cavity which was filled with pus; this tumour was removed by Alban Doran. In Figure 94, Plate XXV., are seen the appearances of breaking-down necrotic areas in the neighbourhood of an abscess-cavity. The transverse muscle-fibres have all lost their nuclei and are broken up into ragged fragments, as if the protoplasm had been submitted to a dry heat and had cracked irregularly, regardless of the cuticle of the cells. A large thrombosed blood-vessel surrounded by leucocytic infiltration is to be seen.

¹ This was a case of Homer Gage. "Fully three-fourths of the tumour showed this degeneration" (*Myomata of the Uterus*, Kelly and Cullen, page 335). This tumour may have been an adenomyoma, and if so the invasion by tubercle from a tuberculous endometritis would be easy to understand.—AUTHOR.

The earliest record of a suppurating myoma which I have been able to find was reported on June 7, 1871, by

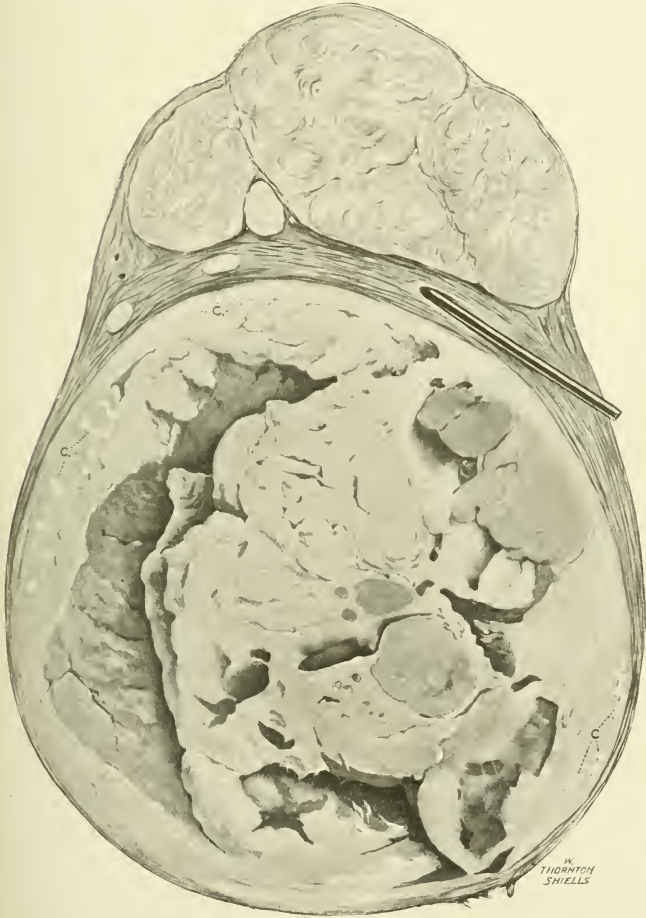


FIG. 93.—Showing intramural myoma, the greater part of which has undergone sarcomatous change. There was a large crescentic abscess-cavity between the sarcomatous central part and the peripheral calcareous myomatous tissue. C = Calcareous areas.

Charles M. Carter.¹ The patient was a single woman,

¹ *Trans. Obstet. Soc. Lond.* vol. xiii. pages 167, 168.

aged 68 years. She was known to have had a tumour for forty years. It had slowly increased in size during the last few years of her life. She died of bronchitis, and at the autopsy the tumour was found to fill the pelvis; pus was seen to escape from a small orifice the size of a sixpence. Three pints of pus were measured; it was described as being like that found in connection with dead bone.

A small piece of "bone," $\frac{1}{2}$ inch square, was found in this pus. The tumour proceeded from the anterior wall of the uterus; the latter was nearly normal in size, its cavity contained two small myomas, and a large calcified pedunculated tumour was attached to its right side. The suppurating growth was 8×6 inches in size, the cavity was ragged and honeycombed, the walls measured $\frac{1}{4}$ -2 inches in thickness and had undergone "cretification." The ovaries were normal.

Kelly and Cullen figure four suppurating subperitoneal growths, the abscess in one opening into the colon; also four interstitial growths, one with the abscess opening into the uterine cavity, and also an intraligamentary myoma containing an abscess. These were obtained from material collected from 1428 myoma-cases, so that the condition is certainly rare.

Sloughing and Gangrene.—This condition is practically confined to submucous and polypoid growths, the cause of the infection, which is always saprophytic, being the exposure of the growth in the genital canal to organisms introduced from without, sometimes by the passage of a sound, or by the introduction of pessaries and specula into the vagina.

Injury to the capsule of the tumour by the point of a sound is a common cause of sloughing. The protecting capsule may be abraded or torn during the process of natural extrusion, and gangrene result. The condition is quite common; it is found in tumours of all sizes, and will

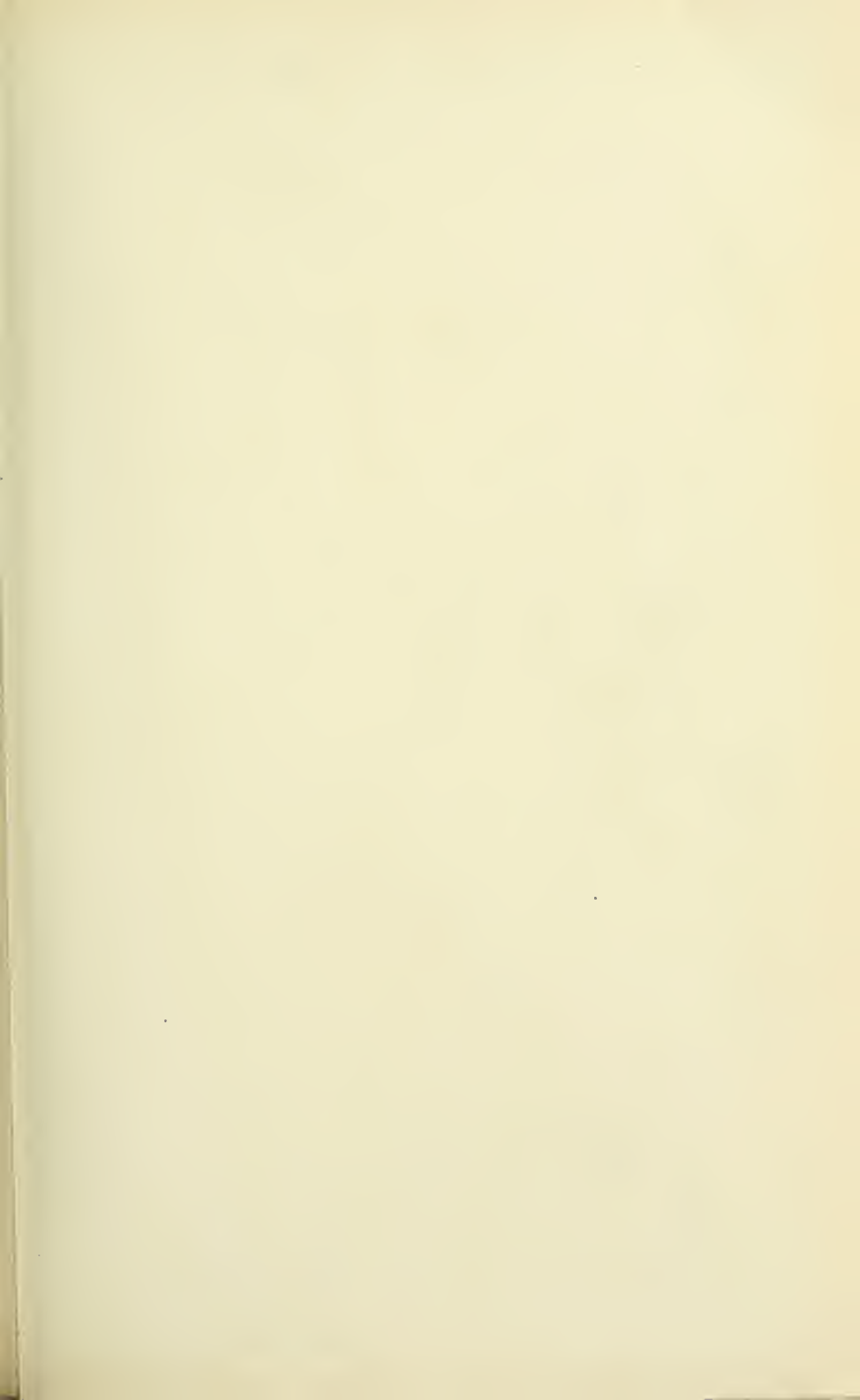


FIG. 94

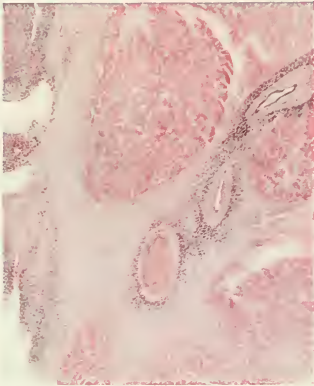


FIGURE 94. Showing acute necrosis of tissues in the neighbourhood of an abscess within a myoma.
2 in. obj. 2 eyepiece.

FIG. 96

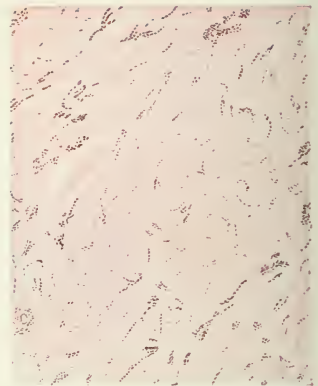


FIGURE 96. Showing necrosis in a submucous myoma. Gangrene had not supervened.
 $\frac{2}{3}$ in. obj. 3 eyepiece.

FIG. 95



FIGURE 95. Showing the gangrenous tissue of a sloughing submucous myoma from a case of puerperal fever.
 $\frac{2}{3}$ in. obj. 3 eyepiece.

be referred to under the clinical description of submucous growths (see pages 195-202).

Microscopically the characters of a sloughing myoma can be studied in Figure 95, Plate XXV. ; the section from which this drawing was made was taken from a myoma which sloughed after labour, and led to puerperal fever. The dead tissue has lost its staining properties, both log-wood and eosin being diffused through the opaque necrotic cytoplasm ; all evidence of nuclei has disappeared, and at one edge of the section there is a collection of polymorpho-nuclear leucocytes which are the only structures to retain the haematoxylin.

Figure 96, Plate XXV., shows an area of necrosis which has not yet become inflamed and gangrenous. The outlines of the muscle-fibres are very indistinct and the nuclei are sparsely distributed.

Adhesions.—Tracey in a series of 3561 cases of myoma found that the growth was adherent in 3.5 per cent, so that this complication is not so frequent in the case of myoma of the uterus as it is in ovarian cysts.¹ Pedunculated growths are the most likely to become adherent, because of their degenerative condition, and their liability to stasis, and the need for additional nutrition. An inflamed *appendix vermiformis* and *salpingo-öphoritis* are sources of adhesions to myomas when these growths are present.

10. **Malignant Changes in Myoma.**—Myomas being exclusively mesenchymal growths, the only type of malignant metaplasia which they can possibly undergo must be likewise mesoblastic.

We may thus have (1) Malignant leiomyomas which are very cellular, and capable of producing metastases, although they are not *histologically* malignant ; (2) Sarcoma formed by malignant metaplasia from the muscle-cells and from the connective-tissue cells of a myoma ;

¹ Compare Adenomyoma (see page 442).

(3) Peri- and endothelioma, which are types of sarcoma of low malignancy, arising from the blood-vessels and lymphatics of a myoma. Epiblastic tissue being absent, it is impossible for epithelioma and carcinoma to develop from within a myomatous tumour. A myoma may, however, be *invaded* by a carcinoma and also by a co-existing sarcoma (see "The Uterine Mucosa in Cases of Myoma," page 93).

Malignant Leiomyoma.—In common with other observers, I have examined the metastatic deposits from the lungs and pelvic cellular tissues of a case in which there was a large myoma of the uterus, and where all the growths, primary and secondary, had the structure of an innocent-looking myoma. Unfortunately the specimen, which was removed by the late Stanley Boyd, has been lost, but the sections are preserved, and the lesson they teach suffices to obliterate any scepticism I may have had as to such a condition being a fact.

Sarcoma.—The possibility of a sarcomatous change occurring in a myoma has received a very tardy acceptance at the hands of London gynaecologists, and even up to the present some observers, including John Bland-Sutton, are still sceptical. It seems to me that just as a chemist from his knowledge of atomic weights is certain of the existence of a missing element long before it is discovered, so the pathologist who commences to investigate uterine tumours starts with the full expectancy of finding a sarcoma developing in a myoma. The natural history of a myoma, the type-cell of which is the embryonic *fibroblast*, would be incomplete without this faculty of developing malignant metaplasia.

If a muscle-cell, when it is a normal constituent of the uterine wall, can undergo malignant metaplasia, why should not a muscle-cell, when it happens to be a component part of a myoma, do likewise?

Figure 93, page 81, shows a breaking-down myoma

which was situated between the folds of the broad ligament and which showed calcareous changes, an abscess-cavity, and areas of sarcomatous transformation.

Endotheliomatous Transformation in Myoma.—This change has already been referred to under "Telangiectasis" (page 77). The tumour there mentioned is shown in Figure 63, page 56, and the areas which I regard as showing endotheliomatous change are drawn in Figure 97, Plate XXVI., opposite page 87.

The naked-eye appearances of the growth are those of a 'fibro-cystic' uterine tumour, the pedicle of which has been twisted. The summit of the growth shows omental adhesions from which the fat has become absorbed, leaving only the blood-vessels which, no doubt, are supplying the tumour-mass with nutrition. The 'telangiectatic' and endotheliomatous areas are seen to lie above the smaller of the two cysts. A similar condition was found in a 'fibro-cystic' tumour, which Mrs. Sharlieb removed and sent to me for investigation.

Kelly and Cullen are very definite in their views on the occurrence of sarcomatous transformation in myoma, and they quote Virchow (1863), Weir (1901), Jacobi and Wollstein (1902) as writers who have drawn attention to this change. I have the permission of my friend, Thomas S. Cullen, to quote him freely, and as his summary of the literature, and of the gynaecological experience at the Johns Hopkins Hospital, forms a most complete account of the subject, I shall avail myself of his generosity.

Frequency of Sarcomatous Changes.—Fehling (quoted by Cullen) found that in 409 myomas, *eight* specimens showed sarcomatous transformation. Martin in 205 cases observed direct sarcomatous metaplasia in *four* instances. In Kelly and Cullen's series of 1428 cases, this change was found 17 times and 17 other cases were suspects. Cullen does not think his percentage of 1.21 represents the proper proportion, as only such cases were examined

as presented suspicious areas to the naked eye. This criticism of his own work holds good for that of all observers, since, owing to their bulk, it is impossible to make anything like a complete histological examination of all myomas removed by operation.

Still, Cullen's percentage is very similar to that of other observers, *e.g.* Noble found it worked out at 1.8 per cent and Tracey gives 1.5 per cent.

Direct microscopical evidence of sarcomatous change is, now and then, supported by clinical data. The subjects of apparently innocent myomas, after the removal of these tumours, have succumbed to recurrence. Polypi which have been found innocent have recurred again and again, and have ultimately been found to have undergone sarcomatous transformation (see remarks on page 197).

Naked-eye Appearance of Sarcomatous Areas.—It must be accepted that early sarcomatous change cannot be recognised macroscopically, but when the condition is well established, the gross features of the malignant area afford a striking contrast to the surrounding unchanged myomatous tissue. Quite frequently the malignant area is sharply defined, the line of demarcation is very definite, the cut surface is uniformly homogeneous and of a yellowish-white or buff colour, and the malignant area is softer than the surrounding tissue. In some examples the new growth is not definitely outlined, but merges into the surrounding tissue.

Like sarcoma elsewhere, the malignant areas may become cystic from dilatation of lymph-spaces; hæmorrhages may occur in the tissues, staining them a reddish-brown; and blood-cysts may form from the breaking down of the embryonic blood-vessels. Sarcomatous changes usually commence in the central part of a myoma. In Kelly and Cullen's 17 cases, the location of the sarcomatous growths was as follows: Interstitial, 9 cases; Subperitoneal, 4 cases; Intraligamentary, 1 case; Submucous, 3 cases.

FIG. 97

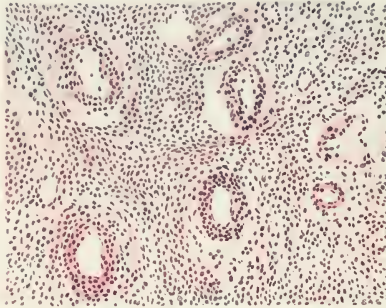
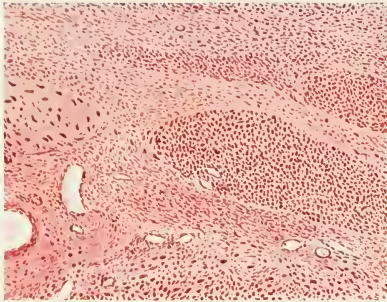


FIGURE 97. Showing an endotheliomatous area in the fibrocystic subserous myoma shown in Fig. 63, p. 96

$\frac{1}{4}$ in. obj. 3 eyepiece

FIG. 98

Hyaline area with metaplasia of muscle-cells



Metaplasia of muscle-cells

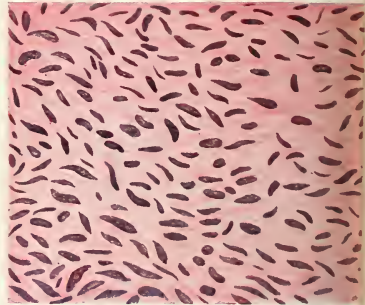


FIGURE 98. Sarcomatous area in a myoma. The malignant change is taking place in the muscle-cells and not in the fibrous tissue.

$\frac{2}{3}$ in. obj. 2 eyepiece.

Myosarcoma. From same slide as Figure 98 under $\frac{1}{6}$ in. obj. 3 eyepiece.

FIG. 99

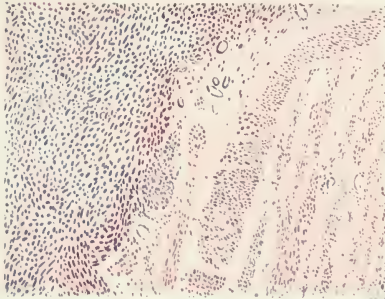


FIGURE 99. Showing sarcomatous metaplasia of the muscle-cells of a myoma. $\frac{2}{3}$ in. obj. 3 eyepiece.



Myosarcoma. From same slide as Figure 99 under $\frac{1}{8}$ in. obj. 3 eyepiece.

Microscopic Appearances of Sarcomatous Transformation.—

Cullen shows that there are two varieties :—

- (1) Sarcomatous metaplasia of the connective-tissue cells.
- (2) Sarcomatous metaplasia of the muscle-cells.

Figures 98 and 99, Plate XXVI., demonstrate the latter condition, whilst Figures 98a and 99a show the same sections under a high power.

(1) Cullen states that Virchow was the first to describe the former variety, and that his description is as follows : “ At certain points the intercellular substance commences to grow, the cells increase through division, thus more and more round cells are formed, at first small, later larger and larger and with bigger nuclei. Meanwhile the intercellular substance becomes less, and more rarefied; and while the stroma increases, the muscle disappears entirely in many places, at other points it still persists and even increases. In this manner the trabecular character of the growth develops. The cells grow, many of them become angular and develop processes, and their nuclei reach the size of epithelial nuclei. They are, however, usually arranged in rows or groups. With this increase in the cellular elements the original stroma is in part or entirely replaced by the new growth. Such portions become soft, friable, and have a whitish or yellowish appearance. Comparatively large blood-vessels penetrate the softer portions and give rise to haemorrhagic infiltration. In this way the cyst-like spaces are produced.”

(2) In most cases the sarcoma-cells are thought to be due to metaplasia of the connective-tissue cells of a myoma, but in 13 of Kelly and Cullen's 17 cases they were apparently the result of a transformation of the myomatous muscle-fibres, and in the remaining 4 cases the presumptive evidence was in favour of a similar origin. The test was always made by taking sections from the periphery of the growths, because in the central portion all trace of the myomatous

muscle has disappeared, and its place is occupied by spindle-celled sarcoma.

The sarcomas of connective-tissue origin are either spindle-celled or round-celled; those of muscular origin are invariably spindle-celled. It is possible that both stroma and muscle may take part in the malignant transformation simultaneously.

As stated under "Hyaline Degeneration" (page 48) this condition is often a precursor of, or, at any rate, intimately associated with sarcomatous transformation (see Figs. 100 and 101, Plate XXVII.). Cullen explains the metaplasia under these conditions by saying that "the muscle fibres scattered throughout the hyaline and partially liquefied material have a much more favourable opportunity for swelling up or for taking upon themselves increased activity, not being closely packed together as in the ordinary myoma." He says: "The more we study these tumours, the more strongly we become impressed with the apparently predisposing tendency to sarcoma created by the primary hyaline change."

It is stated on page 84 that a myoma may be *invaded* by a sarcoma; Figure 102 represents the anterior view of a myomatous uterus showing two submucous nodules, which on section proved to be large round-celled sarcomas. These nodules were covered by a large blood-clot, which filled the uterine cavity at the time of operation.

A coronal section through the meridian of a large myoma in the posterior uterine wall of this specimen also showed several rounded areas of yellowish, opaque, homogeneous sarcoma. These areas contrasted sharply with the whorled appearance of the myomatous tissue. There was a metastasis in the broad ligament on the right side.

The microscopic appearances are seen in Figure 103, Plate XXVII. The round sarcoma-cells are packed in large alveoli which have formed in the myomatous tissue. The latter appears to have undergone no responsive change.

FIG. 100

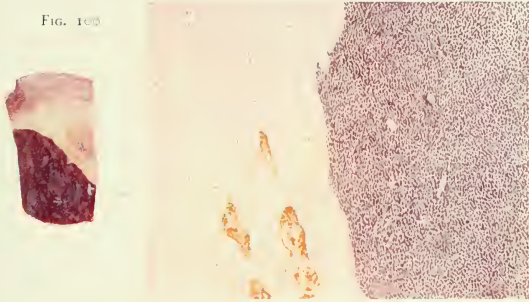


FIGURE 100. Showing a sarcomatous area ending abruptly in the hyaline tissue of a myoma. The inset is a drawing of the naked-eye appearance of the microscopic slide.

FIG. 101

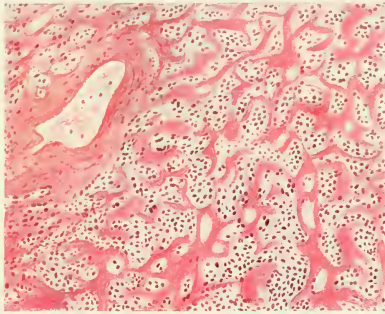


FIGURE 101. Showing trabecular arrangement of hyaline tissue which has left spaces in which the muscle-cells can swell up and undergo sarcomatous metaplasia.

FIG. 103.

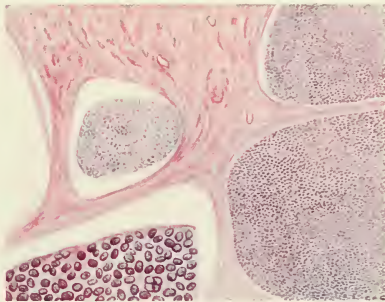
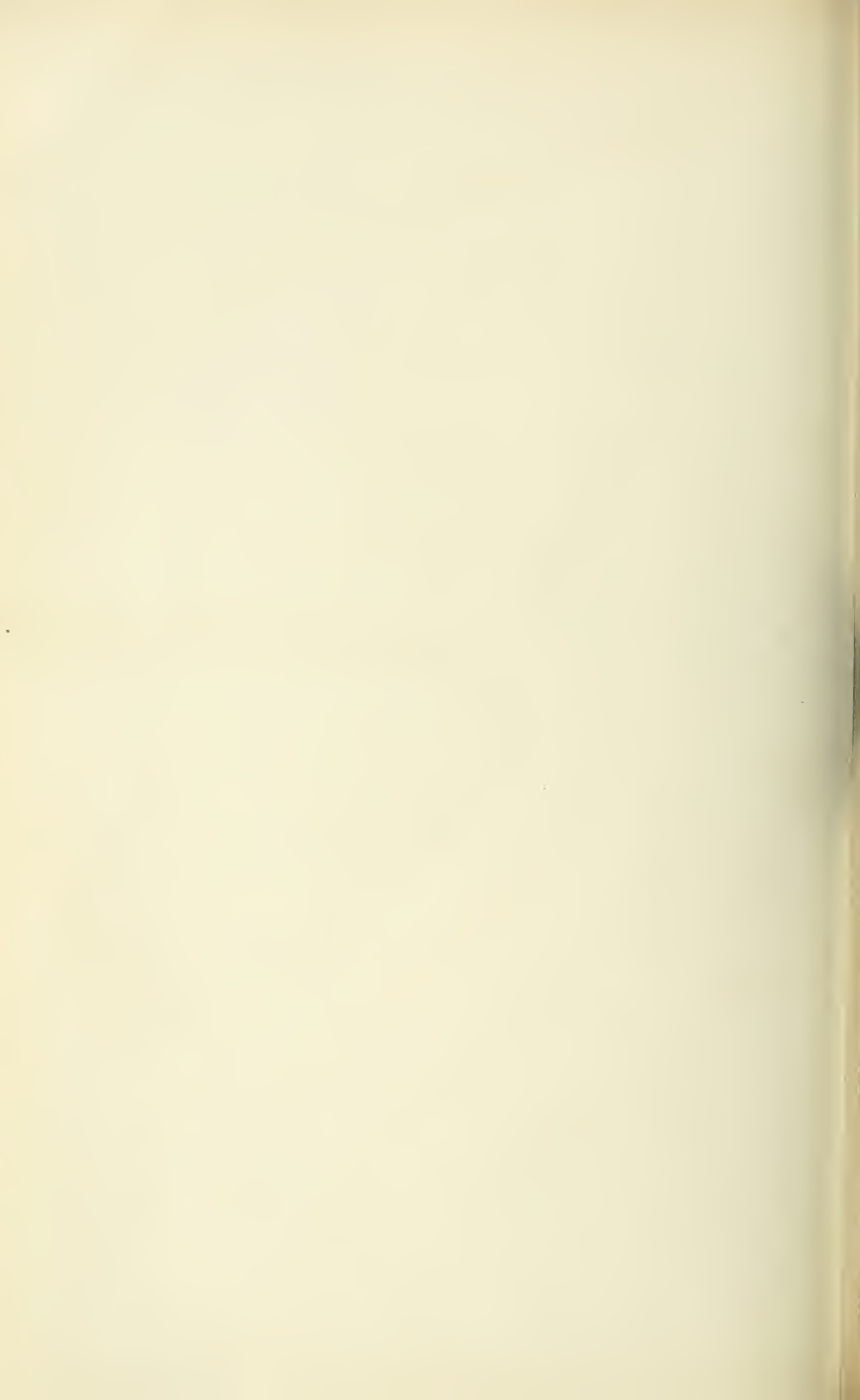


FIGURE 103. Showing invasion of a myoma by a coexisting sarcoma. In the right hand lower alveolus the cells are shown under $\frac{1}{8}$ in. obj. No. 3 eye-piece. (Section of growth shown in figure 102.)



The inset shows the cells under $\frac{1}{8}$ inch objective. There is no sign that the myoma-cells are undergoing malignant metaplasia. It appears to be a case of a definite invasion,

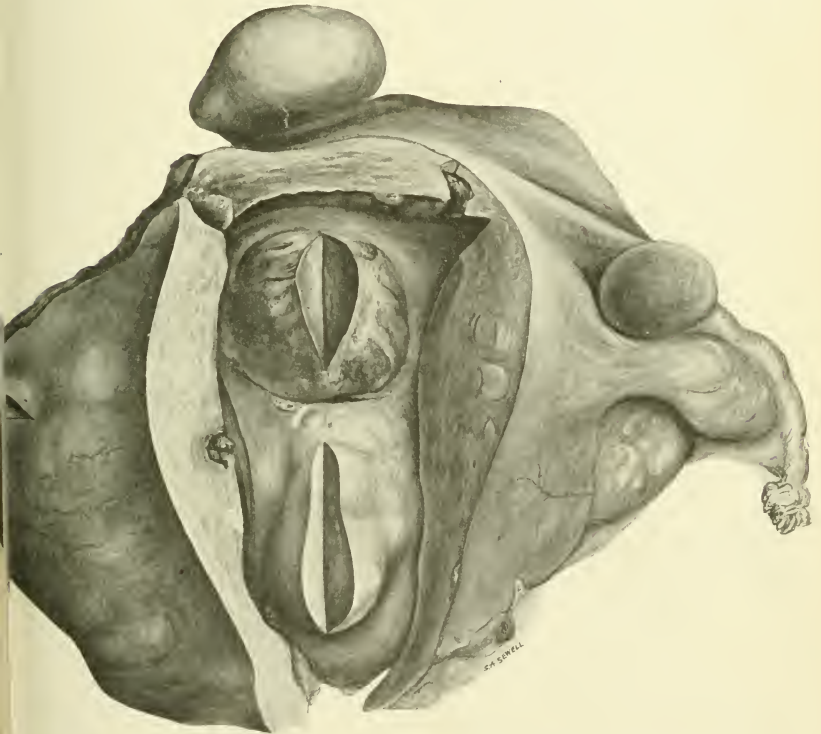


FIG. 102.—Showing a myomatous uterus invaded by a round-celled sarcoma, which is submucous in situation, and probably arose from the connective-tissue stroma of the endometrium. A wedge-shaped incision has been made in each sarcomatous nodule to show the smooth homogeneous cut surface.

and it is very probable that the round-celled sarcoma started in the stroma of the mucous membrane, lining the cavity of the myomatous uterus. Further reference to the subject of sarcomatous change in myoma will be found in Appendix IV. pages 569-573.

CHAPTER V

CHANGES IN THE UTERUS IN CASES OF MYOMA

Position of the Uterus.—This is mostly influenced by retroperitoneal myomas; the burrowing intraligamentary growth will cause lateral displacement, which varies in degree according to the size of the myoma. Interstitial cervical growths elevate the body and elongate the cervix.

Backward displacement and flexion of the body are often produced by interstitial growths, and sometimes by sessile and pedunculated growths arising from the posterior wall. The body of the uterus may be pushed backwards, forwards, or more rarely downwards, by interstitial myomas, whilst submucous growths may drag it down and even invert the fundus (see Fig. 28, page 22). Torsion of the uterus has already been referred to (see page 77).¹

Size of the Uterus.—The uterus is generally enlarged in the case of myoma; this is due to an associated hyperplasia of all its component parts; whether this be the effect of the myoma, or whether the hyperplasia and the myoma are due to a common factor (? ovarian), is a debatable point.

Subserous growths, whether single or multiple, alter the size of the uterus but little. In the case of interstitial growths, it is usual to find a great increase in thickness of the muscular walls, so that often after myomectomy the uterus, when sewn up, is of twice the normal size. The walls of a uterus which is engaged in extruding a submucous myoma are thickened; see Figure 23, page 20,

¹ Also Appendix II. page 561, and page 179.

which shows a uterus opened up during the partial 'delivery' of a mass of these growths. The behaviour of the uterine muscle in this case calls to mind the polarity of the uterus, seen in frozen sections of the organ, during the second stage of labour. In these cases it seems fair to assume that the increased thickness of the uterine muscle is due to physiological work-hypertrophy.

Shape of the Uterus.—This is altered in so many ways as to defy description. With a submucous myoma it often assumes a uniform pear-shape and resembles the pregnant organ in consistence and contour (*grossesse fibreuse*, see page 195).

The Cervix.—When the myoma is corporeal, the cervix does not, as a rule, share in the general hyperplasia.

In cervical interstitial growths the muscular capsule is stretched out and thin, the canal is lengthened (see Fig. 29, page 24), and its axis deflected, so that the os may be found to one or other side, or pushed up underneath the symphysis pubis.

During extrusion of a corporeal growth, the cervix is opened up, and its walls thinned by stretching, but it contracts down again upon the pedicle after expulsion of the growth, and may cause its strangulation (see Fig. 25, Plate V., page 20).

The Cavity of the Uterus.—The *cavum uteri* is mostly influenced by submucous sessile and pedunculated growths. In the case of the sessile submucous tumours, the enlargement is often apparently more than the presence of the growth would account for; see Figure 16, page 15, which shows the cavity greatly enlarged over the submucous segment of a 'cup and ball' myoma; also Figure 56, page 50, where the cavity is widened and elongated over the submucous portion of a myoma undergoing liquefaction. Figure 26, Plate V., facing page 20, shows the same enlargement of the cavity, due to the presence of a submucous growth.

Figure 12, page 10, shows that the cavity is practically unaltered in the presence of pedunculated and sessile *subserous* myomas. Figure 19, page 16, demonstrates the dilatation of both the cavum and cervical canal by a submucous growth.

In the days when the uterine sound was extensively used, the size, length, and direction of the cavity of the uterus were considered as matters of supreme importance; at the present time the cavity of the uterus is often first studied after the removal of the growth, and there is no doubt that the sound is a dangerous instrument to use in cases of submucous myoma. By probing about in the uterine cavity the protecting mucous capsule of the growth may be lacerated, and this, in days gone by, was no doubt a fruitful source of the sloughing of these tumours (see page 82). The only occasion for the use of a sound in these cases is in the differential diagnosis between a submucous myoma lying in the vagina and an inverted *fundus uteri*.

It is obvious that the size and shape of the cavity will vary with the propinquity of the growth or growths, and with the extent to which they encroach on its lumen. A *subserous* fundal growth will leave the cavity beneath it unaffected. A wide *interstitial* growth with a submucous segment may stretch the cavity in length and width to an enormous extent, as shown above; if, on the contrary, it does not push its way towards the cavity, the latter will not be affected. Cullen describes a submucous myoma becoming adherent to the uterine walls and causing partial obliteration of the cavity.

Blood in the Cavity of the Uterus.—In two of my cases, on opening up the cavity a considerable amount of coagulated blood was found; in one case the myoma was submucous, in the other sarcomatous invasion had occurred in several areas of the myomatous growth.

Pus in the Cavity of the Uterus.—Cases have been described of pyometra associated with myoma, but this condition, common enough in carcinoma, is rare in cases of

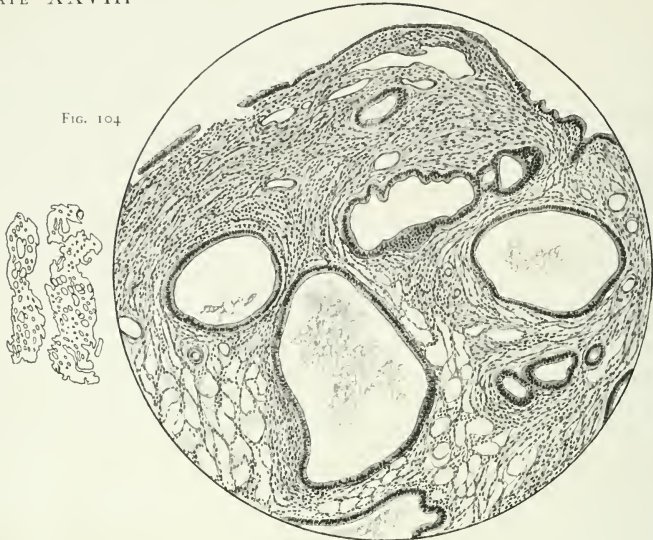


FIG. 104

FIGURE 104. Showing endometritis polyposa cystica, a condition sometimes seen in association with uterine myoma.

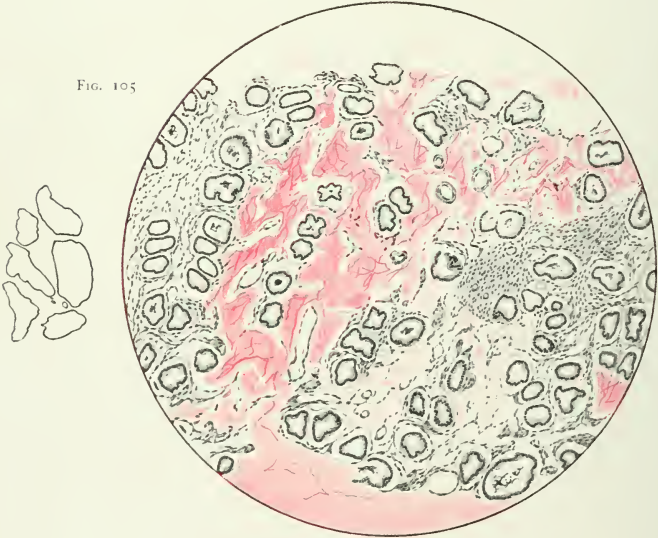


FIG. 105

FIGURE 105. Showing a subepithelial hæmatoma with disintegration of the mucous membrane produced by the hæmorrhagic flow.

The insets show the size of the pieces of endometrium removed by curetting.

myoma. Cullen mentions it in connection with tuberculous endometritis complicating a myoma.

The Uterine Mucosa in Cases of Myoma.—*The mucous membrane of the cervix* becomes inflamed from septic discharges in cases of sloughing submucous growths. It is stretched, thinned out, and desquamated, by the extrusion of a myomatous polypus. Excluding sepsis and extrusion, the mucosa of the canal is uninfluenced by corporeal growths. Cervical myomas, which open up and elongate the canal, render it more liable to sepsis—the mucous membrane covering these growths is always atrophied by stretching (Fig. 17, Plate IV., page 15). With the above exceptions, the generality of myomas produce no changes in the cervix or in the mucosa of its canal.

The Mucous Membrane of the Body.—Like the muscularis, the mucosa is influenced by the hyperaemia which prevails in cases of myoma, and it is common to find hyperplasia and hypertrophy of the lining membrane in conjunction with that of the muscle-wall (Fig. 18, Plate IV.). The myoma may, or may not, be the exciting cause, for, as was previously stated, the uterine hyperplasia and the myomatous change may both be the outcome of ovarian hypersecretion.¹

Diffuse ‘fungous endometritis,’ ‘endometritis polyposa cystica’ (Fig. 104, Plate XXVIII.), and mucous polypi, one or the other, are frequently met with in association with *myoma uteri*, and I have often been able to find plasma-cells in endometria of these types; this favours the conclusion that the changes are inflammatory, and therefore not in any way caused by the growth. My experience has been to find the grossest changes in the endometrium in cases where there is also *salpingo-öphoritis* present, and this again points to an infective origin for the endometritis.

Haemorrhage in the Mucosa.—This always occurs during

¹ Hypertrophy and hyperplasia are present in 50 per cent of uterine myomas (Schickele and Keller).

menstruation, but the proximity of a myoma would seem to accentuate it. Sub-epithelial haematomas are common, as are distended and engorged capillaries. Extensive disintegration of the stroma is produced by the pressure of the effused blood (see Fig. 105, Plate XXVIII.).

These endometrial changes are not peculiar to myoma; they are seen in the endometrium in true chronic infective endometritis, quite apart from new growths.

Uterine Polypi.—Mucous polypi are frequently found in cases of myoma, but again there is no traceable relationship between the two conditions; these structures are a localised overgrowth of all the component parts of the endometrium, due in my opinion to chronic inflammation.

There is another type of polypus, which in my experience is more commonly found when myomas exist in the uterus. An example of this is seen in Figure 106, Plate XXIX. This kind of polypus is usually described as 'fibro-adenomatous,' and may be regarded as a fibromyoma with gland-inclusions. The growth is often single, but, in the case shown, there are many such present (see Fig. 21, page 18). Unlike the mucous polypus, it is undoubtedly a neoplasm. Its stroma consists of connective tissue and muscle, and in this are seen gland-spaces. The latter are tubules resembling those of the endometrium, but they are not surrounded by endometrial-like stroma, which differentiates them from the gland-structures seen in diffuse adenomyoma. Except for this distinction it would be convenient to class these growths with adenomyomas, of which they would constitute a polypoid form.

The uterus from which the polypus seen in Figure 106 was removed, together with the history of the case, was sent to me by C. Hamilton Whiteford of Plymouth.

In February 1912, the patient, a nullipara, aged 52 years, extruded from the cervix a black stinking fibroid, 2 inches in diameter, which was removed. The endometrium was smooth, the

FIG. 106

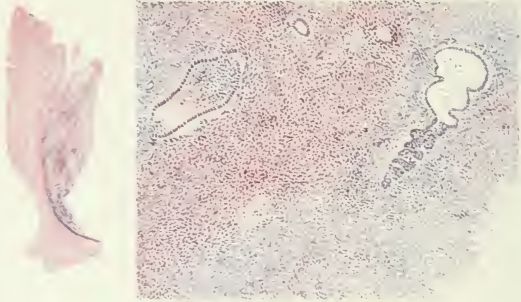


FIGURE 106. Showing the naked eye appearance and microscopic characters of an adeniferous myomatous polypus. It is one of the many polypi shown in Figure 21, page 18.
 $\frac{2}{3}$ in. obj. 2 eyepiece.

FIG. 107

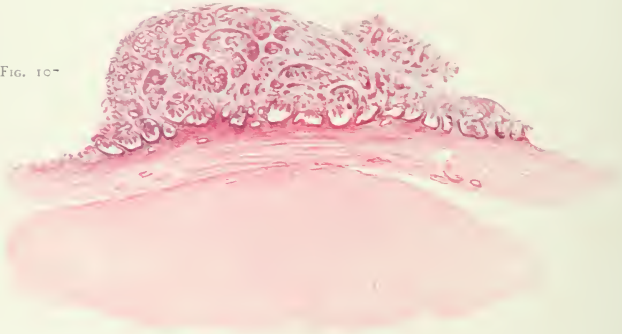


FIGURE 107. Showing adenocarcinoma of the corporeal endometrium overlying a portion of a myoma which showed hyaline degeneration. $\times 4$

uterine cavity measured $4\frac{1}{2}$ inches, many myomas were felt in the uterine walls. In July (1912) a similar myoma became extruded and was removed. The endometrium, which five months previously was smooth, was now found to be covered with polypi—yellow, soft and gelatinous, similar to those of the nose; the largest polypi were 2 inches in length. A handful of these soft growths was removed with sponge-holding forceps. The cervical mucosa was not polypoid.

Hysterectomy followed a month later (August 1912).

After receiving the specimen, I removed the polypus which is seen in Figure 106, Plate XXIX.; and those seen in Figure 21, page 18, form the remaining product (according to the history) of one month's growth.

Tuberculous infection of the endometrium was found in 7 out of 1428 cases by Kelly and Cullen, but in none of these were the myomas infected. In some of the cases, the implication was quite recent; in others, the endometrium was completely replaced by granulations; and in one, the cavity was filled with creamy fluid.

In a case of Homer Gage the infection spread from the endometrium into an interstitial adenomyoma, an infection easily explained by continuity of gland-tissue (see 'Adenomyoma,' page 433).

Malignant Changes in the Uterine Mucosa.—Cullen, in over 1400 cases of uterine myoma, found cancer of the body in 25 (1.7 per cent). The youngest patient was 30, the oldest 64 years. Twelve out of the seventeen patients had never borne a child at term; five had given birth collectively to twelve children.

In 1118 cases, Noble found cancer of the body in 2.4 per cent. Tracey, in 3561 collected cases, found corporeal cancer in 1.7 per cent. Piquand (1905), quoted by Bland-Sutton, found cancer of the body associated with myoma in 15 out of 1000 cases; and Bland-Sutton's own percentage is 1.6; in every case the patient being over 50 years of age. Bland-Sutton drew the conclusion from his own personal

experience, that among women over 50 years of age who submit to hysterectomy, in more than 10 per cent the tumours (myomas) will be complicated with cancer of the body of the uterus.

In 270 major operations for myoma, I have found carcinoma of the body in two cases, and carcinoma of the cervix also in two cases. In removing uteri for carcinoma,

it is not uncommon to find one or more small myomas, but I have not taken note of this fact in the above statement.

Three of the above cases are figured in the text (see Figs. 108, Plate XXX., 109, 110, and 111).

The *coincidence* of cancer and myoma in the uterus is of great clinical importance, but pathologically it cannot be said that one growth predisposes to the development of the other, although operation-



FIG. 109.—Showing the muscle-tissue of a myoma being invaded by adenocarcinoma of the corporeal endometrium. The section was taken from specimen illustrated in Fig. 108, Plate XXX.

C, carcinoma; C', C', cancer-cells showing metaplasia;
M, M, myomatous tissue.

statistics alone seem to favour this view. If the myoma is submucous, an adenocarcinoma of either cervix or body will favour the infection of the former by pathogenic germs. The mucous membrane of the cervix or body of the uterus may be the seat of a carcinoma, and the malignant growth may lie in close proximity to a myoma without involvement of the latter (see Fig. 107, Plate XXIX.). I have shelled out a myoma from a bed of cancerous tissue and failed on microscopic examination to find any penetration

FIG. 108



FIGURE 108. Showing a uterus which is the seat of multiple myomas and cancer of the endometrium. The latter invaded adjacent myomas. See figure 109, page 96.

of the growth by cancer-cells. The spreading cancer-cells took the line of least resistance, and ran along the



FIG. 110.—Showing diffuse adenocarcinoma and myoma of the body of the uterus.

lymph-channels, in the cleavage between the growth and the uterine muscle, avoiding the more compact and comparatively avascular myoma.

In Figure 107, Plate XXIX., is shown a section of a

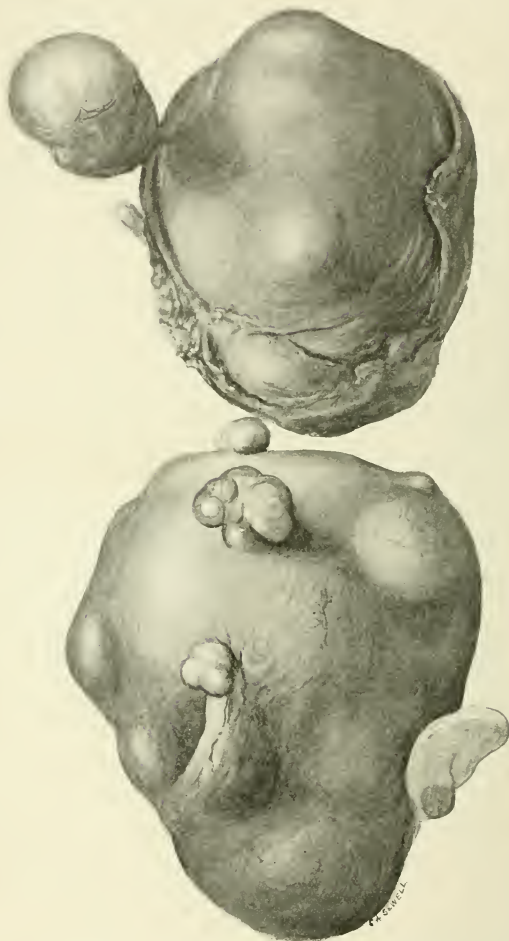


FIG. 117.—Posterior view of Fig. 110, showing subserous nodules which led to the diagnosis of myoma, the presence of carcinoma of the body being overlooked.

myoma in a state of hyaline degeneration, together with adenocarcinoma of the corporeal endometrium. Not only

the myoma, but also its muscular capsule, has escaped invasion.

Williamson describes carcinoma invading a fibromyoma,

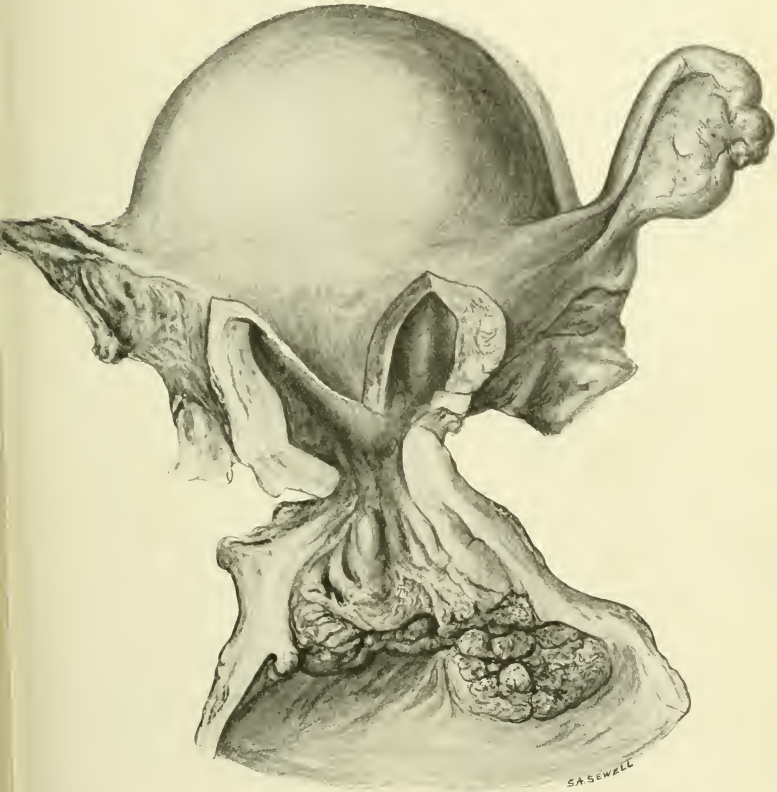


FIG. 112.—Showing carcinoma of the cervix and myoma of the body of the uterus.

which forms one of the specimens in the St. Bartholomew's Hospital Collection (Sp. 3004, 62). The specimen consists of half of the body of a uterus, divided longitudinally, to show the invasion of a fibromyoma by carcinoma. "The uterus is enlarged, and on its outer surface are several

subperitoneal fibroids. The cut surface shows many interstitial tumours. The central portion of the specimen is



FIG. 113.—Showing posterior view of Fig. 112. The myoma is seen in section. It was quite 'healthy.'

occupied by a roughly circular mass of growth, which is a fibromyoma in process of invasion by a columnar-celled carcinoma which has originated in the uterine mucosa."

Cullen also records a case of adenocarcinoma of the

body of the uterus with extension of the growth to the uterine myoma, and an excellent drawing by H. Becker of the invasion is shown on page 407 of *Myoma of the Uterus* (Kelly-Cullen). In this case the cancer was particularly virulent; in addition to invading the myoma, it had spread to the peritoneum and omentum, inguinal, pericardial, and cervical lymph-glands. There were giant-cells in the carcinomatous glands. A complete histological description of this case is given in Cullen's *Cancer of the Uterus*, page 434.

Figure 108, Plate XXX., shows a corporeal carcinoma in a uterus which was removed as myomatous from a woman aged 54 years. The growth invaded the adjacent myomatous nodules.

Figure 109, page 96, shows a section through the sub-mucous portion of one of the myomatous tumours. The processes of an adenocarcinoma are eating their way into the fibro-muscular tissue of the myoma; some of the cancer-cells have undergone metaplasia and are becoming keratoid.

Figures 110 and 111 show the front and back views of a myomatous uterus in which the whole of the endometrium had become carcinomatous. A subtotal hysterectomy was performed in the belief that the case was one of degenerate myoma. The patient was 59 years of age, and recurrence soon followed the operation.

Figures 112 and 113 show the co-existence of a corporeal myoma and carcinoma of the cervix. The patient was aged 50; she had been treated for many years for uterine haemorrhage. The clinical history suggested that the myoma had existed for many years.

Malformation of the Uterus in relation to Myoma.

—Uterine malformation is met with only on very rare occasions when operating for myoma. Abnormal uterine development is relatively more common in cases of 'adenomyoma' than in those of myoma. Some authorities have attributed the defective growth of the uterus and the

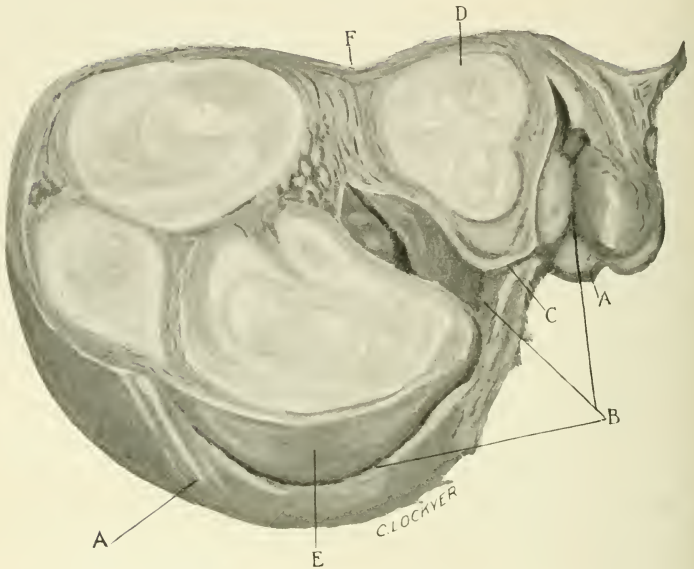


FIG. 114.—Showing a uterus septus containing myomatous tumours.

A, A, level of supravaginal amputation; *B*, uterine cavity; *C*, lower end of septum between uterine cavities; *D*, myoma in the septum; *E*, submucous myoma distending one-half of the cavity; *F*, fundal depression.

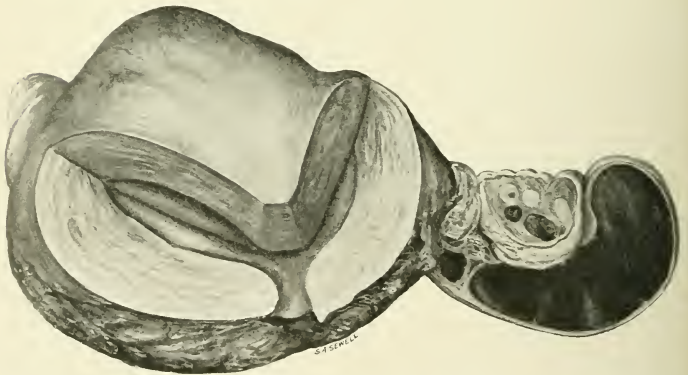


FIG. 115.—Showing haematosalpinx and adherent left ovary in a case of myoma with uterus septus. The cases illustrated in Figs. 114 and 115 were published by Doran and Lockyer, *Journal of Obstetrics and Gynaecology of the British Empire*, 1905, pages 167 and 186.

tumour-formation to one and the same cause, but there seems to be no justification for insisting upon a common causal factor.

A fair idea of the rarity of myoma reaching a size of clinical importance in malformed uteri, may be gained from the fact that Kelly and Cullen among the 1400 cases which they record cite only one example. This is figured in their monograph, *Myomata of the Uterus*, page 156. It is a *uterus septus* with multiple myomas in the septum and elsewhere, making up a mass which reached 10 cm. above the umbilicus. In the examination of over six hundred myomatous uteri removed by operation I have encountered but two cases of uterine malformation. These were published by Alban Doran and myself in the *Journal of Obstetrics and Gynaecology of the British Empire*, 1905, and we summarised the recorded cases up to date. Space does not allow me to describe the cases here; indeed, in my opinion, such rarities are of interest purely from the developmental standpoint and are of no special clinical importance.

Figure 114 shows a coronal section of a *uterus septus* which I removed from a patient, a III-para, aged 42 years, on account of severe menorrhagia which was accompanied by dysmenorrhoea. The condition had been diagnosed as pregnancy by a general practitioner four months prior to operation. The os uteri was single and very patulous. The left ovary being cystic and the corresponding tube being inflamed and swollen, both were removed; the right appendages were normal. The specimen measured 6 inches from side to side and 5 inches in the vertical direction. The median septum ended a quarter of an inch above the cervical amputation. Figure 115 shows another example of a septate uterus containing an interstitial myoma, which was removed by Alban Doran from a patient aged 42. This woman was sterile. The clinical symptoms were complicated by the presence of a haematosalpinx.

CHAPTER VI

GROSS LESIONS OF THE FALLOPIAN TUBES AND OVARIES IN ASSOCIATION WITH MYOMA OF THE UTERUS

Fallopian Tubes

OUT of 934 cases Cullen found that one or both tubes were adherent in 434. This large percentage was made up as follows: white subjects 35.6 per cent, coloured subjects 63 per cent, showing the interesting fact that adherent appendages were almost twice as frequent in negroes as in white women.

Hydrosalpinx was noted in 88 cases of Kelly and Cullen's series of myomas. A well-marked example from one of my own cases is seen in Figure 116.

Haematosalpinx.—Kelly and Cullen record 12 cases of pure haematosalpinx (*i.e.* not blood-stained hydrosalpinx) in the 934 cases mentioned above. Figure 115 shows a genuine haematosalpinx attached to a myomatous uterus. The plicae were engorged with blood, as if the tubal mucosa were menstruating.

Chronic Salpingitis (non-purulent).—This condition in Kelly and Cullen's series was found to exist in 48 cases, *i.e.* in about 5 per cent, and in all but 3 cases it was bilateral.

Pyosalpinx.—Kelly and Cullen found pyosalpinx in 41 cases, *i.e.* in 4.4 per cent.

FIG. 117

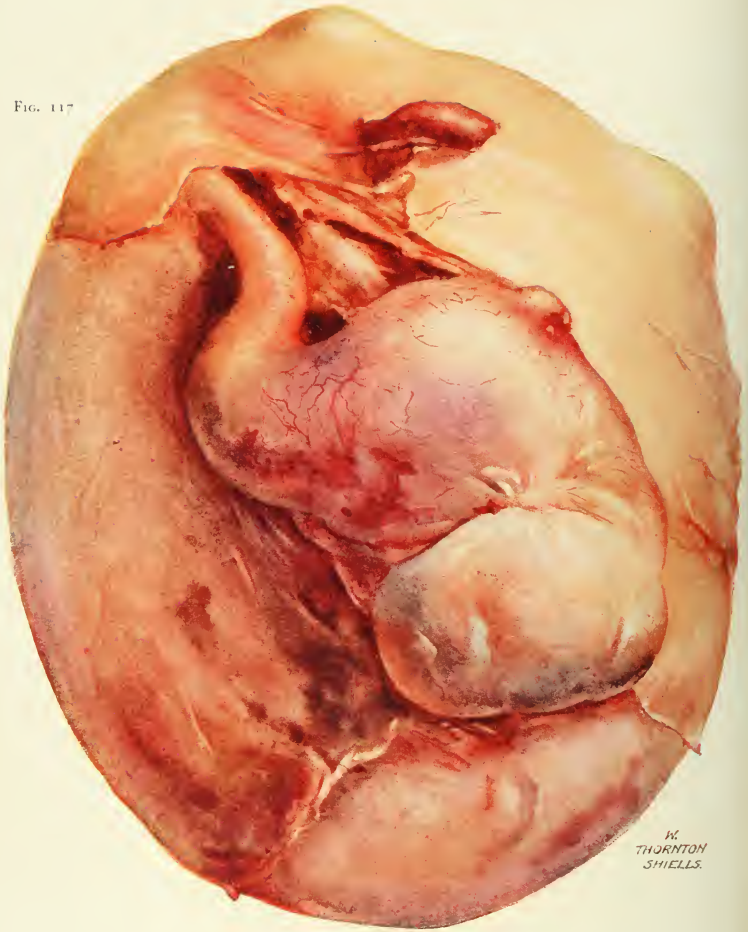


FIGURE 107. Myoma uteri associated with pyosalpinx, from a drawing in the possession of T. W. Eden.

Figure 117, Plate XXXI., shows a large pyosalpinx adherent to a myomatous uterus, removed by T. W. Eden.

From Kelly and Cullen's statistics it would appear that gross inflammatory changes are found in over 9 per cent of cases operated upon for *myoma uteri*, and that in nearly half of these the salpingitis has reached the stage of suppuration.

Tubo-Ovarian Cysts.—These interesting and puzzling

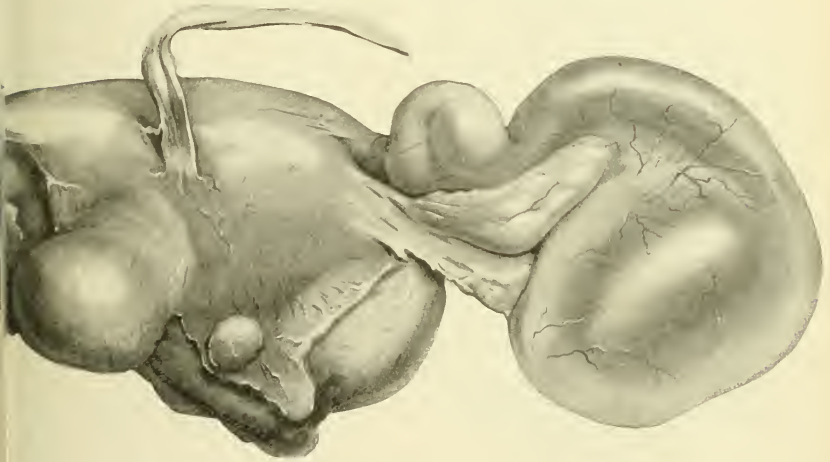


FIG. 116.—Showing a myomatous uterus and a right-sided hydrosalpinx. Attached to the posterior surface of the uterus below the level of the fundus is the pedicle of an old ventri-suspension or fixation.

structures are found to accompany myoma of the uterus, and when it is remembered how frequently *salpingo-oöphoritis* is associated with 'fibroids' of the womb, this is not to be wondered at.

The view propounded by Thomas Cullen as to how this condition of fusion arises, seems to me so logical that I repeat it here. He says: "In these cases there has evidently been a mild inflammation; the tube has become adherent to the ovary, and a hydrosalpinx has developed.

At a later date a matured Gräafian follicle, at the point of adhesion, has been unable to empty itself, and has developed into a Gräafian-follicle cyst. The cyst and the hydrosalpinx have eventually opened into one another."¹ Figures 118 and 119 show two different types of tubo-ovarian cysts associated with myoma.

My colleague, Gordon Ley, holds the view that these tubo-ovarian structures are tubal throughout, *i.e.* the con-

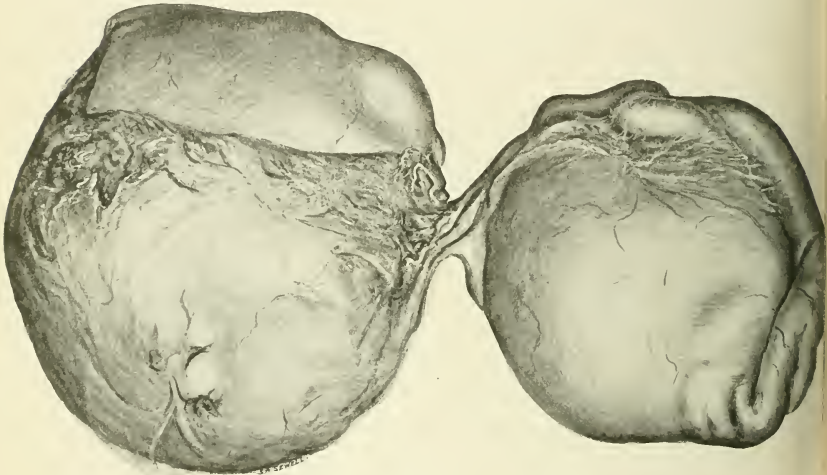


FIG. 118.—Showing a myomatous uterus and a typical tubo-ovarian cyst.

dition is one of sactosalpinx with a dilated retort-shaped end, to which an ovary has adhered and become spread out on the surface of the bulbous extremity of the retort.

Figure 120, page 108, shows a large tubo-ovarian abscess associated with a myomatous uterus. This case is very puzzling, as the abscess-walls contain muscle-fibres in abundance ; but as the tube opens into it, I am constrained to regard it as a sactosalpinx fused with an ovarian cyst and not as a suppurating myoma.

¹ Thomas S. Cullen, *Hydrosalpinx*, Johns Hopkins Reports, 1895, vol. iv. page 351.

Tubercle.—Cullen says that the presence of a thickened *nodular* tube with a *patent* fimbriated extremity is always presumptive evidence of tuberculosis in this situation.

In 14 out of 934 cases Cullen found the Fallopian tubes to be the seat of tuberculosis ; in every case the disease was

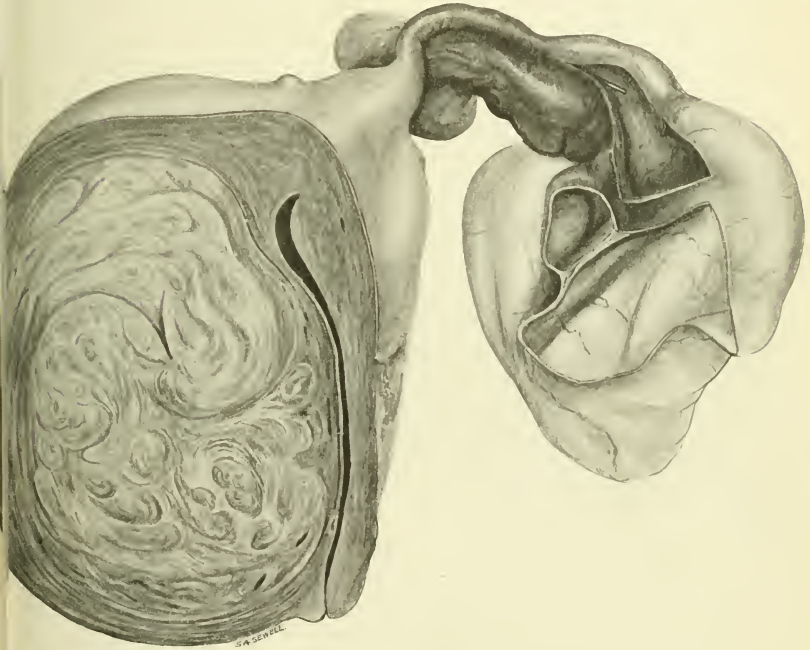


FIG. 119.—Showing a uterus containing an interstitial myoma of the anterior wall. There is present a tubo-ovarian cyst which shows the tube opening into a multi-locular ovarian cystoma. A pointer is inserted at the site of junction between the lumen of the tube and one of the loculi of the cyst.

bilateral, and in six instances the character of the lesion was recognised only on microscopic examination. In one case only was tuberculosis suspected before operation, the symptoms of myoma overshadowing the infective process. This case was under the care of Halsted for hip-joint disease. The endometrium in some of these fourteen cases was likewise affected.

Tubal Pregnancy.—I have once met with this condition as a complication of *myoma uteri*; this case is shown in Figure 141, page 163, where the case is referred to under "Pregnancy and Myoma." The operation was performed for extrauterine pregnancy; the myoma was discovered at the operation.

John Bland-Sutton says: "The rarity with which

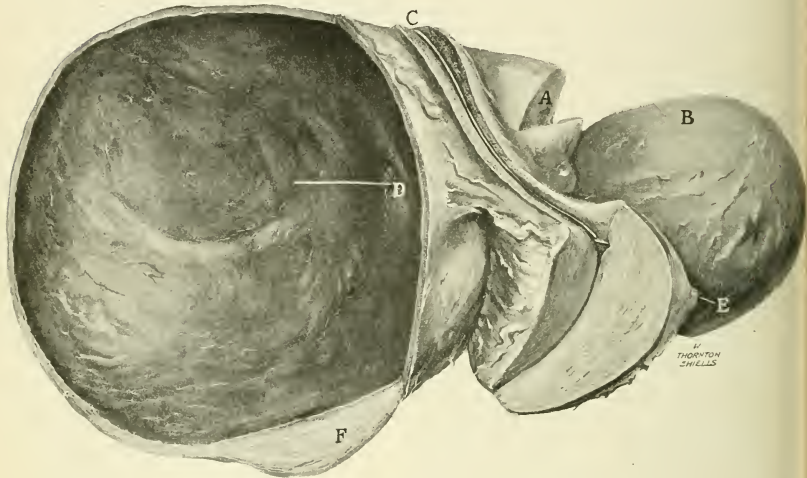


FIG. 120.—Showing a large tubo-ovarian abscess on the right side, with the tube opening into it at *D*. The proximal two-thirds of the tube have been opened up, and a bristle lying on its floor passes out of sight at the back at *C*, and is again seen through an opening in the posterior wall of the cyst.

A and *B*, myomas; *E*, cut end of left Fallopian tube; *F*, thickened wall of abscess-sac. It contained muscle-fibres.

tubal pregnancy occurs in association with uterine myoma is, in a measure, indicated by the scanty literature relating to it. The infrequency of the combination may be explained on the ground that the period of life (20-30) when tubal pregnancy occurs most frequently, represents a comparatively quiet time for uterine myoma."

Kelly and Cullen encountered six tubal pregnancies in 934 cases of *myoma uteri*. The analysis of these six

cases shows that five of the six patients had never been delivered of a child at term, and three of the six had never been pregnant before. In four of the six cases the symptoms due to the myoma completely masked those of the tubal pregnancy, and the condition was therefore unsuspected before the abdomen was opened. In five of the cases the gestation-sac had ruptured; one was intact, and the tubal sac had a velvety feel, "due to the pregnant sphere being surrounded by soft tubal muscle and numerous dilated blood-vessels"—a sign which is lost after the tube ruptures.

Ovaries

The ovaries were adherent, or showed some pathological change, in nearly one half of the cases examined by Cullen, *i.e.* in 438 out of 934. The lesions included 184 cysts of various sizes. Nine were multilocular cystadenomas, twelve cystic papillomas, and seventeen were 'dermoid' cysts. Among the classified cysts were also 68 Gräafian-follicle cysts which varied in diameter from 1 to 8 inches.

Lutein Cysts were present in thirty-four cases; these varied in size from 1 to 4 inches.

The presence of so large a number of follicular and lutein cysts is accounted for by the corresponding frequency of adhesions, since both these varieties of cysts are the results of atresia caused by inflammation.

Lutein Haematomas are not infrequently met with in the cases of adherent appendages found associated with myoma. They are often densely adherent, and they are easily infected. Figure 121 shows an ovarian haematoma *unassociated* with tubal inflammation and of a size which did not obtrude itself in a case of large myoma. Figure 122 shows bilateral lutein haematomas together with a myomatous uterus. Figure 81, Plate XX., opposite page 73, shows the same.

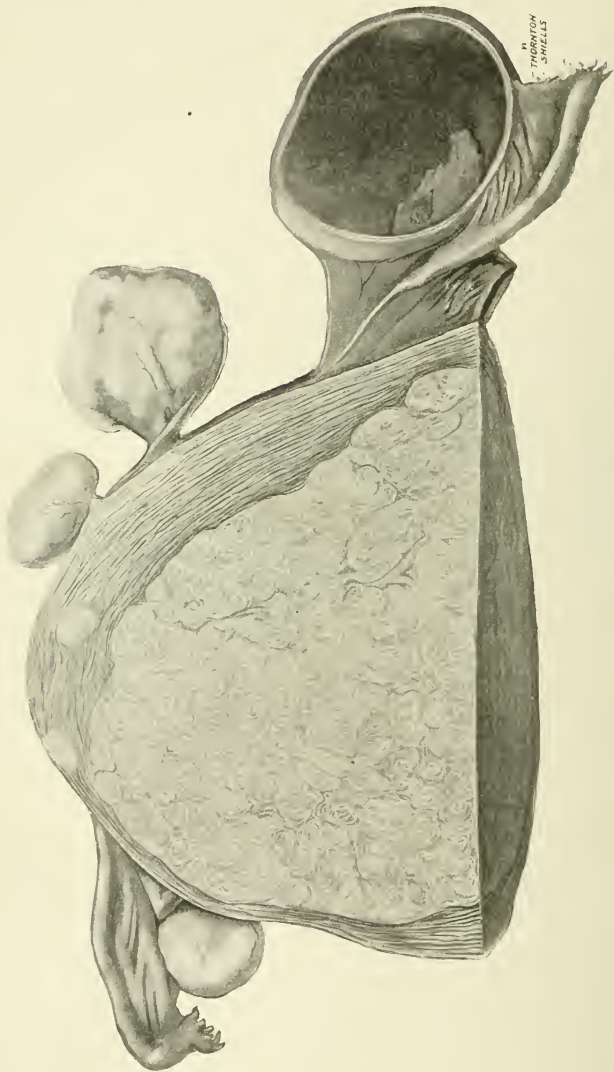


FIG. 121.—Showing a single lutein haematoma with appendages devoid of inflammatory signs.

Multilocular Cystadenoma.—In a series of nine cases mentioned by Kelly and Cullen, the myoma predominated clinically in five, and in the remaining four the symptoms caused by the cyst were of primary importance; in one case the pedicle of the cyst was twisted.

Cysto-papilloma.—Cullen mentions ten cases in which this complication was unilateral and two in which it was

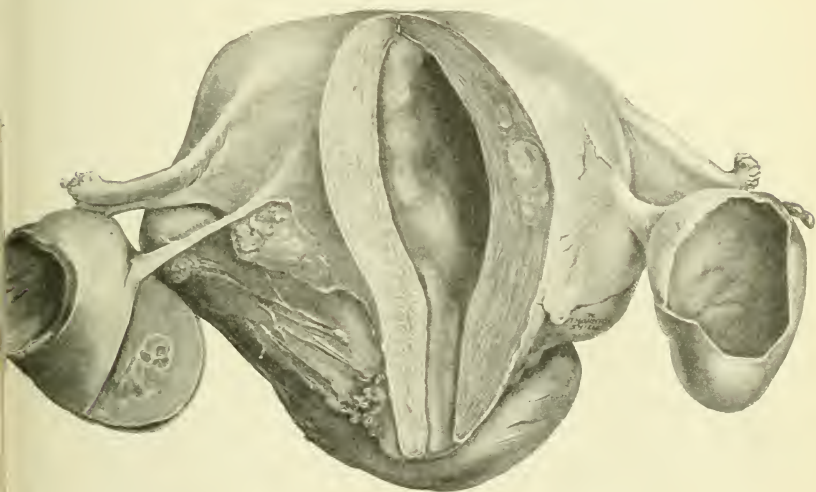


FIG. 122.—Showing bilateral lutein haematomas with a large myomatous uterus. This tumour was removed in a London hospital by Professor Howard Kelly with my assistance. Both cysts ruptured, and thick inspissated blood escaped during operation.

bilateral; in four instances the papilliferous growths had penetrated the cyst-wall and extended to the peritoneum. Ascites is mentioned as occurring in one case only.

In Figure 123 is seen a specimen which shows bilateral cysto-papilloma of the ovaries together with the presence of a hilum-cyst; on the right side beneath the latter there is a small area of fairly normal ovarian tissue.

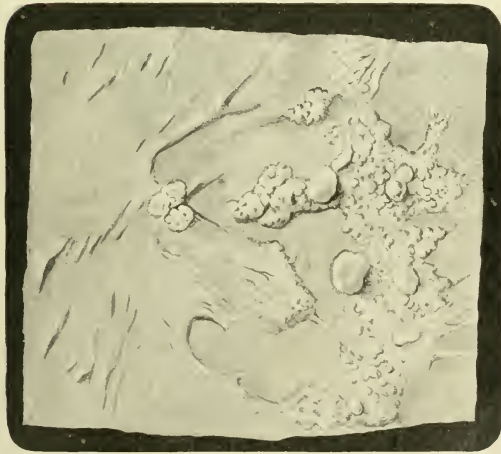
The specimen was removed by the late Stanley Boyd; the operation was difficult; the patient made a good recovery.

Figure 124 shows a segment from the wall of a large



FIG. 123.—Showing a myomatous uterus accompanied by cysto-papilloma of both ovaries. There is an epiovaritic cyst in the left ovary (on the right side of the figure). The uterine cavity has been opened from the front. The tumours were removed by the late Stanley Boyd.

papilliferous ovarian cyst. The accompanying myoma of the uterus was not diagnosed before operation.



A



B

Dr.
THORNTON
SHIELDS

FIG. 124.—A shows a segment from a large papilliferous ovarian cyst. B is a myoma which was 'masked' by the cyst. It was calcareous; and another calcareous myoma which was present had become separated from the uterus and was attached to the omentum and to the anterior abdominal wall. The patient was a spinster, aged 63 years.

Broad-Ligament Cysts.—Figure 125 shows an intra-ligamentary cystoma which arose on the right side, and by

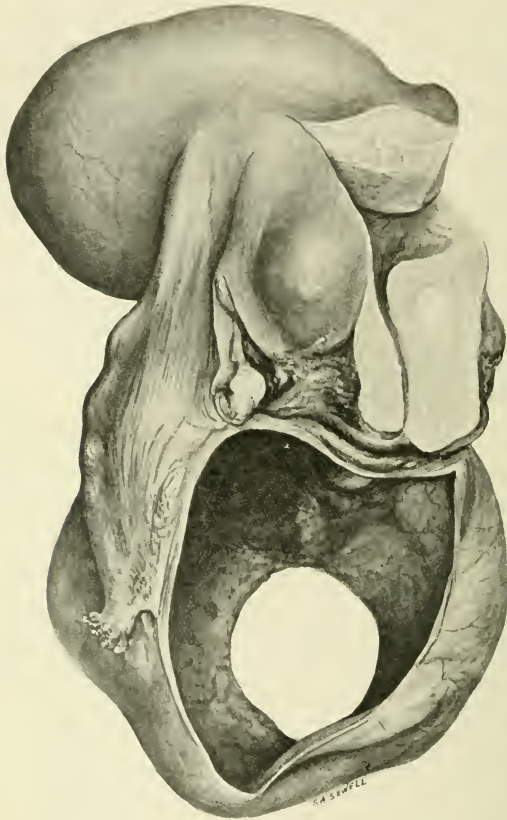


FIG. 125.—Showing a broad-ligament cyst of the right side, lying at a lower level than the myomatous uterus to which it was adherent.

burrowing pushed up a myomatous uterus and came to lie below the latter. The walls of the cyst were stained by yellow-ochreous patches indicative of old blood-extravasations. The anterior wall of the uterus has been opened up.

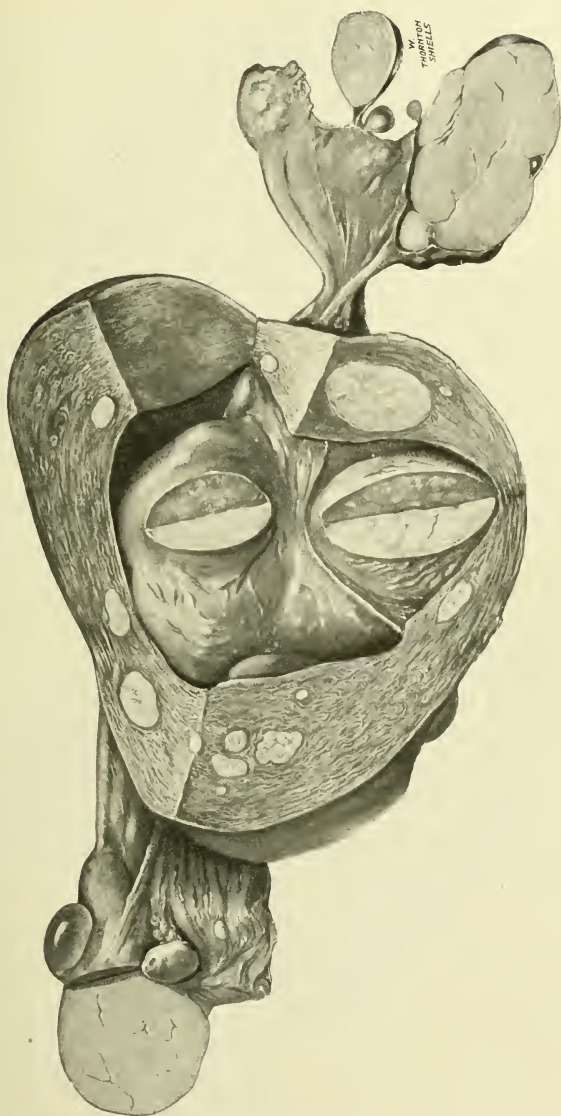


FIG. 126.—Showing a myomatous uterus and bilateral solid carcinoma of the ovaries.

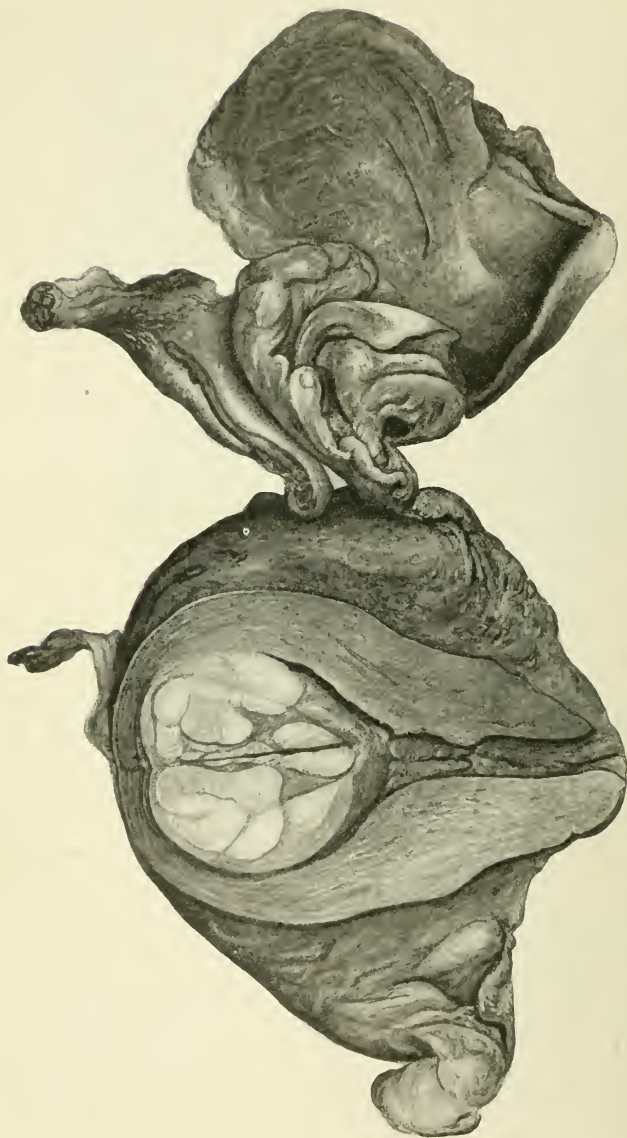


FIG. 127.—Showing a myomatous uterus and a left-sided ovarian abscess. The anterior walls of the suppurating cyst were torn during removal. The posterior wall is intact, and shows a trabecular arrangement which is characteristic.

Adenocarcinoma of the Ovary.—Cullen found malignant disease of the ovaries in 8 out of 934 cases of myoma

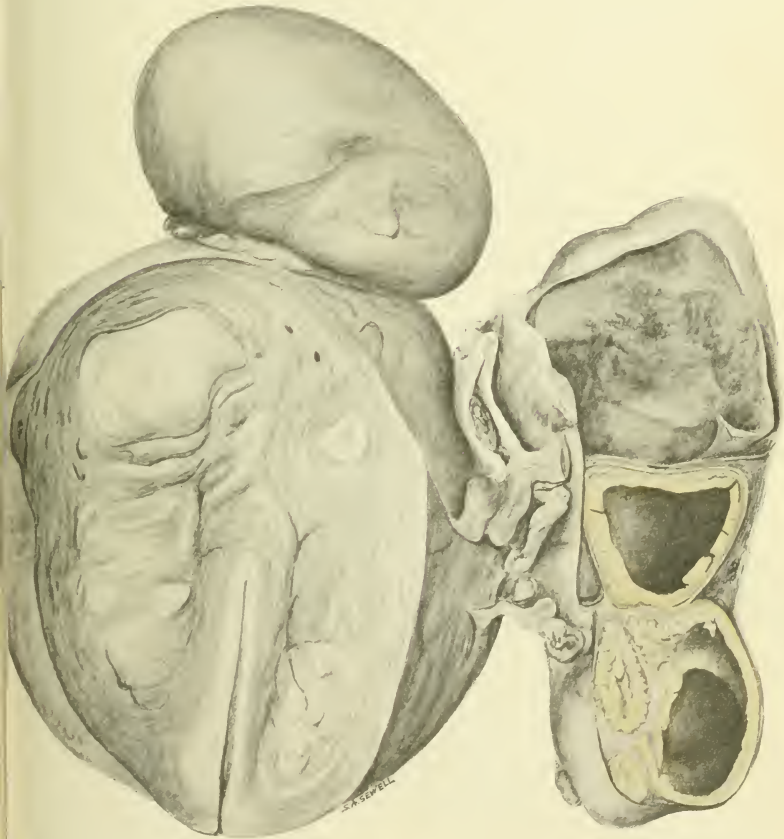


FIG. 128.—Showing a myomatous uterus together with an adherent ovarian cystoma which contained two lutein abscesses with yellow convoluted walls. The pus contained a coliform bacillus. The patient died of suppurative peritonitis.

of the uterus. In four of these the disease was bilateral ; in some there was secondary involvement of other structures.

Figure 126 shows a uterus with multiple myomas accompanied by solid ovarian carcinomas. The patient

in this case died of *carcinomatosis peritonei* a year and a half after operation.

Teratomatous Ovarian Cysts.—In seventeen cases of the Kelly-Cullen series ovarian ‘dermoids’ were present ; they

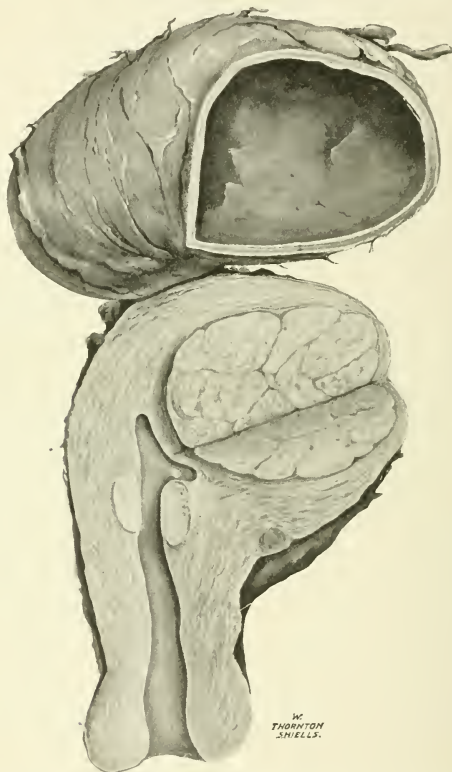


FIG. 129.—Showing a suppurating ovarian cyst adherent to the posterior surface of the uterus.

were usually unilateral, and varied in size from 3 to 17 cm. in diameter. In two-thirds of the cases dense adhesions existed. There were two deaths in this series : one from infection and one from myocarditis.

Fibroma of the Ovary.—Three cases of unilateral fibroma

of the ovary are mentioned by the above authors, and, as they state, this 'association' is of interest only to the pathologist, having no clinical importance. A good example from my own collection is seen in Figure 62, page 55.

Ovarian Abscess.—This serious complication is generally secondary to infection of the Fallopian tube and pyosalpinx. The condition is due in the majority of cases to infection of a lutein haematoma or corpus luteum. It is one of the most dangerous complications of uterine myoma.

Figure 127, page 116, shows a uterus opened from the front with a submucous myoma and inflamed adherent appendages. On the left side is seen a large ovarian abscess with its front wall torn and retracted; the tube is represented by the grotesque ragged projection above the abscess-sac. A fundal adhesion is seen.

Figure 128, page 117, shows a lutein abscess which contained most offensive (*B. coli*) pus. It was adherent to the upper part of the rectum. The patient died of suppurative peritonitis.

Figure 129 shows an ovarian abscess lying above a myomatous uterus; the abscess-sac was very adherent.

CHAPTER VII

POSITION OF THE BLADDER, URETERS, AND PELVIC COLON

The Bladder

CERVICAL and retroperitoneal myomas arising anteriorly will cause elevation of the bladder, and the same effect is produced by myomas arising elsewhere when they happen to become impacted. A large interstitial or submucous growth in the fundus may cause retroflexion of the uterus and become impacted; it will then draw up the urethra and base of the bladder, thus giving rise to symptoms simulating an incarcerated retroverted gravid uterus.

Slowly growing myomas will, during their ascent into the abdomen, cause a gradual elevation of the bladder; with marked ascent, it is not unusual to find the bladder high up in the abdomen.

Adhesions between the serous coat of the bladder and a myoma may rarely account for upward vesical displacement. Downward displacement is more uncommon; but I have met with a few cases in which cystocele was an accompaniment of large myomas, and in one instance this occurred in the case of an elderly nullipara,¹ so that the effects of labour could be excluded.

The mucous membrane of the displaced bladder is usually normal, cystitis is uncommon, and if the viscus is

¹ "Genital Prolapse," *Practitioner*, December 1913.

cut into, or torn open, during operation no harm, as a rule, results, if the wound is properly sutured. The walls of an elevated bladder are sometimes extremely thin, and may be mistaken for peritoneum.

John Bland-Sutton removed the upper third of the bladder on one occasion. The wound was closed, and the bladder drained with a self-retaining catheter for ten days. Three years later it was found that the bladder could hold 15 ounces of urine. The significance of a wounded bladder is far otherwise if the accident remains undiscovered at the time of operation, since it may then lead to extravasation of urine with fatal results.

Figure 130 shows a drawing made from a specimen in my museum. It represents the ureters and a portion of the bladder-wall. The right duct has been tied and the adjacent vesical wall perforated.

The accident happened during the removal of the large complicated tumour seen in Figure 102, page 89, by 'blind ligation' of the right uterine artery. A blunt pedicle-needle carrying stout silk was passed deep into the pelvis between the impacted tumour and the bony pelvic wall. No doubt the ureter was felt, and taken by the operator for the uterine artery; then, probably wishing to tie the vessel

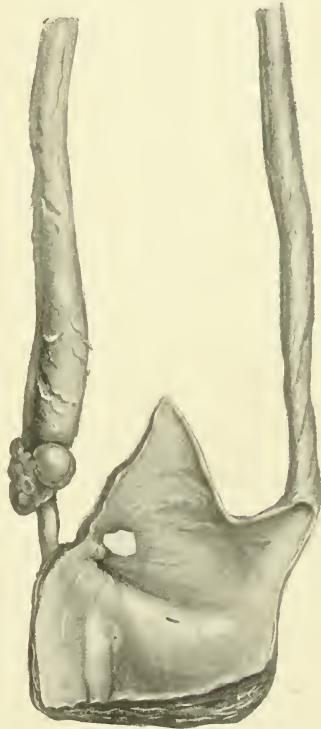


FIG. 130.—Showing the right ureter tied during operation, and a perforation in the bladder-wall which was only discovered at the autopsy. The ureter is distended above the ligature.

as far out as possible, the blunt point of the instrument was carried forwards and pushed through the corner of the bladder. Extravasation of urine followed, leading to general sloughing of the pelvic cellular tissues. At the autopsy the septic track was found to have spread up to the umbilicus, along the cellular space in which the urachus is situated.

John Bland-Sutton, in large print, makes the statement that "the bladder and ureters are more often injured in the removal of mesometric fibroids than in any other pelvic operation." This is not the experience of those operators who undertake to carry out Wertheim's technique for cancer of the cervix.

Although cystitis is rare in cases of myoma, as above stated, it is by no means unknown.

The above author mentions the case of "a woman forty-five years of age [who] had a submucous myoma which caused retention; the urine became septic, and a large phosphatic calculus formed. The stone was crushed by an able surgeon and the fragments removed by an evacuator; she died a few days later. The bladder was much enlarged and its walls thickened: the ureters were dilated, the orifice of each was so big as to admit the index finger. The kidneys were loculated cysts with very little cortical substance, and in the pelvis of each kidney there were fragments of the calculus. The post-mortem examination showed that after the stone was broken up in the bladder with the lithotrite, the stream of water from the evacuator forced the smaller fragments from the bladder up the ureters to the pelves of the kidneys."

Cullen also mentions one case of vesical calculus associated with uterine myoma. The patient was aged 52 years; she had a large myomatous uterus which almost filled the abdomen. There had been vesical symptoms for a year, *i.e.* frequent micturition, blood, tenesmus, and sudden retention. These symptoms were almost continuous for nine weeks prior to operation. The stone was detected on passing a catheter, and an attempt to remove it *per urethram* having failed, it was extracted through a vesico-vaginal incision. "Recovery was satisfactory."

Silk sutures used for tying vessels in the neighbourhood of the base of the bladder sometimes work their way through its muscular and mucous coats—this has twice happened in my earlier cases; in each a vesico-vaginal fistula formed, but in both instances spontaneous closure followed.

A woman, John Bland-Sutton states, underwent hysterectomy for 'fibroids' in Australia. The urine afterwards contained calculous material. The urethra was dilated, and then the stump of the cervix was found inside the bladder "bristling with silk ligatures arborescent with phosphatic deposit,"—the sequence here being sepsis in the stump, followed by an abscess, which burst into the bladder, and a permanent anomalous position for the cervix at the site of the fistulous track.

The effects produced by myoma on the function of the bladder will be considered under "Symptoms" (pages 172-175).

The Ureters

Myoma, on the whole, disturb the position of the ureters very seldom, but retroperitoneal growths can do so to a marked degree.

Pressure.—Kelly and Cullen found hydro-ureter, attributable to pressure, in eleven of their operation-cases, but these ducts were not dilated in their case of a myoma weighing 89 lbs. In 148 autopsies in which myomas were discovered, Welch found hydro-ureter in five, one being associated with diffuse nephritis.

It is obvious that pressure on the ureters is more a question of the position than of the size of a tumour. A growth in the pelvis, large enough to fill the basin and become impacted, is the one likely to exert pressure on these ducts by compression against the bony pelvis.¹

I have seen a case of hydro-ureter in which the duct

¹ See also Jolly's case, Appendix II. page 563.

was at first taken to be a fairly large-sized broad-ligament cyst; but only once have I discovered the condition in operating for uterine myoma.

Accidents to the Ureter.—Accidental ligation and division are liable to occur: (1) When the ureter is displaced by a burrowing tumour; (2) at the site of ligation of the uterine artery.

When displaced, the duct may be ligated on the front aspect of the tumour, or laterally at the level of the pelvic brim. I have twice included it with the *ovarian* vessels, in a ligature passed at the level of the brim of the pelvis. An example of accidental ligation at the level of the uterine artery is seen in Fig. 130, already referred to under accidents to the bladder. In this case commencing hydro-ureter is seen, but the fatal issue was due to the wounded bladder and not to the obstructed ureter; indeed, as John Bland-Sutton has stated, it is very probable that many surgeons have tied the ureter during an operation for the removal of a 'mesometric' (intra-ligamentary) myoma without ever having knowledge of the fact. In this connection it may be stated that I have thrice tied the proximal end of the ureter as an alternative to removal of the kidney,¹ without any untoward result occurring; and six other cases are known to me where the operators' experience was similarly favourable after intentional ligation of the cut ureter.

Bisection.—In two hundred and seventy operations for myoma I have once accidentally divided both ureters. The accident was the result of mistaken identity of the duct on the right side, and was due to displacement and hydro-ureter from pressure; but on the left side the division was quite unconsciously performed, and took place during ligation of the uterine artery close to the bladder and deep in the pelvis. Both ureters were therefore divided at the operation. The

¹ This was done after section of the ureter during the extended operation for cancer of the cervix.

right kidney was removed, and on the day following the hysterectomy the left ureter was implanted into the bladder; the patient made a good recovery.

In *Fibroids of the Uterus*, Bland-Sutton says: "Injuries to the ureters are liable to happen in all forms of hysterectomy, but the majority occur when the neck of the uterus is removed." If we take into consideration all the cases for which Wertheim's technique is employed for cancer of the cervix, this statement cannot be denied; but such an accident ought not to occur in panhysterectomy for myoma.

The injuries to which the ureters are exposed in the course of removing the uterus are given by Bland-Sutton as follows:—

(1) One or both ureters are sometimes included in the ligatures applied to the uterine arteries (see Fig. 130); (2) one or both ureters have been cut or completely divided on removing the uterus; (3) a piece of the ureter (as much as 7 cm.) has been resected; (4) a ureter has been transfixed by a needle and thread whilst suturing the layers of the broad ligament; (5) a tumour arising from the lower part of the pelvis, between the layers of the broad ligament, will sometimes carry the ureter over its crown like a strap (in this position it may be mistaken for an adhesion); (6) in vaginal hysterectomy the ureters have been accidentally clamped.

I have in my collection a retroperitoneal myoma with 10 inches of the left ureter attached to its posterior surface. The growth had pushed its way under the meso-sigmoid, and reached more than half-way up to the left kidney.

Appearances of the displaced Ureter.—As already stated, the ureter has at times been divided between two ligatures, under the impression that it was a dilated blood-vessel; a few words, therefore, on the abnormal appearances which this duct may assume when it has undergone

displacement and obstruction, complete or partial, may not be thought to be superfluous.

In Figure 131 is shown a ureter which has been dilated to the size of a segment of small intestine. On opening the abdomen and examining the pelvis my first impression, early in the operation, was that I was dealing with a broad-ligament cyst of the right side ; the cystic ureter had raised the anterior fold of the broad ligament and carried the Fallopian tube and round ligament over its front aspect, exactly as a broad-ligament cyst is liable to do. The drawing gives no idea of the size of the lower part of the duct, because after removal of the specimen the clamps, contrary to directions, were taken from off the cut ends and the contents escaped ; it was afterwards impossible to produce the former degree of distension by inflation with air. The resemblance to a burrowing cyst held good until the dissection was carried well above the brim of the pelvis, when the true nature of the 'cyst' was disclosed by tracing the ureter up to the pelvis of the right kidney. Being retroperitoneal it had no mesentery, and, from its position, it could not be confused with bowel. When its true nature dawned upon me, Kelly's test was applied to the part above the pelvis, and the ureter gave a distinct *vermicular contraction* on stroking it with the handle of the scalpel ; this was a particularly interesting phenomenon in a duct distended to the size of the small intestine. The cause of the distension was the presence of two phosphatic calculi at the vesical end of the duct.

The strap-like appearance mentioned by Bland-Sutton is due to a thickening of the peritoneum, caused by peri-ureteritis. The converse, *i.e.* the resemblance of a fold of peritoneum to the ureter, often proves a bugbear, and necessitates a subsequent search for both ureters after the removal of a burrowing myoma. During enucleation of an intraligamentary growth, the capsule is often adherent

along certain lines of cleavage, or the true line of separation may not always be hit off. It may then happen that a cord-like portion from the surface of the tumour is found in the capsule, and this may resemble a duct, sufficiently

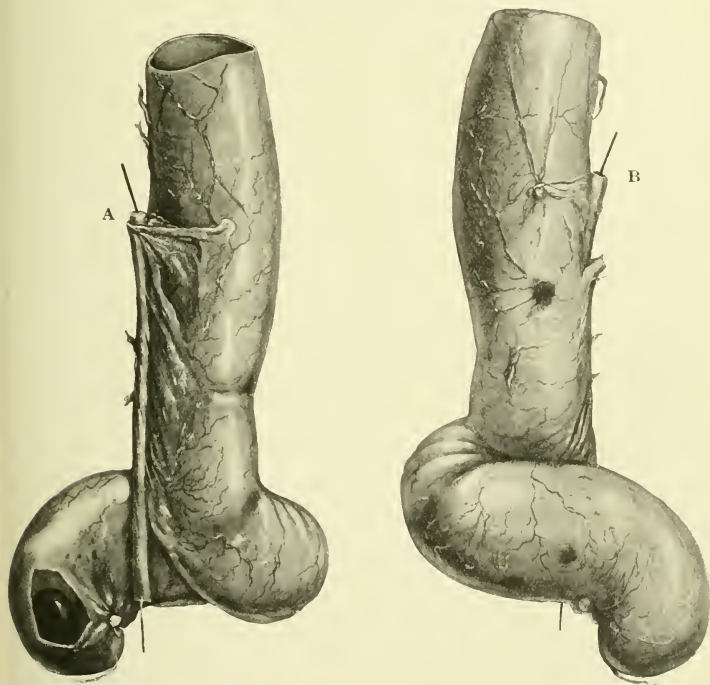


FIG. 131.—Showing the presence of two ureters which were situated on the right side of the body. One of the pair is normal in size, the other is dilated and caused a cystic swelling in the right broad ligament, which was at first regarded as a broad-ligament cyst. A window cut in the distal end of the dilated duct shows the presence of a ureteral calculus.

to create a scare in the operator's mind that he may have carried away a portion of the ureter with the tumour.¹

The obliterated hypogastric artery may be found cut across in the thickened peritoneal sheaths of the broad

¹ A big vein, emptied by pressure of any kind, may puzzle an inexperienced operator. Thornton and Bantock used to admit this fact (Alban Doran).

ligament, which have been separated from the tumour during enucleation, and the finding of these fibrous cords may arouse the suspicion that injury has been done to the corresponding ureters.

In all cases of doubt, the question as to the integrity of these ducts must be settled before the abdomen is closed. The suspicious fold of peritoneum, or the suspicious structure whatever it be, should be gently stroked up and down its long axis to elicit Kelly's sign of "vermicular contraction of the ureter"—and it is best also to make a determined search for the ducts and to trace them from the brim of the pelvis to the bladder.

Cullen draws attention to the "delicate tracery of vessels" so characteristic of the ureter (see Fig. 131, page 127).

As a last resort this author points out that if the operator "feels relatively sure that it [the ureter] has been tied, he can split the bladder and introduce a renal catheter through the ureteral orifice. This will not lengthen the operation by more than fifteen to twenty minutes, and may be a life-saving procedure." The ureters were located in this manner in two of the Johns Hopkins Hospital cases.

The Pelvic Colon

As in the case of the bladder, the rectum is liable to displacement caused by the growth of a myoma and to injuries during operations for its removal. Adhesions to the rectum are common in cases of myoma complicated by tubo-ovarian inflammation, and in the presence of pelvic abscess they may be very dense and intimate. The rectum may be found adherent to the back of a myoma of the cervix below the peritoneal reflection, whilst the peritoneum of the bowel and that of the tumour may adhere at any point. Kelly and Cullen give an illustration of this, showing large vessels passing from the one to the other.¹

¹ *Myoma of the Uterus*, fig. 29, page 42.

Burrowing myomas may open up the mesosigmoid, carrying the corresponding part of the pelvic colon upwards into the abdomen, where it will overlie the surface of the tumour. The rectum may be pushed to the right by this class of growth, so as to enter the pelvis to the right side of the median line. As the result of dense adhesions the rectum is frequently lacerated during operation; many of these injuries fortunately involve the serous and muscular coats only; and most of them occur low down below the peritoneal reflection. In the worst examples the mucosa is lacerated and the lumen of the bowel exposed; this happened in five cases reported from the Johns Hopkins Clinic. Kelly and Cullen advise that when the rectum is welded to the cervix or to the lower part of the uterus, bisection of the latter should be made in order to get at the adhesions from below (see Operations, page 501 (g)). Another alternative is to dissect back the bladder and amputate the cervix.

It is better to leave a portion of the tumour on the rectal wall, than to run the risk of tearing the bowel (see page 537); the area may then be excluded by making the peritoneal closure of the pelvic floor at a higher level.

A raw area should never be left, but should be inverted upon itself by interrupted mattress, or by Lembert's, sutures. When the lumen of the bowel is opened, two rows of stitches are necessary for closure; fine silk or linen thread forms the best sutures for the mucous membrane, and fine catgut may be used for the covering sutures.

Occasionally it becomes necessary to resect a portion of bowel; in the writer's experience this has occurred once with *adenc*-myoma and once with *fibro*-myoma (see Fig. 300, page 545). After closure of a complete laceration of the rectum or sigmoid, the nurse must be specially cautioned not to give an enema.

Displacement of the rectum downwards is a very rare

accompaniment of uterine myoma, far less so than is cystocele.

Pelvic abscesses when accompanying myoma of the uterus sometimes open into the rectum: two of my own cases gave a history of this occurrence, and in one an ovarian abscess was found together with dense peri-rectal cellulitis; this patient died of peritonitis after the performance of hysterectomy (see Fig. 128, page 117).

Cases of cancer of the rectum in conjunction with myoma of the uterus have been met with. In three instances I have resected the bowel, thinking that cancer was present; in one there was chronic induration only, and the other two were cases of adenomyoma.

CHAPTER VIII

MYOMA IN RELATION TO PREGNANCY

PREGNANCY is most liable to be complicated by myoma in women over thirty years of age. Women who are the subjects of uterine myoma are less liable to conceive than those who are not thus afflicted; the presence of these tumours is a cause of relative sterility. If it were not so, this inimical association would be much more common than it is. There can be no doubt that conception does not readily occur in a myomatous uterus, and it is not uncommon to find a myomatous subject pass through many years of "sterile married-life" before becoming pregnant for the first time. It is largely the spinsters and sterile wives who come to the gynaecologists suffering with uterine myoma.

Whilst the above statements embody the facts in the majority of cases, nevertheless multiparity by no means secures for a woman immunity from the development of uterine myoma. Notable exceptions to the general rule regarding sterility are occasionally met with; thus, I have recently removed a large myomatous uterus from a woman who had borne eight children. The growth was interstitial, soft, *red*, and *fatty*.

Subserous myomas do not as a rule exert any retarding influence upon conception; they show very little tendency to affect the uterine cavity in any way, and their natural propensity is to part company with the uterus altogether and acquire other sources of nutrition.

Although subserous growths cannot be proved to influence conception and are often quite innocuous to pregnancy, labour, and the lying-in period, they may nevertheless lead to serious complications at any stage of gestation as the result of twisting of their pedicles, and also by descending into the pelvis and so becoming impacted. In the case of sessile subserous growths which are too large to enter the pelvis, it may be said that unless they distort the uterine axis and cause an abnormal lie of the child or actual obstruction, or undergo secondary changes and acquire adhesions, it is not likely that they will disturb the course of pregnancy and labour. From their mere bulk they may hasten the expulsion of the uterine contents, but even when they are very large, there is little inclination for them to cause premature labour, owing to the space provided by the yielding of the anterior abdominal walls.

Myomas which burrow in the pelvic cellular tissue, and those which become *submucous*, form a class of growths the behaviour of which towards conception, pregnancy, labour, and the puerperium, forms a striking contrast to that exhibited by those tumours which become subserous and ascend out of the way; so much so, that practically all the interest centred in the association of myoma and pregnancy concerns retroperitoneal and submucous growths. Interstitial, retroperitoneal, and submucous myomas do not prevent conception, but they are a distinct hindrance to its occurrence, and, as stated already, long periods of sterility may supervene before a married woman, who has such a growth, falls pregnant. This leads to many surprises both to patients and to surgeons; the woman with a myomatous uterus has long considered herself immune as regards conception, and has abandoned any hope of maternity which she may have had in early married life. The surgeon mistakes the enlargement of recent date for that due to the various types of degeneration to which

these growths are prone; the true nature of the complication is then discovered only after hysterectomy—indeed there is hardly any surgeon of considerable experience who has not been baffled in diagnosis by cases such as these.

It is obvious that the more a myoma encroaches on the uterine cavity, the more is it liable to interfere seriously with conception and with the progress of gestation.

The tendency to abortion in the presence of submucous growths is favoured (1) by the uterine contractions which these growths set up, (2) by expansion of the uterine cavity caused by the tumour, and (3) by the frequent association of an unhealthy hyperplasia of the endometrium; and this last is probably a hindrance to conception likewise: consequently of all myomas the submucous variety is most prone to hinder impregnation and to favour abortion. From their exposed position submucous myomas are exceedingly liable to septic infection, necrosis, and sloughing.

Why interstitial tumours, which do not invade the cavity, so frequently delay conception, is not so easily explained, unless associated endometrial changes are made to account for the fact.

Scipiades,¹ in a paper based on sixty-seven cases, discusses the effects of myoma on pregnancy, labour, and the puerperium. He finds that only 17 per cent of afflicted women are free from symptoms referable to the tumour. Pain is a marked symptom in about 35 per cent. Mechanical symptoms referable to difficulty in the passage of urine and faeces, and also in breathing, occur in 28.57 per cent of the cases. This author finds that there is placenta praevia in 6 per cent of cases.

The prevailing idea is that myomas enlarge and become softer during gestation, but Scipiades denies this for the majority of tumours, nor does he favour the view

¹ Scipiades (Elemer), "Myom und Schwangerschaft," *Abhand. an dem Gebiet. d. Geb. u. Gyn.* Bd. ii. H. 2, S. 201; also *Zentr. f. Gyn.*, 1912, xxxvi. 149; also Scipiades, "Geburt u. Wochenbett bei myomatösem Uterus," *Zentr. f. Gyn.*, 1913, S. 1247.

held by some authors that myomas predispose to abortion, but he finds haemorrhage a marked symptom in from 14 to 16 per cent of cases. Symptoms referable to peritoneal complications occur, according to the above author, in from 10 to 12 per cent.

Diagnosis.—The *diagnosis* of the associated condition of myoma and pregnancy varies in certainty, according to the age of gestation and the size of the new growth: the more recent the conception and the larger the tumour the more difficult becomes the diagnosis. In one of my own cases there was a history of miscarriage followed by continuous haemorrhage; a tumour reaching above the umbilicus was diagnosed as a myoma; the operation revealed a four months' foetus in a uterus lying on the top of a large cervical myoma (see Fig. 134, page 142).

In a case of Alban Doran's the myoma was as soft as the pregnant uterus, which was of normal development, and gave as loud a souffle, but the large size of the mass precluded the diagnosis of twin pregnancy in the two halves of a bicornute uterus (see Fig. 136, page 143).

In the late W. A. Meredith's case, which is shown in Figure 133, page 140, the *gestation-sac* happened to be low down and was felt in the pouch of Douglas with the myoma above it; the diagnosis of pregnancy was therefore made on physical examination.

The diagnosis of pregnancy is seldom difficult or at fault; it is more certain than that of the tumour. Scipiates states that only in two-thirds of the cases can the presence of myoma be diagnosed with certainty, since it is so easy to confuse the abnormality with other conditions, such as ectopic gestation, *uterus bicornis*, twins, and other tumours, notably ovarian. The diagnosis of the lie of the foetus is often difficult; abnormal presentation is very common. Abnormal uterine gestation, *i.e.* moles, either carneous or vesicular, may simulate myoma, and soft solitary myomas

are in their turn frequently regarded as the gravid uterus (see "General Diagnosis," page 195).

Prognosis.—As regards *prognosis* Scipiades states that operation becomes a necessity in from 30 to 33 per cent of cases, and as the operative interference frequently results in abortion, he estimates that scarcely more than one half of the pregnancies go to term. Taking this view, together with his expressed opinion that myomas *per se* do not favour abortion, it would seem that he blames surgical interference for a high foetal mortality, which is an impression to which I must take exception. There is no doubt that the prognosis varies with each individual case.

Scipiades has found that the course of *labour* is delayed. In the first stage dilatation of the cervix is especially interfered with by impacted cervical myomas, premature rupture of the membranes occurring in three-fourths of all cases. Breech and transverse lies also contribute to delay in the first stage; the second stage of labour is not delayed, but is more painful. The third stage is abnormal in 21 per cent of cases, Credé's expulsion or manual delivery of the placenta becoming necessary. Without exception, sub-mucous myomas always cause trouble in the third stage of labour. The most dangerous complication is haemorrhage; *post-partum* bleeding being frequent.

Anderbert and Fournier¹ express the view that it is most difficult to make a prognosis during pregnancy or even at the beginning of labour. They say that prophylactic interference is always unnecessary, at least where it is only a question of obstruction. If the tumour ascends, or if it remains mobile until late in pregnancy, the prognosis as regards labour is good; but even when the tumour is impacted, there is no indication for operation, according to these authors, until the patient has been *three*

¹ "Accouchement spontané dans quelques cas de fibrome prævia," *Rev. mens. de gyn.* Ann. 8, page 309, 1913.

hours in labour; not until then would they do Caesarean section. In support of their views they give accounts of four pelvic myomas: one ascended during gestation, and the other three were drawn up during the progress of labour.

Another French author, Louis Pierra, also favours the expectant treatment, and records two cases of pregnancy complicated by large myomas in the lower uterine segment.¹ In one of Pierra's cases there was a miscarriage at the sixth month; the lie of the child was oblique; after ascent of the tumour, turning and extraction were easy. The tumour fell into the pelvis on the tenth day of the puerperium. In the second case the tumour was felt to go up during internal version, and after extraction of the foetus it returned to its old position. Pierra advises that all vertex cases should be turned into breech and extracted, to avoid the use of forceps.

G. T. Harrison² expresses the opinion that the dangers of myoma to pregnancy, labour, and the lying-in state are over-estimated, and that too many operations are done for this complication. He says that large and multiple myomas of the uterine body cause no trouble, and that growths lying deep in the pelvis are drawn up; but the admission is made that cervical myomas are dangerous, and the risk of *post-partum* haemorrhage is also acknowledged. *Expectancy* is advised by Harrison, and Caesarean section must not be performed too early, it being this author's view that it is important first to get the effect of the pains; but the operation must not be deferred too long, for fear of adding to the risk of sepsis. Harrison agrees with the French authors that the forceps is dangerous, but he goes farther, and denounces turning and extraction as well.

¹ "Deux observations de fibrome volumineux du segment inférieur compliquant la grossesse avec ascension de la tumeur au cours du travail," *Rev. mens. de gyn.* Ann. 8, page 328, 1913.

² *Virginia Med. Semi-Monthly*, vol. lxxvii. N. 24, page 601. (Quoted; reference unobtainable.)

The effect of pregnancy on a myomatous tumour is very marked.

From the pathological standpoint it has already been pointed out that 'red degeneration' of myoma is particularly associated with pregnancy in the mind of the clinician, partly because this form of necrosis is more frequently seen in uteri which are gravid than in those which are not, and partly from the fact that pain and enlargement of the tumour are concomitant. Leith Murray considers that the pain and enlargement vary with the amount of the thrombosis present in the vessels of the tumour.

Since 'red degeneration' of myoma occurs more frequently in pregnancy than in any other condition, it has most naturally been concluded that pregnancy is a predisposing factor in the causation of this particular type of 'degeneration'; but in favour of the latter being due to a merely local condition in the tumour itself, is the fact that only a single myoma out of many may be affected. Although very small myomas are liable to undergo hyaline change, this degeneration is more marked, as a rule, in the larger growths than in the small ones; and since the phenomenon of haemolysis is dependent, according to Leith Murray, upon pre-existing hyaline and fatty degeneration, it follows that we are most likely to find red haemolytic change in large tumours, whilst the smaller escape.

This statement fits in, as far as my experience goes, with the behaviour of interstitial and submucous tumours, but not with that of large subserous growths; but this may be due to the limited material obtainable for observation, since it has been quite exceptional for me to get an opportunity of examining a subserous growth during or immediately after pregnancy, only one instance coming to hand, and in this there was no red degeneration at all.

Many writers think there is a *physiological* enlargement of myoma during pregnancy, and there is no doubt

in the mind of most observers that these tumours often show a distinct increase in size, but pathologists attribute this enlargement to oedema and other secondary changes. Decidual reaction in a myoma has been shown to occur (see Appendix VI. page 578. Disappearance of myoma after labour is unproven.

Cervical Myoma and Pregnancy

The fate of cervical myomas, when complicating labour and the puerperium, is a subject of some interest. The expulsion of a cervical myoma during labour has twice come under my notice (see Fig. 132). I have also seen bruising of the growth, leading to necrosis and sloughing. An instance of a cervical growth obstructing labour, and causing tonic contraction of the uterus, is recorded by Braxton Hicks. The tumour grew from the anterior wall of the cervix and *os uteri*, and was removed by enucleation. The patient was a multipara, and when Braxton Hicks first saw her, she had been in labour for twelve hours. The uterus was very firmly and continuously contracted around the foetus. The head was at the brim, pressing against the upper aspect of a firm but elastic tumour, which occupied the whole upper vagina, so as to render it difficult to reach the head, and then only by introducing the hand into the vagina. On tracing the *os uteri*, the tumour was found continuous with it, and it was thus not difficult to make out its true nature, although it had been mistaken at first by the midwife for a breech presentation, and by some medical men for a distended bladder, which indeed it much resembled.

The catheter made it clear that the tumour lay posterior to the bladder. Version was found after two attempts to be impossible. Forceps could not be applied, delivery after perforation was judged to be impossible, so enucleation, écrasement, and Caesarean section were the only remaining alternatives. Enucleation was fortunately chosen.

The foetal head came quickly down into the brim, and the child was delivered, by "gentle traction, alive and hearty." The patient bore no evidence of shock either in appearance or pulse, and gave no anxiety whatever. The tumour weighed $1\frac{1}{2}$ lb. Microscopically it was found to



FIG. 132.—Showing a submucous myoma which was extruded in advance of the foetal head during delivery.

be composed almost entirely of connective tissue with a few "colossal" fibres, the whole mass being liberally supplied with blood-vessels.¹

Robert Barnes recorded a case where a myoma was driven down before the child's head, and becoming jammed

¹ *Trans. Obst. Soc. Lond.* vol. xii. pages 273-276, 1870.



FIG. 133.—Showing a foetus of nearly four months, lying beneath a large myomatous uterus. The pregnancy was diagnosed before operation.

FIG. 135

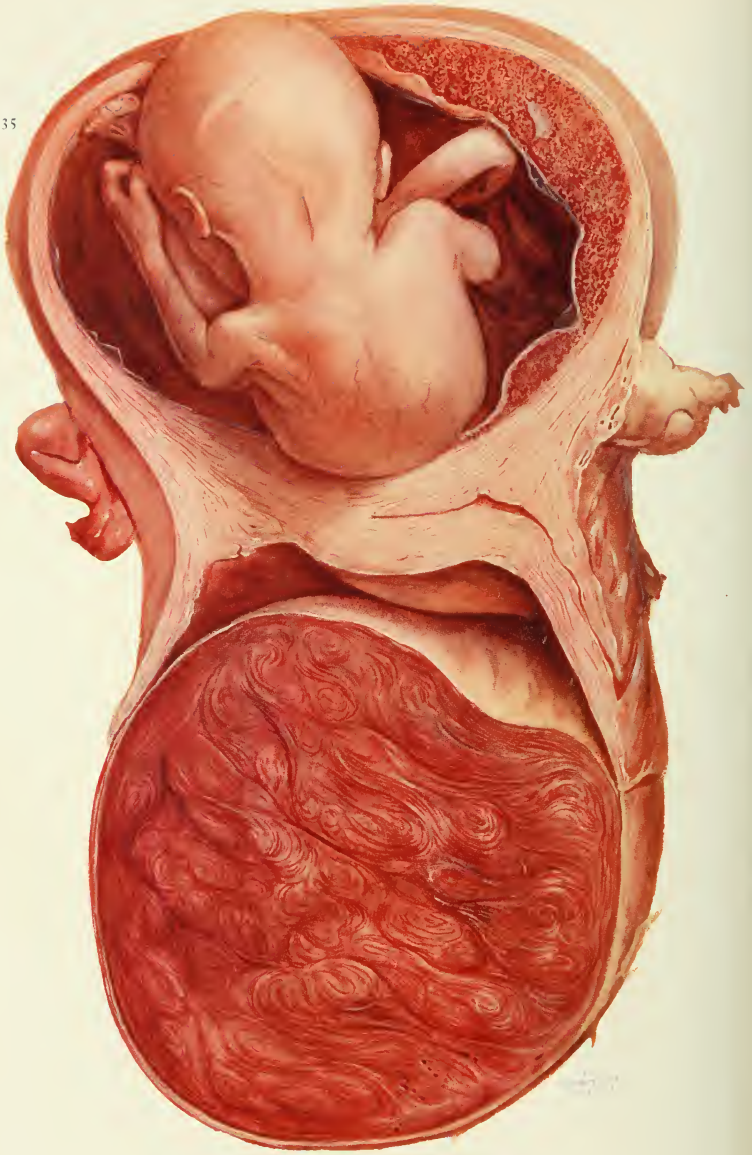


FIGURE 135. Showing a myoma of the posterior wall of the cervix in a state of red necrosis. (Removed by Alban Doran. *Lancet*, Vol. II., 1902, page 1453).

against the symphysis, closed the urethra and caused rupture of the bladder and death.¹

Summary of Cases

Twenty-three cases of myoma complicating pregnancy, labour, and the puerperium have come under my personal observation (see Table, page 158). Eight of these were under the care of various colleagues, the remainder were in my own practice. I have already recorded nine of these cases in the *British Medical Journal*, October 22, 1910. Caesarean section at term was performed in three cases, and the uterus was in each instance removed by subtotal hysterectomy: in one instance the tumour was the size of a large orange, and was situated in the supravaginal cervix; in the other two cases the tumour was a burrowing myoma attached to the lower segment. In four cases hysterectomy—at four months (Fig. 133), $4\frac{1}{2}$ months (Fig. 134), five months (Fig. 135, Plate XXXII.), and $5\frac{1}{2}$ months (Fig. 136) respectively—was performed, urgent symptoms having arisen in each case.

In two instances subtotal hysterectomy was performed for profuse haemorrhage following abortion. One of these cases is shown in Fig. 137, Plate XXXIII., as a good example of red necrosis.

In five cases conservative myomectomy was done: three at the fourth month, once at the sixth month (see Fig. 138, page 144), and once this operation was performed as a Caesarean myomectomy at term.

In five of the twenty-three cases the tumour was submucous.

(1) In one of these the myoma sloughed in the puerperium but came away without operation; the patient was gravely sapraemic for many weeks. (2) A second case of this kind was of great interest. After a miscarriage at $6\frac{1}{2}$ months,

¹ *Trans. Obst. Soc.* vol. v. page 171, July 1, 1863.

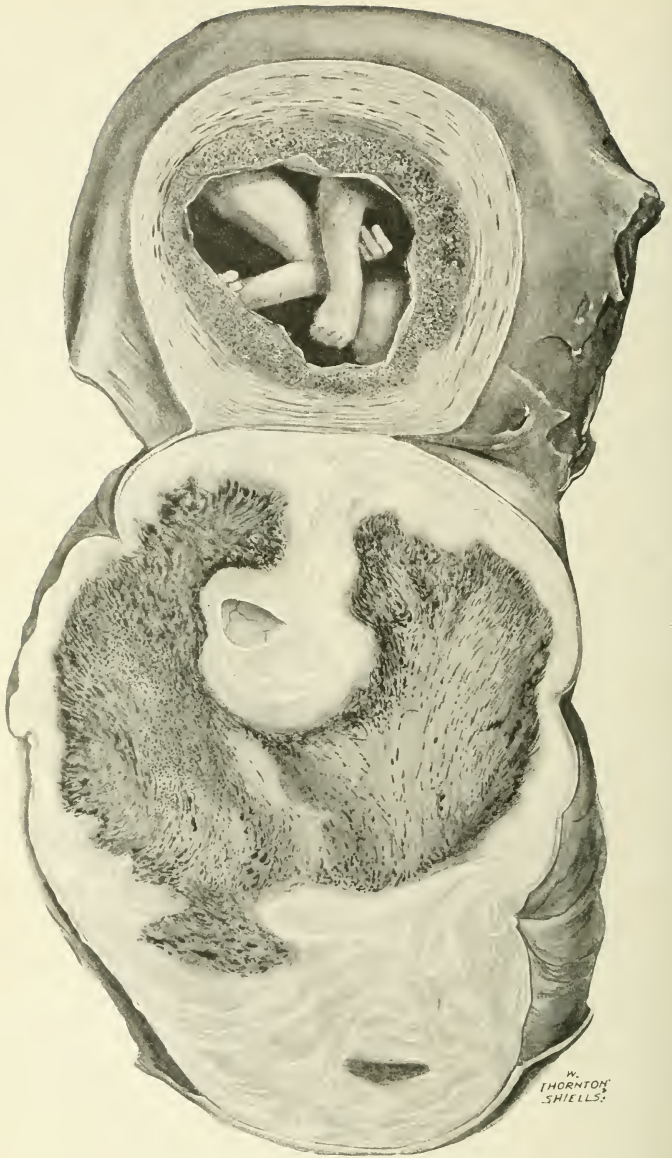


FIG. 134.—Showing a cervical myoma beneath a uterus which contains a $4\frac{1}{2}$ months' foetus. The necrotic area was nearly black in colour, and showed multiple thrombi.

FIG. 137

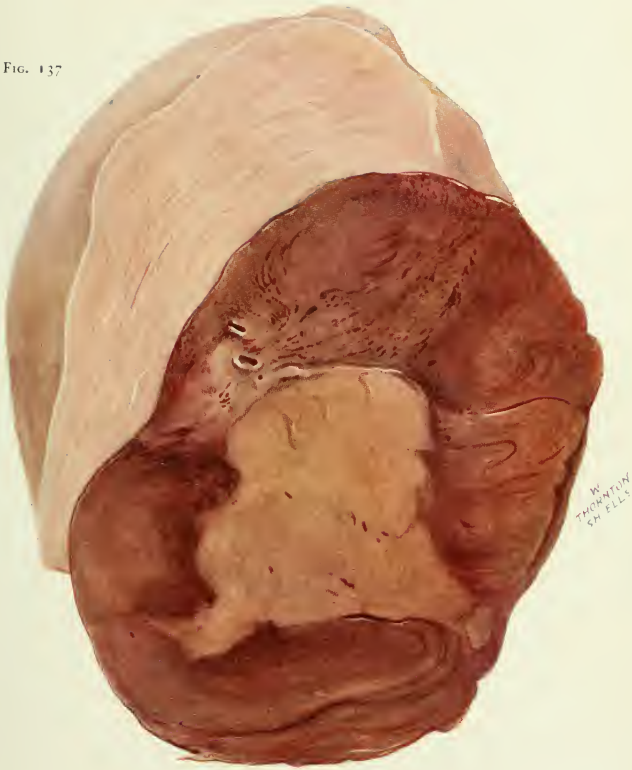


FIGURE 137. Shows a section through a myoma in the posterior wall of a puerperal uterus. Miscariage occurred at half term. Red necrosis is most marked at the periphery, where it presents as a wide zone containing many thrombosed vessels. (Removed by the late Stanley Boyd.)

the uterus remained at the umbilicus, and the patient ran a high intermittent temperature for four weeks. She was an inmate in St. Pancras Infirmary, and the above was



FIG. 136.—Showing a subserous myoma and a gravid uterus at 5½ months' gestation.
(Removed by Alban Doran.)¹

the history when I saw her. On examination there was every evidence of prolonged septic absorption—lemon-coloured skin, typical temperature chart, foul vaginal dis-

¹ *Edin. Med. Journ.*, Sept. 1903.

charge, and a tender uterus reaching to the umbilical level. The os admitted two fingers, and the lower pole of a soft

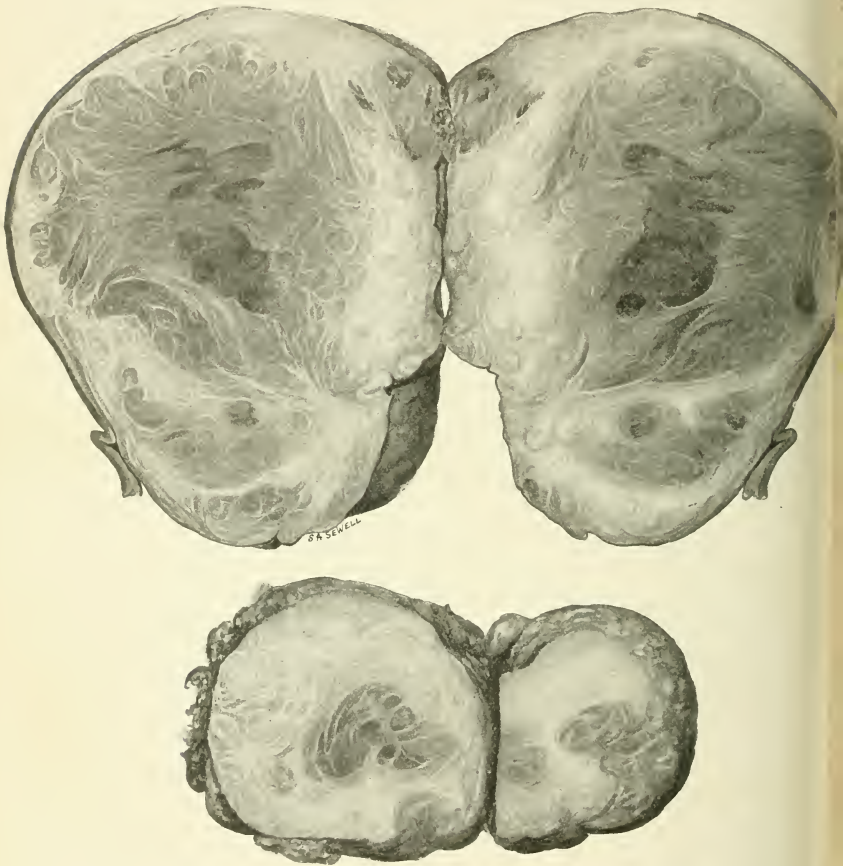


FIG. 138.—Showing two myomas removed at the sixth month of gestation. The larger growth lay low down in the inferior segment. Red degeneration had commenced in the centre of each tumour.

growth could be felt. This I proceeded to remove, and in doing so my exploring finger passed through the soft stretched-out capsule at the fundus. It was only on

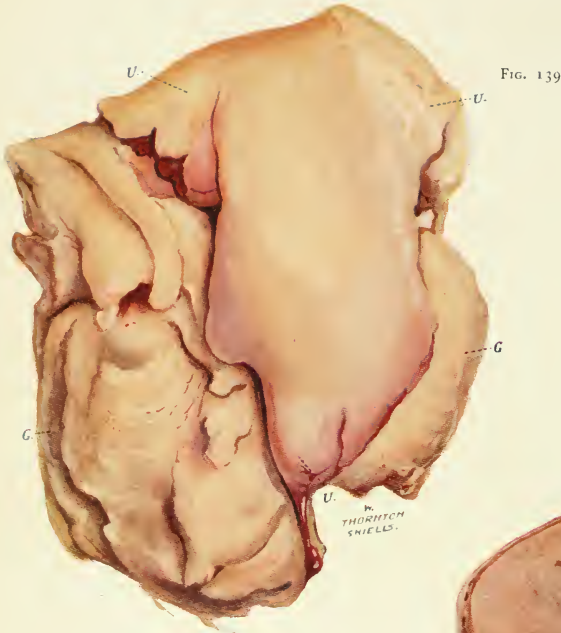


FIGURE 139. Shows an example of yellow necrosis. U Uterus. G Growth. The tumour and uterus were removed after an abortion. In enucleating the growth the uterus was perforated at the fundus, where the uterine wall was extremely thin and soft



FIGURE 140. Myoma enucleated from the fundus uteri after abortion at the third month. The tumour was purplish-grey in colour and was accompanied with foul discharge and pyrexia. The patient recovered

drawing down the growth and thereby unconsciously inverting the uterus with it that I found I was delivering growth, uterus and all. Vaginal hysterectomy was performed and the patient recovered. The specimen is shown in Figure 139, Plate XXXIV., as an example of 'wash-leather' necrosis.

(3) Figure 140, Plate XXXIV., shows a fundal submucous growth which I removed for sepsis following abortion at the third month. The tumour is necrotic and of an ashy purple colour; the uterus was saved, and the patient made a slow but complete recovery.

(4) In the fourth case the submucous growth was extruded in front of the placenta, and was at first thought, by the doctor who attended the patient in her confinement, to be the placenta. Labour had been spontaneous at $6\frac{1}{2}$ months' gestation; the child lived two days. There was no *post-partum* haemorrhage, but the lochia were still red three weeks after delivery, and acute attacks of hypogastric pain occurred frequently. The temperature on the evening of the second day was 101° F., and it remained high until the fourteenth day; the highest pulse-rate had been 112. There was troublesome constipation, but no dysuria. A month after delivery the fundus was 3 inches below the umbilicus, and to the right was a hard sessile mass which was tender.

After the birth of the child a large ovoid mass with membranes attached had come away, and then a tiny placenta, much smaller than the mass, was expressed. I advised admission into the Great Northern Hospital, but the husband had the patient admitted to another hospital, where I heard myomectomy was performed for a large myoma which was found in the uterus. Peritonitis set in forty-eight hours after the operation, and ended fatally.

(5) In case five, abortion occurred at $2\frac{1}{2}$ months, and severe haemorrhage took place necessitating exploration. The placenta was tucked away above a submucous myoma,

and its removal was extremely difficult owing to the obstruction caused by the growth.

The last case in my personal series is one in which the myomas were subserous, and subtotal hysterectomy was carried out at $3\frac{1}{2}$ months' gestation. The patient was a widow, aged 39 years, and had missed three periods; she complained of great pain in both groins, also of frequency of micturition. There was a myoma in the anterior wall of the uterus pressing on the bladder, and another in the right iliac fossa just above Poupart's ligament. I advised myomectomy on account of the bladder-symptoms, but the patient saw another surgeon, who removed the gravid uterus and reported that he found 'pus' in one of the tumours.

Treatment of Myoma complicating Pregnancy

Pregnancy complicated by myoma is a subject of the greatest importance for both obstetrician and gynaecologist. The practice of obstetricians as opposed to gynaecologists was formerly to induce abortion if the myoma was so situated as to ensure its being an insuperable barrier to labour at term, whilst those cases were left to nature in which, after due consideration, the tumour was considered innocuous owing to its safe position above the pelvic brim, or where it was found that a pelvic tumour could be pushed out of the way. A great deal was accordingly learned respecting the possibility of myomas ascending into the perfectly safe upper regions of the false pelvis and abdomen during the course of pregnancy and even during labour itself.

The influence of these observations as to the result of conservative measures is traceable in the present-day treatment of this interesting obstetrical complication, and surgical interference is now usually withheld unless enforced by the intervention of urgent symptoms. A change has occurred in obstetric practice in regard to the frequency

with which abortion is induced for pregnancy complicated with cervical, retroperitoneal, or impacted myomas, *i.e.* tumours which are liable to obstruct labour at term. It cannot be stated that the value of a living child to the parents and to the State was ever lost sight of by the older obstetricians, but the advances of modern surgery have opened up methods of saving child-life, which only a short time ago would have been denounced as unjustifiable, because unsafe to the mother.

The induction of abortion is difficult and dangerous: it may lead to uncontrollable laceration, also to sepsis and necrosis of the growth; therefore as a line of active treatment for pregnancy complicated by obstructing myoma it is, let us hope, a relic of bygone days, no longer to be recommended, unless under exceptional circumstances.

Where interference is called for, the modern treatment comprises the adoption of one of the following procedures: (1) Doing nothing operative until full term; (2) removing the obstructing growth by myomectomy during gestation; (3) obstetric procedures, including reposition, forceps, version, etc.; (4) performing Caesarean myomectomy at full term; (5) performing Caesarean hysterectomy at full term.

(1) There is no doubt whatever that the ideal treatment is to *let the pregnancy go to term wherever possible*; that is to say, unless urgent indications for interference arise, no operative measures, such as myomectomy during pregnancy, should be carried out. In a certain percentage of cases, however, urgent symptoms arise, such as torsion of the growth, extreme pain, and great tenderness over the tumour, dysuria, retention of urine, dyschesia, and obstinate constipation. It therefore happens that real necessity arises for

(2) *Removing the obstructing growth by myomectomy during gestation.* I use the term *obstructing growth* advisedly, because it is my belief that the removal of subserous myomas which lie up in the abdomen (with the gravid uterus filling the

pelvic brim) have too often been removed unnecessarily. Myomectomy during pregnancy is a justifiable operation for obstructing growths which are causing distressing symptoms. Troell¹ records 157 conservative myomectomies in tabular form, and of these no indication for the operation was given in 57 of the cases. Of the remaining 100, the operation of myomectomy was performed on account of haemorrhage in 3; increase in size of growth in 8; for pain in 25; for bladder-symptoms in 23; for peritonitis and fever in 5; for torsion of the myoma or uterus in 17; for threatened abortion in 2; for supposed obstruction to labour in 6; for pressure-symptoms or threatened incarceration in 9; errors in diagnosis in 2 = 100.

In the 157 myomectomies above mentioned the foetal mortality was 23.9 per cent, and the maternal mortality was 3.9 per cent. The average foetal mortality in women with myoma is given by Troell as about 20 per cent, and his comment is that a 23.9 per cent foetal mortality in myomectomy shows that by putting the mother to the danger of this operation we gain nothing in the interest of the child.

That the gravid uterus will tolerate careful and skilled operative interference is a well-established fact. How this tolerance varies during the different months of gestation has been made the subject of investigation by Troell. In the 157 myomectomies abortion followed in 21 cases.

Number of Patients.	Month of Pregnancy in which Myomectomy was performed.	Abortion.	Full Term.
		Percentage.	Percentage.
12	2	41.6	58.4
25	3	12	88.0
37	4	8.1	91.9
22	5	13.7	86.3
13	6	38.4	61.6
6	7	16.7	83.3
1	8	0	100.0

¹ Troell, *Studien über das Uterusmyom*, P. A. Norstedt und Söner, Stockholm, 1910.

The disposition to abort as here represented is therefore 14.6 per cent in the first half, and 30 per cent in the second half of pregnancy ; this estimate being made from 96 cases in the first five months, and 20 cases in the last five months of pregnancy.

As regards the deliveries at, or about, full term, these totalled 48 ; of these 14.5 per cent of the infants died, *i.e.* only 85.5 per cent of the women who did not abort had a living child.

With reference to the cases where pregnancy went to full term, it is interesting to note that in 44 out of the 157 the tumour was pedunculated, and of these 90.9 per cent went to term, there being only 4 abortions. This is what we should expect, so that if a pedunculated myoma becomes twisted during pregnancy its removal involves the child in very little risk. A case of Thorn's¹ in which the gravid uterus was torsioned through 180° by a subserous myoma, and in which myomectomy was performed, went to full term. In a case which I recorded,² the indications were threatened abortion, painful and frequent micturition, and obstinate constipation. The two tumours shown in Fig. 138 were situated low down in the posterior wall of the lower uterine segment, so that the uterus had to be everted and drawn forwards in order to reach the larger and lower growth. I was careful not to drag on the tumours ; but whilst my assistant steadied the uterus, the peritoneum and uterine muscle were separated from the tumour by the finger and handle of the scalpel. There was very little haemorrhage, and the bed of the tumour contracted well after its removal. Although pregnancy has been known to go to term in cases where the foetal membranes have been exposed in the myomectomy-wound, it not infrequently happens that an attempted myomectomy ends in hysterectomy

¹ *Monatsschr. f. Geb. und Gynäk.*, 1900, Bd. xii. 775.

² *Proc. Royal Soc. Med.* vol. vii. No. 6 (*Obst. and Gyn. Sect.*), page 221, 1914.

having to be performed. In the 157 cases recorded by Troell it was necessary to proceed to supravaginal amputation in 12 cases, and in one instance total extirpation was carried out. The need of the radical operation was either uncontrollable haemorrhage or the opening up of the uterine cavity. This uncertainty as to the possibility of saving the uterus should be a deterrent to performing myomectomy during pregnancy unless urgent symptoms call for interference. If none of the symptoms mentioned above are present, enucleation should not be attempted.

As an alternative to myomectomy in the treatment of severe and urgent symptoms arising during pregnancy, many operators prefer to remove the gravid uterus together with the tumour, some advising supravaginal amputation, others total hysterectomy. Troell gives the mortality for supravaginal amputation of the gravid uterus as 3 per cent in a series of 133 cases (1900-1909). The dates of the operations are important, as is shown by the fact that Amand Routh in 1905 gave the mortality for this operation as 21 per cent, his calculation being based on *old* statistics. Unterberger in 1904 had collected 91 cases in which the mortality was only half that in Routh's series. It is noteworthy that in Troell's statistics the mortality in 133 supravaginal amputations, being only 3 per cent, is less than that in 157 myomectomies, which was 3.9 per cent. It clearly shows that myomectomy, even when confined to urgent cases, has its limitations, so that if the tumour has a very wide attachment to the uterine wall it may be safer, as many other authors have stated, to abandon all attempt to save the uterus.

Total extirpation of the gravid uterus yielded, according to Troell, a percentage mortality of 5.5 in 54 cases.

On the operative measures employed to effect delivery at full term *per vias naturales*, i.e. pure obstetric operations, Troell makes the following remarks: "A fundamental

obstetric principle is never violently to drag a foetus past an obstructing myoma lying in the pelvis ; the injuries to the child and to the growth thus produced contraindicate such a forcible procedure. The employment of forceps, turning and extraction, perforation, and cranioclasm are indicated, not on account of the obstruction by the myoma but because of the delay in labour, or because the condition of mother and child indicates rapid delivery." [A most ambiguous distinction.—AUTHOR.]

Puech (quoted by Troell), writing in 1895 on *forceps-delivery* in myoma-cases, recorded 57 cases, of which 67 per cent of the mothers and 44 per cent of the infants "remained alive." Many other authors, including Routh and Munro Kerr, are quoted as having drawn attention to the *high mortality with the use of forceps* in cases of mechanical obstruction.

With reference to *version* in the treatment of labour rendered difficult by myoma, the mortality in 81 cases is given by Troell as 65.4 per cent for the mother and 80 per cent for the child.

Perforation and cranioclasm have rarely been employed in myoma-cases. There was only one such case in 7836 deliveries and abortions recorded by Budin,¹ and this patient died after basiotripsy.

Hydrostatic bags have been used in a few cases of labour complicated by myoma. Of six cases mentioned by Troell three patients died ; in four the tumour was wholly or partly cervical.

Vaginal Caesarean section has been performed a few times in myoma-cases. Dührssen has recommended it, but Holmes, in an article entitled "Bloody Methods of Rapid Dilatation," takes the view that laparotomy is to be preferred to vaginal Caesarean section for such cases.

Symphysiotomy and hebotomy are quite unsuitable in

¹ *Statistics of the Maternité de Paris, 1895-1898.*

the majority of cases, but Lepage recorded a case in 1893 which ended favourably for both mother and child.

In concluding these remarks on obstetric operations a few words may be said about *manual reposition*. The way in which pelvic myomas sometimes ascend during pregnancy, and even during labour, is a well-known phenomenon which has frequently baffled attempts at making an accurate prognosis of events. There are many cases on record where Caesarean section has been refused, in which the accoucheur has been able to push up the tumour between the pains "so as to allow the head to occupy the place from which the tumour had been raised" (Ingelby). Troell quotes Süsseroff as having collected eleven such cases; three of the mothers and nine of the children died.

In another series of eight cases by Jenö and Thorn¹ there was no maternal mortality, and six of the children were saved. This series includes a case of Haultain's, in which reposition under anaesthesia at the sixth month was very difficult, and delivery took place at the end of the eighth month. Attention has been drawn to the dangers of reposition by John Phillips, by my colleague Handfield Jones, and by the late Granville Bantock. Adhesions may be torn, a red myoma may be injured, and necrobiosis give place to actual necrosis and infection of the growth. Finally, with cervix-myomas—submucous and polypoidal in character—lying in advance of the presenting part, it has been already mentioned that their expulsion may occur spontaneously. In removing such a growth, the danger of infection and haemorrhage must be borne in mind. Colpotomy for the removal of a myoma in the pouch of Douglas, an operation recommended on page 185, should never be performed on a pregnant uterus.

Troell states that between 1900 and 1910 fourteen cases of vaginal myomectomy during delivery have been published.

¹ Quoted by Troell, *l.c.* page 148.

These showed one maternal and seven foetal deaths ; but he says that at least in four cases the cause of the death of the child had nothing to do with the operation.

Laparotomy during Delivery.—In those cases where spontaneous or manual reposition fails, and in those where the growth cannot be removed *per vaginam* (*vide supra*), nothing remains but to open the abdomen and perform Caesarean section ; or, in the case of a dead foetus, to perform total hysterectomy without incising the uterus.

Reposition through a laparotomy-wound has on a few occasions been carried out for cases where, owing to adhesions in the pelvis, a growth could not be pushed up from below. Severe haemorrhage resulted therefrom in a case of Thornton's ; and N. Macleod found reposition impossible, and therefore removed the tumour and performed Caesarean section. In a case recorded by Ridell the uterus was everted and guarded by warm compresses, whilst forceps were applied and delivery successfully accomplished.

Myomectomy during delivery was successfully performed in 1901 by Herbert Spencer.¹ The tumour was cystic, and weighed 17 lbs. ; it was thought to be an ovarian growth. It lay in the left broad ligament, and was larger in size than the uterus. "As the patient had gone over term (284 days), and the heart-sounds could not be heard," the abdomen was opened and the tumour easily enucleated. The oozing cavity was packed with gauze, which was removed the day following operation. Spontaneous labour followed 8½ hours after the myomectomy. The foetus died before operation.

Olshausen, Vallin, Hammerschey, and Rubeska are mentioned by Troell as having performed myomectomy during labour. In Hammerschey's case delivery was effected by cranioclastm, whilst Rubeska employed version and extraction in two cases. No maternal death in this series is recorded,

¹ *Trans. Obst. Soc. Lond.* vol. xlv. page 122.

but only one living child was obtained. I agree with Troell in his remark that the child has a better chance from Caesarean section, and the danger to the mother is not increased thereby. To open the abdomen and remove a myoma, and then proceed to craniotomy, indicates a surgical failure.

Caesarean Section for Myoma

The first Caesarean section on a myomatous uterus was performed by W. F. Montgomery.¹ Both mother and child died. The first completely successful case, according to Troell, is that of Myor of Geneva. Stoker of Boston² was the first to amputate the uterus after Caesarean section. His operation was performed many years before Porro began his series, *i.e.* in 1868. Both mother and child died. The first Porro operation was performed on May 21, 1876.³ Both mother and child were saved. The mortality from the Porro-Caesarean operation, and for total hysterectomy, in 1880 is given by Troell as 75 per cent; about 20 per cent in 1890; and in 1900-1909 it varied from 7.1 to 12.5 per cent for the mother, and from 5.2 to 20 per cent for the foetus.

Conservative Caesarean Section for Myomatous Uteri.—In Troell's tables 289 cases are tabulated, 149 of these being recorded between the years 1870 and 1880. Between 1900 and 1909 Troell collected 20 cases which gave a maternal mortality of 12.5 and a foetal mortality of 5.2. This conservative procedure is only to be recommended when there is some insuperable difficulty in getting a myoma out of the pelvis without grave risk to the patient; in fact it is not to be recommended except *in extremis*, or when the removal of the uterus is refused. The maternal

¹ W. F. Montgomery, "Case of Pregnancy requiring Caesarean Operation," *Dublin Journ. of Med. and Chem. Science*, 1835, vol. vi. page 418.

² *Journ. of Gyn. Soc. Boston*, 1869, vol. i. No. 4, page 223.

³ In 1876 Prof. Porro published his memoir, *Della Amputazione Utero-Ovarica come complemento di Taglio Cesareo*, since when the procedure has been known as Porro's operation. See Clement Godson, *Brit. Med. Journ.*, Jan. 26, 1884, page 142; also *Annali Universali*, 1876, vol. ccxxxvii. page 289.

mortality is higher with conservative Caesarean section than it is with either supravaginal amputation, total hysterectomy, or Caesarean myomectomy.

Troell mentions a case of Essen Möller which shows how dangerous the myoma when left may be. A cervical growth made delivery *per vaginam* impossible. Caesarean section was performed. Two days later ileus set in, owing to the sigmoid flexure being incarcerated between the sacrum and myoma. Colostomy failed to rescue the patient, and she died about a week after the first operation.

Supravaginal Amputation or Total Hysterectomy.

—Following Caesarean section the above are the operations of election for myomatous uteri; which is selected will largely depend upon individual operators. Despite the statistics given below I am inclined to advise total extirpation of the uterus. I have performed this operation for cervical cancer after removing the child by Caesarean section, and have come to the conclusion that it is just as easily carried out on a pregnant subject as is the amputation-operation. In cases of doubtful asepsis, the removal of the cervix affords a good channel for vaginal drainage, which is a point of great importance.

Troell tabulates 43 amputations and 20 total hysterectomies. In the former the mortality was 7.1 per cent maternal, and 10 per cent foetal. In the latter it was 10.5 per cent maternal, and 20 per cent foetal.

Caesarean Section followed by Myomectomy.—

From 1900 to 1909 Troell collected 20 cases in which this conservative operation was performed. The mortality was 11.1 for the mother, and 7.7 for the child. Such statistics would lead one to assume that this is as safe an operation as total Caesarean hysterectomy. In my own opinion this impression is misleading. Myomectomy in many cases is a most dangerous operation to perform at term, for even if carefully carried out in the manner I have ad-

vised (see page 149), it may lead to surprising hæmorrhage. Only when the uterine wound is absolutely dry should the puerperal uterus be left after myomectomy. I have knowledge of one case which ended fatally, and am afraid of the operation. In 1906, Russell Andrews¹ recorded a success in a case where he enucleated a 'fibroid,' which filled the pelvic cavity, after he had removed the child by Caesarean section.

Caesarean Section followed by Öophorectomy.—Troell mentions eight cases in which, presumably on account of operative difficulties, the uterus was left, and castration performed. In one instance the myoma became reduced to half its original size in five weeks. In Pryor's case the myoma increased so rapidly in size after castration that total hysterectomy was performed three months later.

Caesarean Section followed by Salpingectomy.—Lewers recorded two cases in which this operation was performed successfully.²

Caesarean Section after Death of the Foetus.—This operation has been performed in cases of uterine myoma, but for obvious reasons it is not to be recommended. The safest plan with a dead child, or with signs of infection, is to remove the gravid uterus entire.

Summary of Treatment.—Induction of labour or abortion should never be performed. Expectancy gives the best chance to the mother and to the child. Pain should be treated by rest in bed and by strict attention to the regulation of the bowels. That the patient must, however, be kept under observation is clear from the indications already given for operation, which include axial torsion of the growth or of the uterus itself; severe uterine hæmorrhage (as in a case of my own, see Fig. 134, page 142), which indicates threatened abortion; infection of the tumour

¹ *Trans. Obst. Soc. Lond.*, 1906, vol. xlviii. page 313.

² *Lancet*, January 1903, page 157.

and peritonitic symptoms ; incarceration of the growth and retention of urine. But severe symptoms are exceptional, and therefore myomectomy during pregnancy has not a large field of utility, especially as it yields a foetal mortality of over 20 per cent. Myomectomy during labour should be confined to tumours which are pedunculated, or which are of no great size, *i.e.* only those growths the removal of which will not imperil the integrity of the wall of the gravid uterus. When carried out, the greatest possible care must be taken to secure perfect haemostasis. *The patient's life must not be risked for the sake of her uterus*, and, speaking generally, the total hysterectomy is the safer operation ; safer, that is, than myomectomy at term, or than conservative Caesarean section. Myomatous polypi should be removed *per vaginam* as soon as they are discovered ; they are a fruitful source of infection. As already stated, whilst under observation in hospital awaiting a possible Caesarean hysterectomy, many myomas which could not be elevated by manual reposition, ascend during labour-pains, and the child is then born *per vias naturales*. Reposition under anaesthesia sometimes succeeds during labour ; if this fails, and the obstruction remains insuperable, proceed to Caesarean section and remove the myomatous uterus, or, if the foetus is dead, remove the uterus unopened. Only in private practice, where assistance and convenience for laparotomy cannot be obtained, should embryotomy be performed. The subsequent trouble with the removal of the placenta has already been referred to. It may be quite impossible to remove the placenta *per vaginam* after the delivery of the foetus, and laparotomy may be essential for the purpose. The dangers during the puerperium from infection of myoma have already been discussed. Below is given a table showing results of treatment in twenty-three cases which have come under my personal observation.

[TABLE

TABLE OF RESULTS OF TREATMENT IN TWENTY-THREE CASES OF PREGNANCY COMPLICATED BY MYOMA.

Operation.	Cases.	Results.	
		Maternal.	Foetal.
Caesarean Section + Hysterectomy	3	All recovered.	All children lived.
Caesarean Section + Myomectomy	1	Death.	Child lived.
Hysterectomy before term	4	All recovered.	...
Myomectomy before term	4	All recovered.	4 Normal labours, 4 children lived.
Hysterectomy (Abdominal) <i>post abortum</i>	2	Recovery.	...
Hysterectomy (Vaginal) <i>post abortum</i>	1	Recovery.	...
Myomectomy (Abdominal) <i>post abortum</i>	1	Death.	...
Myomectomy (Vaginal) <i>post abortum</i>	1	Recovery.	..
Placenta removed	1	Recovery.	...
Pelvic Abscess opened after delivery at 8 months. Fundal myoma left <i>in situ</i>	1	Recovery.	...
No operation	4	Spontaneous labour.	All children lived.
Total	23		

Myoma and Extrauterine Pregnancy

For those who hold as I do that salpingitis favours the occurrence of tubal pregnancy, it is easy to infer that there is a remote causal relationship between myoma and tubal gestation, the frequency with which these tumours are associated with salpingitis pointing in this direction (*vide infra*).¹

Scipiades in a recent paper on the subject of myoma and pregnancy² states that in 2.5 per cent of cases the pregnancy is extrauterine. In my own series of 270 operations for myoma the association of extrauterine pregnancy therewith was twice seen.

In one instance the myoma was not thought of, as the symptoms of the ruptured tubal sac completely masked any which the uterine tumour might have occasioned. In the other case the myoma was enveloped in a densely adherent false capsule which also contained foetal bones—the adventitious sac resembled thick leather; its removal

¹ A myoma between the layers of the broad ligament may so elongate the tube as to delay the passage of a fertilised ovum for a period long enough for tubal embedding to occur (see Fig. 41, page 41).—AUTHOR.

² *Abhandl. a. d. Gebiet. d. Geburts. u. Gynäk.* Bd. ii. H. 2, S. 201, 1913. See also footnote, page 133.

was impossible, so it was packed and marsupialised to the abdominal wound ; there had been a history of a 'false labour' eighteen years before operation. The diagnosis before operation was that of an impacted burrowing myoma ; the foetal remains came as a surprise in dissecting the specimen.

Scypiades is of the opinion that myomas account for $\frac{1}{2}$ per cent of all extrauterine gestations. Cullen reports that in 934 cases of myoma six tubal pregnancies were detected, five of which were ruptured and one was intact. Of these six patients, five had never been delivered of a child at term, and three had never been pregnant before. J. Wesley Bovée published a case of "mummified advanced abdominal pregnancy complicated by uterine fibromata."

The patient was a negress, aged 26 years ; she had had one labour at term and three miscarriages, in each of which the foetus and placenta had been seen. The patient was admitted into hospital with symptoms of a threatened abortion after many months' amenorrhoea. A tumour was felt, the bleeding ceased, and the woman was discharged. A month later a foetus 30 cm. long and the placenta were expelled. From that time onwards the patient complained only of a dull pain in the lower abdomen. Five months later, cramp-like pains and violent haemorrhage set in. Laparotomy was performed for a hard knotty tumour. This tumour proved to be a mummified foetus (32 cm. long) and the placenta, the two being enclosed in a semi-translucent membrane and lying free in the peritoneal space. The whole mass overlay a myomatous uterus and was adherent to the anterior abdominal wall, bowel, mesentery and omentum. The placenta appeared to lie in connection with the outer end of the left Fallopian tube. The adherent adnexa and uterus were removed. This case was evidently one of simultaneous intra- and extrauterine gestation occurring in a patient the subject of *myoma uteri*.¹

An interesting case of pregnancy in one horn of a uterus bicornis and myoma in the opposite horn occurred in the practice of J. A. Magrath of Kingston, Jamaica, in the year 1856. The specimen was exhibited by George Harley

¹ Quoted from *Zentr. f. d. gesamte Gynäk. u. d. Geburts.* Bd. iv. H. 15, S. 710 ; also *Amer. Journ. of Obstet. and Dis. of Women*, 1914, vol. lxix. No. 3, pages 506-511.

at the Obstetrical Society of London in 1859.¹ Harley erroneously described this case as one of *tubal* pregnancy.

The patient, as in J. Wesley Bovée's case, was a negress, aged 22 years. She was seen by Dr. Magrath on the 30th of August 1856 at 9 A.M. She was said to be five or six months advanced in her first pregnancy. She had been complaining for the last month or six weeks of general abdominal uneasiness, and pain in the left iliac region. The previous evening the pain increased severely, and towards midnight she began to vomit, and became weak, cold, and extremely restless. She had always enjoyed good health, except that she suffered from dysmenorrhoea.

When seen, she was in a state of complete collapse ; cold, pulseless, with feeble voice ; restlessness alternating with drowsiness ; an anxious but not sunken countenance ; vomiting everything she took.

She was perfectly conscious, and complained of much pain and tenderness over the whole abdomen, but particularly at the upper part of the left iliac region. The abdomen was tumid and soft, nothing abnormal could be found in the situation of the greatest pain ; but in the hypogastric region there was a firm, very movable, irregular tumour, about the size of the uterus at the sixth month of pregnancy. The vagina was natural, but cooler than usual ; there was no discharge ; the cervix uteri was rather high up and turned to the left side, enlarged, soft, and cushiony ; the os was round, dimpled, and closed ; the body of the uterus felt unequally enlarged, and firmer than usual, but not tender. By abdomino-vaginal examination the tumour was felt to move with the uterus, but not as if the two were closely connected ; by the rectum, the posterior wall was found enlarged, firm, and flattened ; the bladder was empty ; no foetal sounds could be heard. She died at 11 A.M. the same day.

At the autopsy a large quantity of dark fluid blood, mixed with coagula, was found among the intestines. A foetus of about five months' growth was seen lying under the arch of the colon, on the left side, and attached by its umbilical cord to the interior of a dark-coloured, round tumour, about the size of an orange, situated in the left iliac region. In the superior wall of the tumour was a large, rugged opening, through which the foetus and blood had escaped. Both ovaries, with the fimbriated extremities of the Fallopian tube, were healthy. The uterus was very irregular in shape, and had several tumours attached to it. Arising by a narrow pedicle about the middle and on the left side of the uterus was a fibrous tumour of the size and shape of the kidney of an ox.

¹ *Trans. Obst. Soc. Lond.*, 1859, vol. i. pages 101-105.

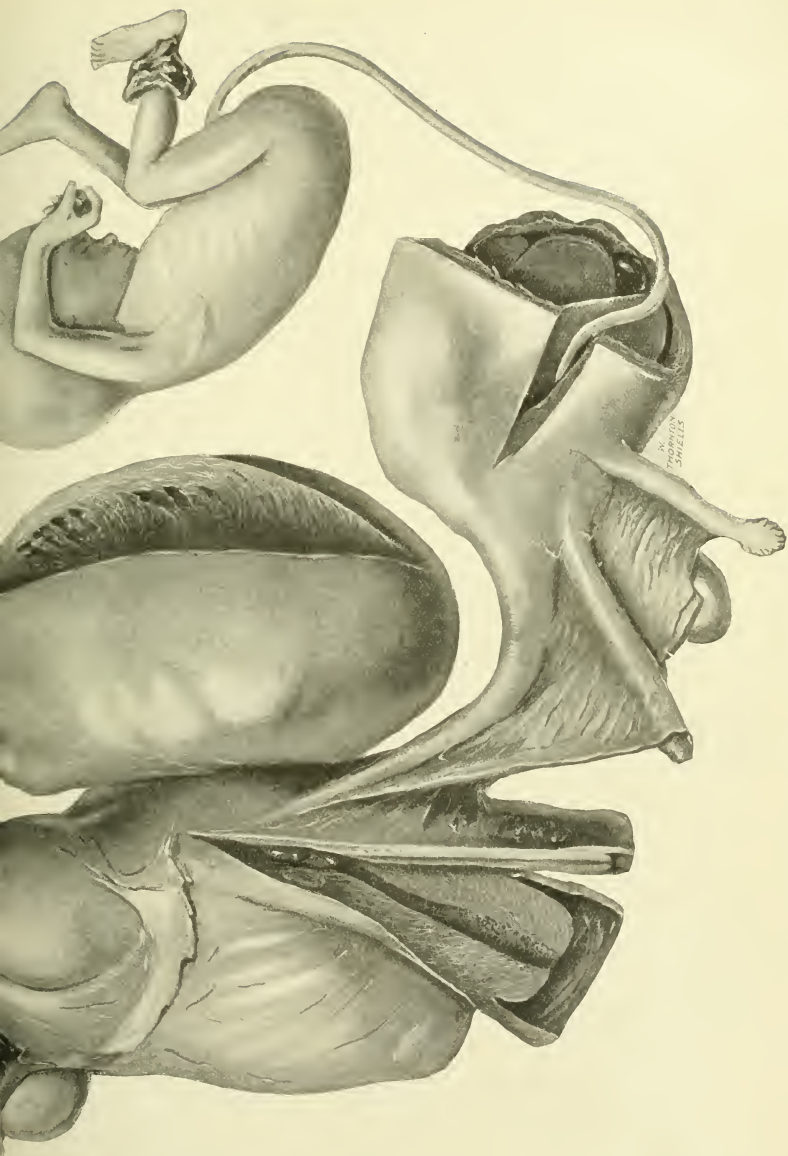


FIG. 14ca.—Showing a myomatous uterus and a ruptured gravid uterine horn. (Harley, *Trans. Obst. Soc. Lond.* vol. i., 1859.)
See also Blacker, *New System of Gynaecology*, vol. i. page 474, edited by Eden and Lockyer.
This specimen is preserved in the Museum of University College Hospital, London (Museum No., 715).

On examination of the tumour in the left iliac region it was found to consist of an expansion of the walls of the Fallopian tube, equidistant between its fimbriated extremity and uterine attachment.

The parietes of the tube at the point of dilatation were considerably increased in thickness, the non-striated variety of muscular fibre being distinctly visible; that portion of the tube opposite to the attachment of the placenta had undergone an immense hypertrophy, taking on the appearance of impregnated uterine tissue. The placenta appeared to be chiefly attached to the upper wall of the tube. The tube itself was not shortened by its lateral dilatation, but seemed lengthened. Its orifice within the uterus could not be made out.

The ovaries were full-sized and healthy; the left contained a well-marked corpus luteum.

This preparation is now in the Museum of University College, London. Figure 140a shows that the above interpretation, which is that of George Harley, is erroneous. The enlarged tube is clearly a uterine horn, and the proximal part of the "tube" which "seemed lengthened" is the pedicle of union which unites the two horns together. The figure is taken from George Blacker's article on "Ectopic Gestation" in the *New System of Gynaecology* (Eden and Lockyer).¹

The details of my own case are as follows:

A. S., aged 36, was first seen on March 29, 1907. Catamenia began at thirteen years, had always been regular, lasting four days, not excessive, not painful; the last period occurred two months previously.

The patient was childless after ten years of wedlock. A month before examination there was pain in the lower abdomen, which lasted one week and then ceased. Six days previously to being examined it started again, very severely after coitus, and continued, though less intense, since. Examination revealed a tumour to the left of the mid-line, extending to 1 inch above the umbilicus and filling up the left side of the lower abdomen; it was dull to percussion, not notably tender; its outline was indefinite owing to the thickness of the abdominal wall.

The cervix was high up behind the pubes and difficult to reach. The tumour did not fill the pelvis, and no definite lower limit of it could be felt. My diagnosis was extrauterine pregnancy or

¹ For details of another interesting case see Cullingworth, "Early Ectopic Gestation (? Tubo-uterine) complicated with Fibromyoma, etc," *Trans. Obst. Soc. Lond.*, 1898, xl. 285.

a twisted ovarian cyst. March 30, Laparotomy. The tumour consisted of a large uterus containing multiple myomas. On its right side was a gravid tube which had ruptured; it was attached to the uterus and to the broad ligament. There was much blood-clot in the pelvis, and on disturbance the bleeding started afresh.

The myomatous uterus together with the right tubal gestation

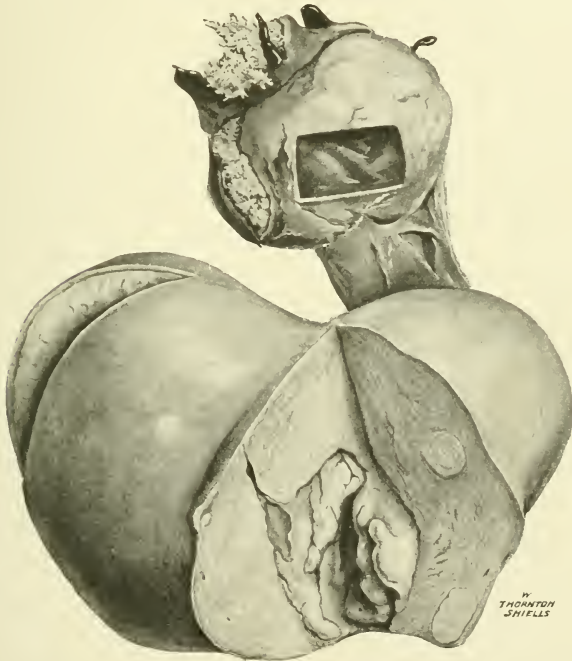


FIG. 141.—Showing a myomatous uterus and a ruptured tubal gestation. The uterine cavity has been opened, and shows the mucous membrane transformed into a decidua.

were removed *en masse* by Kelly's hysterectomy. The patient recovered. The uterine mucosa showed decidual change. The specimen is seen in Figure 141.

The association of extrauterine pregnancy and myoma is of interest from the point of view of differential diagnosis. Kelly and Cullen state that "in several instances we have found it impossible to differentiate between an adherent

myomatous uterus and a tubal pregnancy that has been ruptured for several weeks.”

In four of the six cases recorded by Cullen the symptoms and signs of the presence of a myoma completely overshadowed those of tubal pregnancy. In a case where the gestation-sac was unruptured, this was definitely felt as a “hard ball covered with velvet,” a sign which is wanting after the tube ruptures. The ruptured tube becomes enlarged and surrounded by organising clot, and also acquires adhesions to adjacent structures. The *signs* therefore are liable to be misleading, and reliance must be placed upon the history of symptoms. The cessation of the menses for a month or two, followed by irregular haemorrhage and pain, with a history of acute pain, vomiting, and fainting, are symptoms which favour the diagnosis of ectopic gestation.

Secondary abdominal pregnancy of four years' duration is a rare condition discovered by Cullen whilst operating for what he had regarded as an adherent myoma; in this case as in one of my own (*l.s.c.*) no heed was paid to the patient's statements of a spurious labour.

With another rare condition, viz. interstitial pregnancy, the physical signs simulate those of a myoma. Figure 259 in Kelly and Cullen's *Myomata of the Uterus*, shows a ruptured cornual pregnancy with foetus and placenta attached, the whole mass resembling a subserous myoma. The tumour was removed five months after the typical acute symptoms of a ruptured ectopic gestation had occurred, but there was nothing in the physical signs to assist in making a correct diagnosis. The longer a secondary gestation-sac remains, the more likely is it to be regarded as a myomatous outgrowth, if it is in contact with the uterus.

Peri- and paratubal haematocoeles form solid fixed tumours which, unless the symptomatic history be carefully gone into, may lead to a diagnosis of myoma being made.

CHAPTER IX

CLINICAL FEATURES OF MYOMA

Frequency.—Myomas of the uterus are probably the commonest tumours to be found in any part of the human body. Of 150 consecutive uteri which I collected from the *post-mortem* room of Charing Cross Hospital, 30 were myomatous. It has been stated that one-eighth part of all gynaecological cases are made up of patients suffering from uterine myoma. As regards the relative frequency of myoma in the body and in the cervix, Schröder says that 91.9 per cent occur as corporeal, and 8.1 per cent as cervical growths. Myoma appears to be even more common among negroes than among white women.

Age.—The statement that all elderly virgins have these tumours is probably an exaggeration, and Klob's view that 40 per cent of all women over forty are the subjects of this disease is possibly an over-estimation.

As regards the time of life at which myomas make their appearance it may be stated—

1. That they have never been shown to appear before puberty.
2. That they may arise at any time during sexual life.
3. That they do not arise *de novo* after the climacteric.

Clinical evidence of a uterine myoma may be first established after the menopause, owing to some change, such as necrosis or malignancy, occurring in the previously unobtrusive tumour.

The youngest case recorded as suffering from a uterine

myoma is that of Cavaillon, in which the patient was aged 13 years; the growth after removal was pronounced to be a histologically innocent myoma. Nineteen years was the age of the youngest patient in Kelly and Cullen's series of 1428 cases. The youngest case in my own experience was that of a woman of 22 years who had a cystic myomatous tumour reaching halfway to the epigastrium. Atlee removed a pedunculated myoma from a woman aged 24 years (August 28, 1844).

The youngest fatal case I can find recorded is that of Madge.¹ The patient was a primipara, aged 27 years. Labour was obstructed by a myoma in the pouch of Douglas, which felt like the child's head. Spencer Wells pushed it up under chloroform, and the child was delivered by a blunt hook with traction on the groin. Mother and child died. The myoma was attached to the fundus by a small pedicle; it weighed about 1 lb.

Myomas are most likely to cause trouble, and require treatment between the ages of thirty-five and fifty-five years. Most of the operations for these growths take place during this period.²

Sterility.—Th. B. Phillips in a dissertation of 184 pages on Myoma and Sterility gives statistics based on 1094 cases in the Amsterdam Clinic. Of the 1094 cases of myoma, 814 were in married women = 75.5 per cent; of these, 241 = 29.9 per cent, were sterile. 264 patients were unmarried = 24.5 per cent, so that, as regards the relative frequency of myoma in married and unmarried women, it proved in this instance to be about 3 to 1; but statements on this point are very conflicting.

Regarding the relationship to child-bearing, the 814 married women, quoted above, had 1805 children and 441 abortions; therefore the number of children = 2.25 per cent

¹ *Trans. Obst. Soc. Lond.* vol. iv, page 129, June 4, 1862.

² See Appendix III, page 566.

per mother, and the abortions = .55 per cent ; or, excluding nulliparae, 3.21 per cent children and .8 per cent abortions. The conclusion drawn by Phillips is that myomas are a hindrance to fertility, *i.e.* the presence of myoma reduces the fertility of married women and the frequency of abortion is increased. Phillips says that "in one half of the cases the tumour is the cause of the abortion" (? submucous), and in his opinion the tumour in most cases is the cause of failure to conceive.

With subserous growths abortion is less frequent and fertility relatively high. Phillips finds that the intramural variety of growths preponderates in sterile married women.

Menopause.—A notable clinical feature of myomas is that they cause a postponement of the menopause, so that whilst the average age at which a woman ceases to menstruate may be put down at about fifty years, patients with myoma frequently menstruate up to the age of fifty-five or even later.

Symptoms

There are myomas of even considerable size which cause no symptoms whatever. With what frequency these occur is unknown, but it is certain that a myoma is compatible with perfect health and that its existence is often discovered only by accident. On the other hand, the symptoms to which it may give rise are many and various: indeed, it may be generally stated that there is a tendency for myomas, which for many years have been harmless, subsequently to give rise to symptoms more or less severe, so that it is exceptional for the subjects of these tumours to escape from some or other of the effects which they are capable of causing.

Primarily, the symptoms which we may expect to find comprise haemorrhage, leucorrhoea, pain, pressure-symptoms, and interference with conception, pregnancy, labour, and the puerperium.

Secondarily, anaemia, constipation, dyspepsia, and neurasthenia make up a picture of chronic ill-health. Acute and subacute abdominal disturbances may occur; further, symptoms due to changes in the growth, or to mechanical disturbances of the circulation may set in; and, finally, sudden and oft-repeated retention of urine may be caused by impaction. The chief symptoms will be considered separately.

I. Primary Symptoms. — *Haemorrhage.* — Hospital patients call myomas ‘bleeding tumours,’ because menorrhagia is the commonest symptom, yet it is by no means of constant occurrence. It is dependent upon increased size of the uterine cavity and upon the association of hyperplasia, and, in some instances, of inflammation of the endometrium; or upon the imperfect uterine contraction due to the presence of mechanical obstruction; or upon the presence of a polypus, either mucous or myomatous.

Symptomatic bleeding is further favoured by the intervention of degenerative and malignant changes in the growth. Generally speaking, the more intimate the relationship between a myoma and the uterine cavity, the more pronounced is the haemorrhage, so that submucous (stalked and sessile) growths are most prone to set up bleeding; interstitial growths do so to a less degree, whilst subserous and intraligamentary tumours, not influencing the cavity at all, may cause no bleeding whatever.

John Bland-Sutton lays particular stress upon the part played by the changes in the endometrium, “the chief disturbing agents being pathogenic organisms.” This means that we ought to find histological evidence of a true endometritis in addition to simple oedema and overgrowth of the mucous membrane. I am able to give support to this view in so far as the finding of plasma-cells in a few cases is concerned; but I cannot lay claim to have made a routine examination for plasma-cells in the case of every bleeding myoma that I have removed. With-

FIG. 142

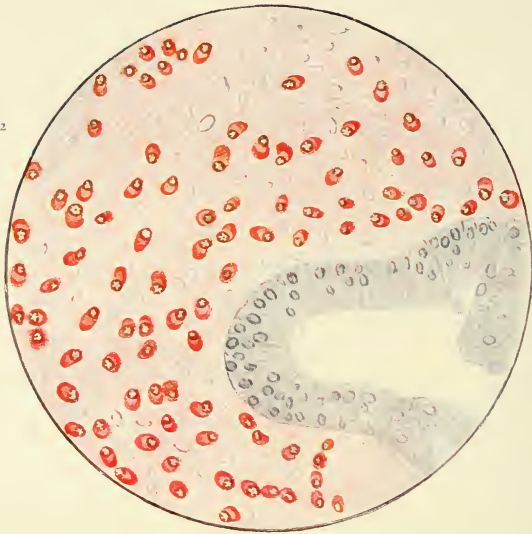


FIGURE 142. Showing inflammation of the Endometrium in a case of myoma uteri. The presence of such a large number of plasma-cells is the only reliable proof of 'Endometritis.' (Section stained by C. J. Marshall.)

FIG. 143

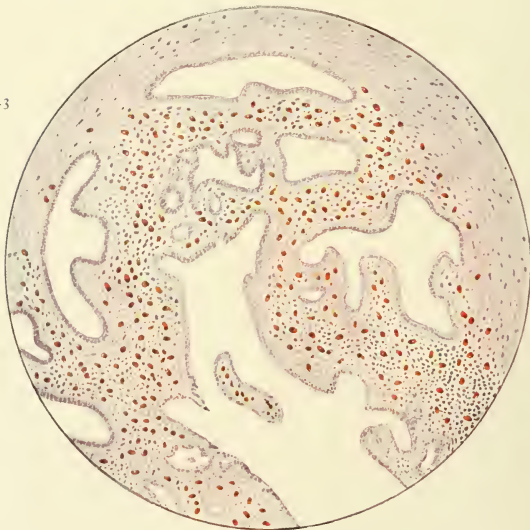


FIGURE 143. Showing the presence of plasma-cells in the Fallopian tube, from a case of myoma uteri, in which there was 'Endometritis.' (Section stained by C. J. Marshall.)

(This is the same case as seen in figure 142.)

out such a routine examination the above view is a mere conjecture.

Figure 142, Plate XXXV., shows the endometrium from a case of *myoma uteri* to be studded with these cells ; in this instance there were inflammatory changes in the adnexa as well (Fig. 143, Plate XXXV.). Bland-Sutton says : " It is quite probable that in nearly all instances where excessive uterine haemorrhage is due to a fibroid, the endometrium is septic, and the severity of the bleeding varies with the virulence of the micro-organism present. All septic wounds bleed, and haemorrhage from this cause is the most intractable of all, and an infected endometrium like a septic wound bleeds profusely." This expression of opinion, so far as I know, has never been supported by histological investigation.

As already stated, the type of haemorrhage due to myoma is that of menorrhagia or excessive monthly periods. In extreme cases the flow is both excessive and prolonged ; in less severe instances the duration is normal but the daily loss increased ; or the total loss may be in excess owing to the period lasting for an abnormal time, so that the 'clear' interval may be reduced to ten days or even less, with a loss of rhythm in the periodicity : indeed in the worst cases scarcely any free interval is obtained, but only a cessation in the intensity of the loss, and patients may even die as the result of the haemorrhage. In these extreme cases the patient is pale—waxy pale—with a transparent skin ; there is puffiness of the feet and ankles, and breathlessness ; the haemoglobin may be reduced to 20 per cent or lower. These are all signs of loss of blood, and may occur quite independently of malignant changes.

From the anaemia follow secondary symptoms which will be considered under "Heart," page 180.

Mention has already been made of the continuance of menstruation beyond the average date of the menopause. This clinical feature is not confined entirely to those growths

which cause the most pronounced menorrhagia, viz. the submucous variety, but is a common feature of every variety of myoma. In this connection it may be mentioned that the aetiology of myoma and that of the haemorrhage with which it is associated is regarded by some speculative minds as dependent on a single factor, namely, an aberration of ovarian secretion.

Internal Haemorrhage from myoma has been recorded by Rokitansky, Spencer, Bruce Clarke, Stein, Gusserow, Zweifel, and Cullen. This occurs from the large veins which spread themselves over the surface of 'parasitic' myomas, and which are liable to become varicose, and possess, at best, only very thin walls. In Cullen's case the abdomen was opened a few minutes after examination of the patient had been made by students. Several hundred cubic centimetres of blood were found in the peritoneal cavity, due to the partial separation of a subserous nodule from the uterus. In the same way a violent blow on the abdomen will cause laceration of a myoma and severe internal haemorrhage.¹

Leucorrhoea.—When the intermenstrual period is of some considerable duration, it is quite common to get a leucorrhoeal discharge. This is an excessive whitish or yellowish discharge, which is often tinged with blood, just before and after the period; it is a common, but not an important symptom.

The hyperplastic condition of the endometrium in cases of myoma, which has already been referred to, will account for the excessive secretion from the cavity of the uterus, and to this is often added the discharge from coincident cervical catarrh and erosion.

Departures from the common mucous or muco-purulent type may occur with secondary changes in the tumour. Thus with cystic growths the discharge may be thin, watery, and sometimes tinged with blood; with a sloughing sub-

¹ See also Appendix II. page 562, paragraph 2.

mucous myoma the discharge is putrescent and extremely nauseating. Sometimes a thin watery discharge is particularly irritating and sets up *pruritus vulvae*.

Pain.—Pain is not an obtrusive symptom of myoma; when present it directs the clinician's attention to complications either in the tumour itself—in the nature of degeneration, malignancy or infection—or to changes, often inflammatory, in the adjacent structures. Uncomplicated myomas may, however, give rise to a sense of weight and bearing down, and may be tender just before a period. They may cause definite pain in two ways: (*a*) by making the menstrual process painful; (*b*) by compression of the veins and nerves in their neighbourhood.

(*a*) *Dysmenorrhoea*.—Severe dysmenorrhoea is quite uncommon with uncomplicated myoma. It may be induced by excessive uterine contraction in the attempt to extrude a myomatous polypus, or in expelling large clots during excessive menstruation.

Small myomas are much more likely to cause dysmenorrhoea than large ones; subserous growths cause neither haemorrhage nor dysmenorrhoea. With complicated myomas, menstruation is frequently painful, and this will be referred to later.

When menstruation is painful, the pain does not precede, but is concomitant with the flow—when the pain is severe the presence of a polypus in process of 'delivery' may be suspected; the patient may then describe the symptoms as 'labour pains.'

(*b*) *Pain from Pressure*.—This may only amount to ill-defined abdominal discomfort, or more frequently there is pain in the back and across the hips and down the thighs; sometimes it is definitely localised, for example to one hip; in character it is usually a dull ache, but it may be sharp and even lancinating. Sometimes continuous nerve-pressure will cause cramp-like pain in the legs and feet, and this pain

in the lower extremities may be put down to rheumatism ; in other cases the pressure causes numbness and loss of sensation.

Symptoms due to pressure on viscera are important ; they relate principally to disturbances in the functions of the bladder and the intestines.

The Bladder.—The anatomical displacement and structural alterations in the bladder which occur as the results of myoma have already been discussed (pages 120-123) ; it now remains to mention the functional disturbances which are met with in certain cases.

In spite of the close anatomical relationship of the bladder and uterus, disturbance of the vesical function is a relatively infrequent symptom of myoma. The explanation is found in the free range of mobility afforded to the dilatable part of the bladder by the loose connective-tissue space which surrounds this viscus beneath the flaccid utero-vesical fold of the peritoneum. When a myoma during steady growth gradually ascends out of the pelvis into the abdomen, its effect upon micturition will be the same as that of a gravid uterus : *i.e.* before the growth advances above the pelvic brim, it is liable to cause an increased frequency of the act, and after it has reached the abdomen, an uncomplicated myoma may cease altogether to irritate the bladder, and the frequency of micturition will pass off. The fact that the bladder has been drawn up with the growth seems to make but little difference to its function, since its capacity for holding urine is not encroached upon. It seems clear that, as long as diastole or expansion is not prevented, the bladder is very tolerant of displacement, whilst actual encroachment on its capacity at once brings about a necessity for a more frequent emptying of the viscus.

The commonest bladder-symptom is *painless frequency of micturition*. In rarer cases dysuria is an accompaniment ; when the bladder becomes adherent and its walls

pressed together, actual strangury may occur, but more commonly the 'pain' is just a feeling of discomfort and weight.

Frequency of micturition occurs in about 7 or 8 per cent of the cases of myoma which find their way into the wards of a hospital, whilst frequency with tenesmus is far less common.

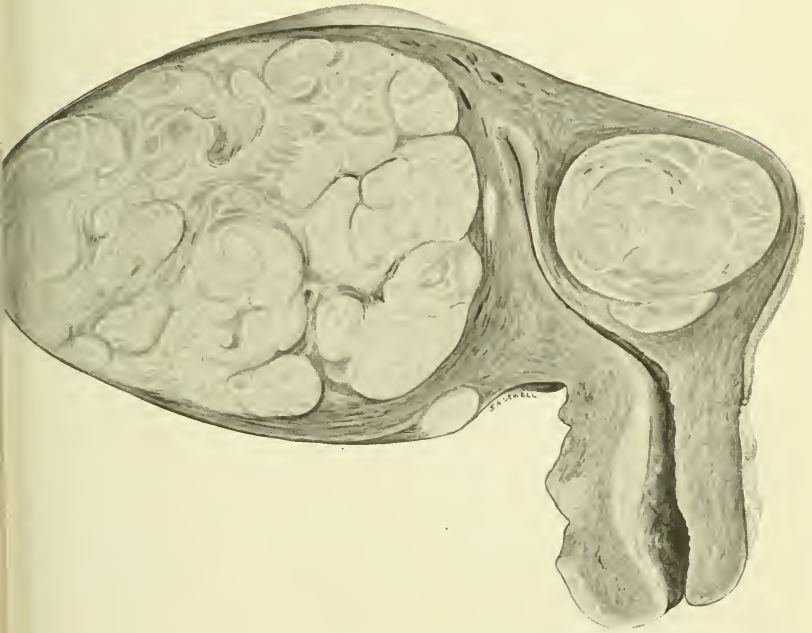


FIG. 144.—Showing a myomatous uterus which caused acute retention of urine in a 'working' woman.

Retention of urine is a rare symptom. In Kelly and Cullen's series of 1400 cases partial or complete stoppage of urine occurred in 20, *i.e.* in less than 1.5 per cent, and the trouble varied from difficulty in starting micturition to sudden complete obstruction, which lasted in some instances for twenty-four hours.

Figures 144, 145, and 146 show three myomas which were first discovered by the patients' doctors, who in each case were called out in the night to draw off the urine.

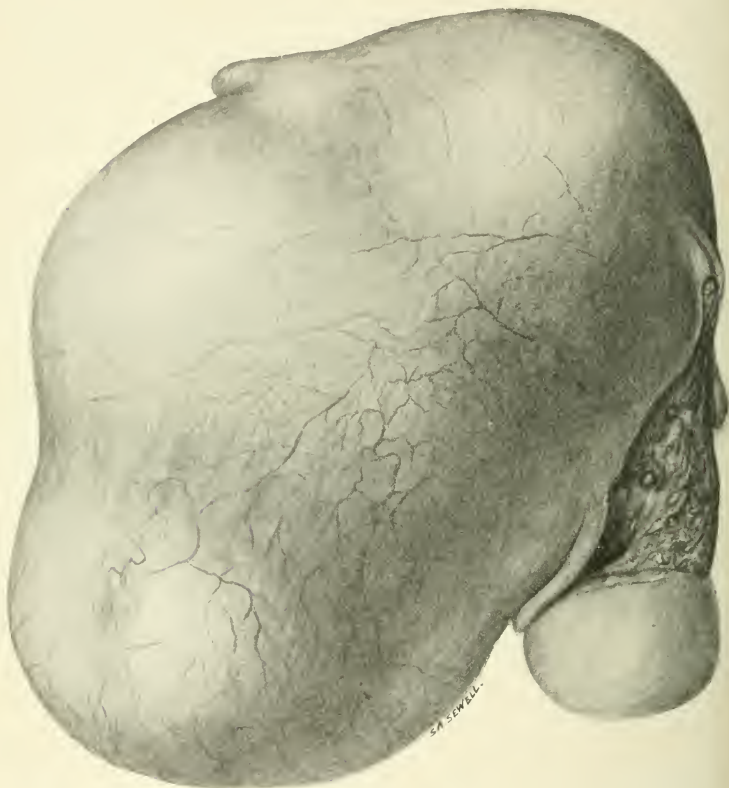


FIG. 145.—Showing a myoma of the posterior uterus wall. It was removed from a hospital patient on account of her suffering from acute retention of urine.

There have been four cases only, in a series of 270 myomas which have come to me, on which I have had to operate for retention of urine. In three cases the existence of the growth was unsuspected until acute retention supervened.

A submucous myoma in a retroflexed uterus will sometimes cause acute retention in exactly the same way as an incarcerated, retroverted, gravid uterus ; the urethra is then not so much impacted as stretched, the lumen being obliterated by the process of stretching and elongation.

A description has already been given in another section



FIG. 146.—Showing a myoma of the posterior wall of the uterus which was removed because it caused retention of urine.

of the effects produced on the ureters and kidneys by chronic retention of urine, but it may here be stated that chronic retention and cystitis, and the sequelae relating thereto, are rarely seen in association with uterine myomas. Cystitis was only twice found in 1400 cases by Kelly and Cullen.

Incontinence of urine is sometimes caused by pressure of the uterine tumour on the bladder, but this is very seldom. Urinary symptoms are more often noticeable just before, and

during menstruation, at which times myomas can often be observed definitely to increase in size. Pressure on the ureter and displacement of the duct have been dealt with in a previous section (see page 123).

Blood-vessels and lymphatics in the broad ligaments may show signs of direct compression by myoma. The results are localised dilatation of both veins and lymphatics; these collapse on removal of the tumour, and therefore the condition is not seen in museums, but can be appreciated only by those present during an operation. From the same cause, oedema and varices of the lower extremities occur.

Haemorrhoids from pressure on the inferior haemorrhoidal veins are not uncommon.

True thrombotic phlegmasia, due to clotting of blood in the external iliac and femoral veins, has been described, but this is very rare. Varicose veins of the vulva, and blue discoloration of the vaginal mucous membrane, have been noted in certain cases of myoma.

The Rectum.—Constipation is constantly associated with myoma of the uterus. Constipation and haemorrhoids are most commonly found in cases of cervical tumours, a type of growth which may fit the pelvis so accurately that it is impossible for the rectum to escape from pressure. It is very rare, however, for the haemorrhoids to be so severe as to necessitate their removal at the time of hysterectomy,¹ and as a rule these varicosities disappear after the removal of the myoma.

Dyschesia, independently of haemorrhoids, is sometimes produced by the pressure of a myoma. Kelly and Cullen have noticed “a certain constancy” with which dysuria and dyschesia occur together.

Reflex neuroses such as nausea and vomiting, which are so common when a uterus is enlarged by pregnancy, are very rarely met with in uterine enlargement due to myoma.

¹ See remarks on page 507, paragraph 2.

Such symptoms should make the surgeon think of adhesions and kinking of the bowel, and they may indicate the onset of actual obstruction ; but this is a very rare complication of myoma¹—Cullen records a case where it was due to co-existing carcinoma of the sigmoid. Partial obstruction, however, is not so rare, and it is attributable to extensive adhesions between the bowel and the tumour ; also to adhesions of the bowel to inflamed adnexa ; and in some instances to an adherent *appendix vermiformis*.

The upper abdominal viscera, *i.e.* the stomach and liver, may be disturbed in their function by very large myomas which reach to the upper limits of the epigastrium. Such tumours also make their pressure felt upon the action of the heart and lungs, causing shortness of breath and various cardiac symptoms, but as these are not, as a rule (and in point of fact very seldom), due solely to the pressure, cardiac symptoms will be referred to under “The Heart in Myoma-Cases” (see page 180).

Pain due to Complications.—In addition to pain which is directly referable to the effects of pressure, must be mentioned the severe pain to which the presence of complications gives rise. As was seen in Chapter VI. page 104, the most frequent complication is coincident disease of the tubes and ovaries. Chronic inflammation of these organs is likely to occasion more or less abdominal pain and discomfort, together with recurrent attacks of pain of a severe character. Suppurative inflammation in the tubes and ovaries may cause acute abdominal symptoms, difficult at first to distinguish from an acute infection of the appendix or gall-bladder. As has already been pointed out, ovarian cysts, either true neoplasms or blood-cysts (lutein haematomas, see Fig. 81, Plate XX., opposite page 73), may co-exist with

¹ W. D.* Spanton recorded a case of acute obstruction caused by myoma in *Proc. Roy. Soc. Med. (Obst. and Gyn. Sect.)*, 1909, vol. ii. page 87. This complication was also encountered by Barris (see *Proc. Roy. Soc. Med. (Obst. and Gyn. Sect.)*, vol. iv. part ii. page 108, 1911).

uterine myoma, and should they do so, the tendency is for these adnexal structures to acquire adhesions in the pelvis, which will anchor them in this situation ; and when this is the case, they become very painful and tender. In the case figured on Plate XX. the patient complained of continual abdominal pain for many years.

Again, complications which arise within the tumour itself form another source of pain. This is most marked in the case of infection of the tumour, a condition to which submucous myomas are mostly prone. An acute infection in a submucous growth may give rise to acute pain as well as fever.

Subserous and interstitial growths, though unexposed to external sources of microbic invasion, do not escape infection. Chronic infection leading to peritoneal adhesions and fixation of the growth is, when present, always a source of pain, generally of a subacute and constant character ; this type of pain is aggravated before, and at the beginning of, the menstrual period.

Infected myomas are always a source of pain ; but aseptic necrosis of the growth is also in many instances a source of pain likewise ; *e.g.* in certain cases, of which Figure 79, Plate XIX., is an example, the tumour whilst undergoing fatty necrosis of the red type (necrosis with haemolysis) caused pain and was also extremely tender, so that the patient resented its being touched. In the particular case to which I refer, satisfactory palpation was impossible, and the diagnosis was made under anaesthesia ; the patient being tuberculous, and having had her right kidney and ureter previously removed for this disease, it was thought possible that the acutely tender lump might prove to be a pelvic abscess due to secondary infection following tubercle. Although *red* necrosis is generally aseptic, rise of temperature is occasionally found in association with the pain. The cause of the pain and occasional fever is not clear, but the same occurs in the case of sarcomatous metaplasia, even

when, as with red necrosis, there is no plastic peritonitis present.

Torsion of the stalk of a *subserous* myoma is a source of pain, which in certain rare instances may be very severe. Kelly and Cullen mention the case of a coloured woman, who suffered severely from cramp-like pains in the abdomen for six days before admission, together with dysuria and a rise of temperature; the cause of the pain was a complete twist of the pedicle of a subserous myoma.

Later on, these tumours cause pain from the adhesions they acquire whilst undergoing necrotic changes consequent on stasis.

Mention has already been made (page 77) of the rare fact that in the axial rotation of the cervix, which is not an uncommon occurrence in *moderate* degrees in cases of myoma, the body of the uterus may be partially or even completely severed from the cervix; in such unusual instances the recorded symptoms simulate those of a twisted ovarian cyst, *i.e.* sudden attacks of pain, vomiting, diarrhoea, and distension of the abdomen.¹

Speaking generally in regard to the symptom of pain in cases of myoma, it must be confessed that it is often impossible to distinguish, from the clinical character of the pain, the nature of the complication to which it is due; associated tenderness is no helpful guide, for an adherent tumour is tender, the tenderness being peritoneal, whilst a non-adherent necrotic or sarcomatous myoma, as has been stated already, may be equally tender.

II. Secondary Symptoms.—The symptoms to which myomas give rise, when present as a complication of pregnancy, labour, and the puerperium, have been discussed in Chapter VIII., pages 131-164. We now pass on to the consideration of secondary symptoms, and of these the most important is *anaemia*.

¹ For further reference to this interesting complication, see Appendix II. p. 561.

Anaemia.—This symptom is most marked in the subjects of a submucous myoma, since this is the type of growth which causes the greatest amount of haemorrhage.

Kelly and Cullen collected twenty-two cases in which the haemoglobin was only 40 per cent, or less, at the time of the patient's admission into hospital; in nineteen of these the tumours were submucous, two were adenomyomas, and one an interstitial myoma. In fourteen of the above cases the haemoglobin was under 30 per cent; in four instances it was 15, 14, 12, and 10 per cent respectively.

The above authorities noted that it is unsafe to rely upon the patient's general appearance as an index of the anaemia, and they draw attention to the beneficial effect of rest and general treatment before operation; in this way they were able to raise the haemoglobin from 10 to 21 per cent, and from 15 to 46 per cent before operation. Experience has proved that anaemia in the absence of sepsis need not be feared by the surgeon, but if it is associated with infection, surgical operations are often fatal.

Intimately associated with anaemia are certain cardiac changes. We must therefore devote a short space to this subject.

The Heart in Cases of Myoma.—In the *Wiener medicinische Wochenschrift*¹ will be found a paper by Max Herz, on "Kropf-herz, Myom-herz, Klimax-herz," but to the question, Is there a myoma-heart? "the answer is in the negative."

Fatty degeneration, brown atrophy, and cloudy swelling of the heart-muscle occur, but these changes are all referable to the anaemia produced by prolonged loss of blood.

F. Masselot and H. Vignes in an article ("Comment il faut surveiller un fibromyome utérine")² speak of *fibroma-heart* among the complications of uterine myoma, but

¹ Max Herz, Jg. 63, 1913, S. 1355.

² F. Masselot and H. Vignes, *Gynécologie*, Ann. 17, N. 11, 649, 1913.

Bland-Sutton, Leopold, and Kelly agree that the cardiac changes and symptoms are due to anaemia, *i.e.* that they are functional, and clear up as soon as the haemoglobin percentage is raised to normal.

In Kelly and Cullen's series of over 1200 cases there were 92 cases of impaired cardiac action; these authors give a record of the varieties of cardiac sounds which were noted. The predominant feature was a soft systolic murmur at the apex. Cardiac dilatation, especially of the right auricle, was noted by Hofmeier and Fehling. Myocarditis was found at an autopsy by Welch, but it was not clear that myoma was the cause.

The cardiac symptoms are most marked in the cases where there has been most pronounced haemorrhage, *i.e.* submucous growths, and are not in any way dependent on the size of the myoma.

This completely answers the question as to whether a myoma generates toxins inimical to the heart, and refers the cardiac lesion back to anaemia. The clinical proof that a 'myoma-heart' is an anaemic heart, is afforded by the fact that the heart-symptoms disappear *pari passu* with the anaemia; in other words, the 'myoma-heart' is not found with large myomas which do not bleed.

CHAPTER X

DIAGNOSIS OF UTERINE MYOMA

I. **Physical Characters.**—Myomas usually occur as multiple growths—more rarely they are single; they may form nodular tumours, whilst, again, they may be quite smooth.

(a) *Size and Shape.*—In size these tumours vary from microscopic nodules up to a mass large enough to distend the whole abdominal cavity. In shape they are round, as a rule—less frequently oval; the spherical development is dependent on the muscular capsule, but various influences alter the fundamental shape.

(b) *Consistence.*—As a rule a myoma appears as a solid inelastic growth, but it may be hardened from calcification, or softened by degeneration, and even elastic from cyst-formation.

(c) *Mobility.*—The range of movement possible to an uncomplicated myoma varies with the intimacy of its attachment to the uterus. An interstitial or sessile growth will possess mobility corresponding to the range of the uterus itself and varying only with its size and relation to the pelvis. A pedunculated subserous growth may move all over the abdomen, its freedom varying with the width, thickness, and length of its pedicle.

(d) *Sensitiveness.*—With the exception that a moderate degree of tenderness may be felt over the tumour just before and during menstruation, a healthy myoma is quite

insensitive to palpation ; but when infected, malignant, or adherent, myomas may become acutely tender and painful.

II. Topographical Anatomy.—As the physical diagnosis of myoma is so entirely dependent upon the anatomical features and developmental peculiarities of these growths, a certain amount of repetition is here necessary in order to save the reader from the tedious task of making frequent cross-references to the section on anatomy.

It has been stated that myomas are multiple in their arrangement, but only a limited number of the growths proceed to anything like palpable dimensions. It is frequently found that one tumour preponderates in size, whilst smaller growths are grouped around it, sometimes even in the same capsule ; or they may arise from other parts of the parent uterus and form a conglomeration of tumours, for which Cullen has used the term the “potato-bed.” Such a mass of tumours, some pedunculated, some sessile, may conceal the body of the uterus and upset the relations of the attachment of tubes, ovaries, and round ligaments. As a totally different picture, may be seen a single myoma causing symmetric enlargement of the uterus, just as it occurs in pregnancy. Between the conglomerate ‘potato-bed’ on the one hand, and the *grossesse fibreuse* of Guyon on the other, there will be physical variations so numerous as to defy description. The difficulty of dealing satisfactorily with the physical features of myomas has been met by T. W. Eden by dividing these tumours for diagnostic purposes into small, medium-sized, and large ‘fibroids.’ Another plan, which will here be followed, is to adhere to the topographical division of myomas while discussing points of diagnosis.

A. Corporeal Myoma

(1) **Subserous Myoma.**—As already stated, these tumours may be large or small, sessile or pedunculated, and

may possess but a very thin capsule of uterine muscle. The small variety are felt on palpation as a knob or localised irregularity on the surface of the uterine wall. Many such may be felt in one and the same uterus by bimanual palpation. The large subserous growths are felt as independent tumours, *i.e.* the body of the uterus may be distinguished as such apart from the growth; the mobility of the latter will vary with the width of its attachment to the body of the uterus. When solitary and small, they may be mistaken for the anteflexed or retroflexed body of the uterus, but their hard consistence and the proper location of the fundus will serve as determining factors. With a broad connection, the tumour will have only the range of movement afforded by the uterus itself; with a stalked attachment, it may be moved from side to side with ease, until such time as free movement is prevented by increased size of the growth, or by the acquiring of adhesions.

The thickness of the pedicle varies in some degree with the size of the tumour—the larger the growth, the longer and narrower, as a rule, is its pedicle. In the presence of a pedunculated myoma, the uterus may retain its shape up to the point from which the pedicle arises; sometimes it may be elongated and thickened by muscular hypertrophy; the length of its cavity as determined with the sound is not notably increased. With very easily movable subserous myomas ascites may occur.

The smaller the connection of the tumour with the uterus, the more difficult becomes the diagnosis of a uterine myoma—indeed the uterus and the tumour may feel as if totally independent of one another, since the pedicle is very difficult, if not impossible, to palpate; with a wide pedicle it is possible to appreciate its fleshy consistence, and at times its breadth can be estimated. The hard consistence of a subserous tumour will sometimes enable its outline to be defined from that of the body of the uterus, the

latter being much softer. Since subserous tumours lie in the abdominal cavity, they may attain to an enormous size ; and when pedunculated, they have to be diagnosed from solid ovarian tumours, and if cystic, from fluid ones. Confusion is very likely to arise when a uterus is rendered

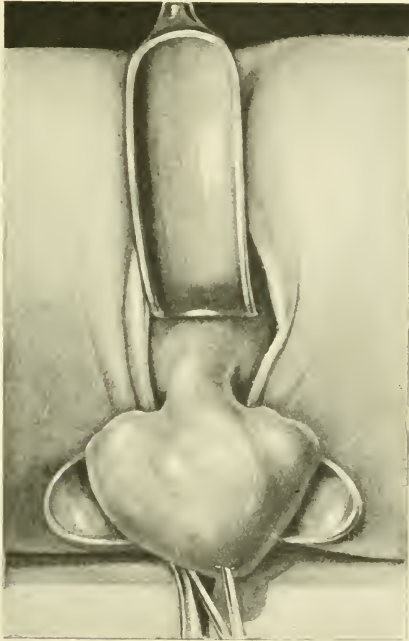


FIG. 147.—Showing a pedunculated myoma of the posterior wall of the uterus removed by vaginal myomectomy.

irregular by myomatous nodules and is accompanied by an ovarian fibroma with a long pedicle ; the ovarian tumour is quite likely to be considered as uterine also. The converse holds equally good ; since a subserous myoma may be just as freely movable as an ovarian tumour, it may easily be mistaken for such, especially if ascites happens to be present. If the uterus can be demonstrated as normal

in size and free from myoma, a solid pelvic tumour with ascites is most likely to prove to be ovarian.

Although pedunculated myomas frequently lie in the abdomen and may attain a large size, they not infrequently lie in the pelvis and can easily be removed through the pouch of Douglas by vaginal myomectomy. Figure 147 shows a specimen which was removed in this way. When the tumour is in the pelvis, the difficulty of deciding between an ovarian and a uterine origin is by no means diminished. Case 10,555 in the Kelly-Cullen series is an instance of this. A rounded mass about 10 cm. in diameter lay in the pelvis. It could be displaced to any part of the abdomen. The fundus was retroposed. It was impossible to determine whether the tumour had any connection with the uterus or not; it was thought to be ovarian *on account of its excessive mobility*. When the abdomen was opened, it was found to be a pedunculated subserous myoma. Reference has already been made to the tendency of these growths to acquire a vicarious extrauterine blood-supply, *i.e.* to become cut off from the original source of nutrition and to be henceforth 'parasitic.' This condition is naturally associated with loss of previous mobility, and also with the development of ascitic fluid in some cases; the difficulties in diagnosis are then much increased, and if, as in a case recorded by Cullen, the ascites be extreme (51,000 c.c.), the clinical signs will favour the diagnosis of an ovarian tumour, or the sign of ballottement caused by a solid tumour in free fluid may suggest pregnancy.

That pedunculated subserous myomas which have become cystic may be mistaken for ovarian tumours, the case reported by Lloyd Roberts forty-three years ago at the Obstetrical Society of London clearly shows. See also Figure 61, page 53.

After *total* separation from the parent uterus a subserous

myoma may lead to an error in diagnosis, since the mass may be presumed to have arisen *de novo* at the site at which it is found ; in this way a primary omental growth or a malignant nodule in the bowel, or even a renal tumour, may be diagnosed. In two cases of my own, it was possible in one instance to regard an isolated growth at the umbilicus as a metastasis in the omentum, for the patient had a malignant papilloma of the left ovary ; and in the other, the parasitic tumour was regarded as ovarian, since it adhered to the back of the broad ligament by the side of an endotheliomatous ovary of the same size.

Subserous myomas may render diagnosis difficult or impossible by becoming infected, as for example the case recorded by Cullen, where the growth contained 21 pints of pus containing cocci in short chains. Other cases are related, where abscesses in subserous growths have established fistulous communications with the bowels ; and although intestinal obstruction is rare with myoma, kinking of the bowel adherent to a subserous growth has led to intestinal distension, faecal vomiting, and death.¹

The fact that internal haemorrhage can occur from the torn pedicle of a subserous fibroid has been mentioned (see "Symptoms," page 170). Although subserous myomas are usually of very hard consistence and the commonest histological change is hyaline (*Vernarbung*), it occasionally happens that they present difficulties in *histological* diagnosis, so that these growths sometimes figure amongst the debatable myosarcomas which may arise from the muscle-tissue of a myoma.

(2) **Interstitial Myoma.**—A solitary interstitial growth is generally easy to recognise as a uniform even projection of one wall of the uterus, with the opposite wall stretched out over the swelling in crescentic fashion, the whole forming a spherical mass which comprises the uterus and

¹ Kelly and Cullen, "Myomata of the Uterus," page 136, *Gyn.* No. 12,216.

tumour together. Such tumours tend to become more and more submucous (Fig. 16, page 15); only by the use of a sound can the degree of encroachment on, and alteration of, the cavity be estimated. When they arise in the posterior wall of the cervix they present special clinical features which will be described under "Cervical Myoma," page 206.

A solitary interstitial myoma has to be differentiated from sarcoma arising primarily in the body of the uterus; also from adenomyoma, and even from carcinoma of the body and from chorionic carcinoma. In many cases the differential diagnosis is impossible, more especially when some degenerative or infective process implicates the tumour.

Interstitial myomas have been diagnosed in cases of vesicular mole, in which localised contraction of the uterine wall has produced irregularities which were mistaken for myomatous masses. In a case of this kind the clinician was mystified to find the position of the lumps vary, and the diagnosis was finally established only on opening the abdomen, when they disappeared entirely.

Chorionic carcinoma (chorionepithelioma) has been diagnosed as a solitary interstitial myoma.

I was present in September 1906 when Cullen opened an abdomen, in the Johns Hopkins Clinic, under the impression that he had to deal with a large interstitial myoma. The mass which had been fixed in the pelvis moved freely under ether, and suggested an interstitial myoma about 6 inches in diameter. As soon as the tumour was exposed, Cullen and I both thought it was a pregnant uterus. The vessels were much dilated, but on the posterior surface was a slight prominence with a curious yellowish discoloration of the tissue beneath. The diagnosis was ultimately rendered conclusive by Cullen incising the uterus, when a very vascular growth was discovered, differing from sarcoma and carcinoma, and both of us had no doubt that it was a chorionic carcinoma. The

general practitioner who had sent the patient to hospital then informed us that some time previously he had curetted

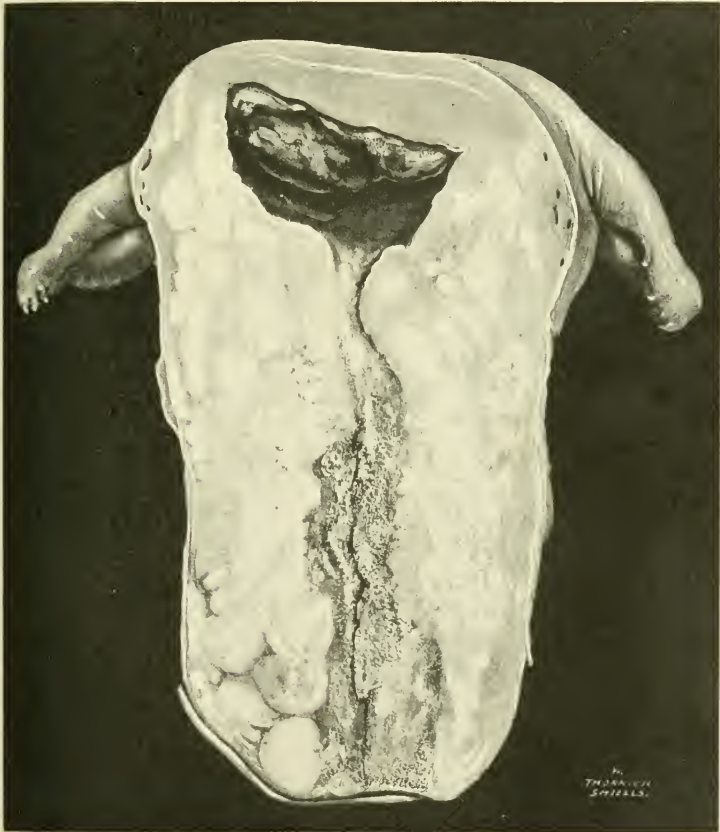


FIG. 148.—Showing generalised carcinoma of the uterus, which was diagnosed as myoma.

her, and he subsequently sent the material to me in London, and this proved to be portions of a chorionic carcinoma.

Figures 148 and 149 show a condition which may not inaptly be described as a general carcinomatosis of body and

neck of the womb. When I removed the uterus, I thought it was the seat of a solitary interstitial myoma becoming submucous, and it was not until section was made that the real nature and particular interest of the specimen



FIG. 149.—Showing the posterior view of the cancerous uterus seen in Fig. 148.

became apparent. The accompanying haematometra caused more enlargement of the fundus than appears in the drawing of the hardened uterus.

Sarcoma of the body has been mistaken for a solitary

uniform interstitial myoma again and again, although the error usually arises in diagnosis between the submucous variety and a malignant growth, to which further reference will be made. This difficulty, as stated before, is more particularly met with when the myoma becomes degenerate and is the seat of pain and tenderness.

Cullen has recorded cases in which solitary interstitial myomas after infection have become the seat of intramural abscess. In one instance, the abscess burst into the cavity of the uterus; in another, the pus burst externally and infected the peritoneal cavity. The diagnostic problems in such cases can be extremely complex.

Large interstitial myomas which have become cystic are very often mistaken for ovarian cysts, and this statement also applies to these growths when they are rendered oedematous by impaction, or before they have become actually cystic. A case of my own illustrates this point :

The patient was a single woman, aged 52 years; there had been no discharge of any kind since the climacteric, which occurred at the age of 48. The patient was admitted to hospital on account of "an internal tumour causing bladder-trouble," which had been getting larger lately, but had caused no pain, beyond a vague aching in the lower abdomen. The "bladder-trouble" was found on inquiry to be frequent painless micturition; the patient found it necessary to urinate every two hours during day and night. Constipation was also troublesome.

Physical examination revealed a large pelvic tumour reaching to the umbilicus, nearly centrally placed, but inclining rather more to the right side than to the left. The maximum girth was $27\frac{1}{2}$ inches; this was situated a handbreadth below the umbilicus. A second swelling, the size of a goose's egg, lay close to the left anterior superior spine. This was nodular in front, smooth behind, and reached into the left flank; it was semi-fixed; there was a band of resonance between it and the large central tumour. The small tumour was tender, and both were of firm consistence. Douglas's pouch was empty; the anterior fornix was depressed by a cystic swelling continuous with the main swelling above the pubes. The cervix was pushed to the left; the uterine body was not felt. The diagnosis of a cystic swelling of right ovary, with displacement of

the uterus, was made. An attempt to tap the cyst through a 2-inch incision was made (1904), but the walls proving too tough, the laparotomy-wound was enlarged, and it was then found that the cyst communicated with the uterus. The mass was easily drawn outside the abdomen together with the appendages; the latter were clamped close to the uterus and divided down to the level of the vagina on both sides; this was easily done, as the vagina was well

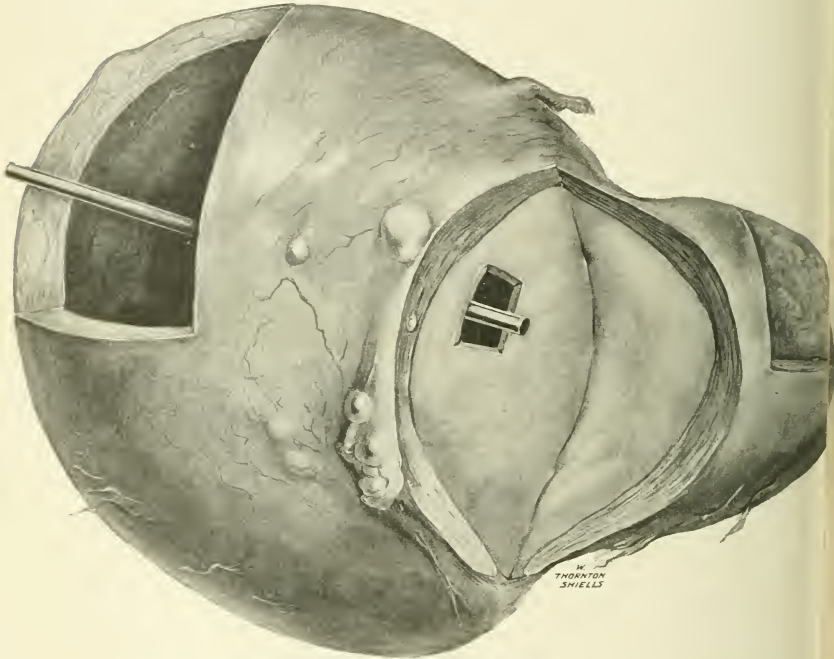


FIG. 150.—Showing large cystic myoma which was filled with bloody fluid. It was diagnosed as an ovarian cyst. See also Fig. 61, page 53.

dragged up by the tumour. The uterus was removed by supra-vaginal amputation. The blood-vessels in the base of the broad ligaments were much enlarged and bulged considerably when ligatured. The specimen (see Fig. 150) consisted of a large cystic interstitial myoma occupying the posterior wall of the uterus. It was globular in shape. Its external surface presented nine small subperitoneal growths, several of which were calcareous. The cyst contained 3 pints of nearly pure venous blood, which failed to coagulate owing to a

total absence of leucocytes. The anterior wall of the uterus was occupied by a solid myoma which presented one small calcareous nodule externally, but was otherwise smooth. The large cystic growth measured 7 inches in the vertical and 7 inches in the transverse diameter. The smaller growth was 12 inches in circumference, and the whole mass, including the cystic and solid tumours, measured 34 inches in circumference. The uterine cavity was expanded by the cystic growth which caused its posterior surface to be convex. It measured 6 inches vertically and was 4 inches in width. The posterior wall of the cavity was an eighth of an inch thick, the anterior wall was half an inch in thickness, whilst the wall of the cyst was a quarter of an inch thick on its posterior aspect. The membrane lining the cyst could be stripped off readily from the subjacent tissue ; it was yellowish-brown in colour, fairly smooth, and not wavy. The ovaries were not removed, but the right mesosalpinx contained a small cyst, the left a small myoma, and there were several small intraligamentary growths projecting into the attachments of both broad ligaments to the uterine wall. The mucous membrane of the uterine cavity was quite smooth and much thinned out. A portion of the wall common to the uterus and the cyst was examined microscopically. The mucosa was thin and atrophic, the tubules were shrunken and wrinkled, in places the membrane was reduced to a few lines in thickness and had become fibrous. Then followed layer upon layer of fibro-muscular tissue, the bundles constituting each layer being widely separated by open longitudinal spaces. This tissue was very vascular in places, and finally gave way to a layer of tissue which was composed partly of loose fibrous wavy bundles and partly of vacuolated hyaline material, some of the vacuoles still containing cells or cell-nuclei or leucocytes. This constituted the lining membrane of the cyst. It was separated from the subjacent muscle-tissue by a stratum which was markedly infiltrated by leucocytes and which contained many large blood-vessels.

Interstitial myomas may, very rarely, be invaded by carcinoma ; the diagnosis of this condition can only be made by the histologist.

The diagnosis of a single interstitial myoma of the body of the uterus may be extremely easy, its presence being demonstrable as a globular mass which is continuous with, and moves with, the cervix, as felt *per vaginam* and *per rectum* ; whilst *per rectum* the sacro-uterine ligaments are

felt to be in relation to the tumour, both ovaries can be felt at the sides, and also with a relaxed abdominal wall, the round ligaments can be palpated as well ; they will pass obliquely upwards and inwards to the front wall of the growth. In spite of these anatomical facts the difficulties in forming a correct opinion may be so great that only an estimation of the probabilities can be arrived at.

Too much stress cannot be laid on the importance of obtaining an accurate history of the case, *e.g.* the irregular haemorrhage with carcinoma is a help to diagnosis, but when there is a doubt, exploration of the uterine cavity will settle the question.

In large interstitial growths examination under anaesthesia may be necessary for diagnosis ; the cervix should be seized and drawn down whilst an examination *per rectum* is made, and the assistant may draw up the growth *per abdomen*, and so make traction on the cervix. If on bimanual examination the surgeon pushes *down* the abdominal mass whilst testing its influence on the cervix, he may be misled by the results of his investigation. A solid ovarian growth superimposed on the uterus will, when depressed by manipulation, communicate mobility to the cervix ; whilst *upward* traction on the cervix is much more apparent when a myoma is drawn up than when a fibroma of the ovary is similarly treated.

The sound will show a displacement of the cavity forwards, backwards, or to one or other side, together with enlargement or elongation in cases of single interstitial myomata. The shape of the uterus in cases of single myomas often corresponds to that of the gravid uterus ; this applies to interstitial growths, but more especially those which invade the cavity and become submucous. When multiple and numerous, the diagnosis of interstitial myomas is easier. The uterus is irregular in shape, and the sites of origin of the growths can be made out by palpation.

(3) **Submucous Myoma.**—The physical diagnosis of a submucous from an interstitial growth is impossible in many cases, especially where the cervix is closed.

The uniform rounded shape of the uterus which passes gradually or abruptly into the *portio vaginalis* is in favour of the growth being already submucous—in fact the more close the resemblance to the pregnant organ, the more likely is it that the tumour lies mainly in the uterine cavity ; but absolute proof that this is so, is only possible by palpation when the cervical canal is opened up, and the lower pole of the growth is felt by the examining finger. This sign is most likely to be obtained during menstruation, and, in point of fact, the true situation of the tumour is more often accurately determined by the symptoms than by the physical signs which are revealed by palpation. A very characteristic symptom already noted is the expulsive pains which are associated with submucous growths. These painful uterine contractions, occurring during the menstrual flow, cause an enlargement of the tumour by congestion, and also a dilatation of the cervix ; when menstruation is over, the congestion of the growth subsides, it recedes again into the uterine cavity, and the os closes.

So long as a submucous myoma remains in the uterine cavity, the diagnosis is mainly to be made from the symptoms—menorrhagia and dysmenorrhoea. When it has been driven down into the cervical canal, the entire cervix and the *portio vaginalis* are expanded to form a rounded investment to the extruding pole of the growth.

When a uterus is enlarged, but of normal shape, with the cervix unaltered, the diagnosis has to be made between a submucous myoma (*grossesse fibreuse*) and a gravid uterus of corresponding size. Here again the symptoms are often the best guide. The history of regular severe hæmorrhages with a myoma, and the cessation of menstruation during pregnancy, will decide the matter in some cases, but

irregular bleeding in pregnancy may be mistaken for true menstruation. Hegar's sign, the flail-like attachment of the body to the neck of the womb in the early months of pregnancy, is helpful, as is also the softening of the cervix and the drawing up of the latter with apparent shortening. Blue discoloration of the vaginal mucous membrane is sometimes observed in the subjects of myoma, but is never so marked as it is during pregnancy.

Activity of the breasts will favour the exclusion of a submucous myoma, for although a constant sign of pregnancy, mammary secretion is very rare with myoma.

Great difficulty in diagnosis can occur when the foetus is dead, so that in doubtful cases, signs of life should be waited for; soft myomas may have a consistence resembling that of pregnancy, whilst pregnancy with a dead foetus *in utero* may result in a hard tumour and cause frequent haemorrhages. The sound must not be used in these cases, the diagnosis must remain open, and repeated investigations should be made.

Submucous myomas vary exceedingly in size: the smallest are often no larger than a cherry, or a pigeon's egg, whilst the largest may give rise to a tumour, the upper pole of which extends to the umbilicus, with its lower extremity reaching far below the dilated os, and even projecting through the vulva.

The diagnosis of *small* sessile submucous growths is mainly symptomatic. Before the cervix is dilated, the presence of such growths is conjectural. Profuse and prolonged menstruation is, as a rule, the first sign of a submucous nodule; the excessive bleeding may develop gradually or may be severe from the first. In some instances the loss of blood is very alarming; it is bright red at the onset and later becomes dark and brownish. Large clots resembling pieces of liver may be passed. As these growths are most frequent during the child-bearing period of life, the question

of pregnancy with abortion has to be considered. The so-called 'cervical abortion' in which the dislodged ovum lies in an expanded cervix above a closed external os, whilst the empty uterus is felt above, presents a picture very like that which may be seen in a non-parous subject whose uterus is in process of expelling a submucous myoma, with the os not yet opened up (see Fig. 161, page 215). Even when the intrauterine tumour can be felt through a partially dilated cervix, the differentiation between a myoma and an intact ovum is by no means always obvious.

Since the presence of a *small* submucous growth does not alter the shape of the uterus, the signs and symptoms to which it gives rise may correspond with those of chronic metritis, and an exploration of the cavity of the uterus may be necessary before the diagnosis can be settled.

When the external os is sufficiently dilated to enable a polypus to be seen as well as felt, the diagnosis is simpler. An ovum is generally of blackish hue from infiltration with blood, whilst a polypus which has not yet been extruded and is not gangrenous, has the colour of the normal endometrium, but this colour-test by inspection may fail; as an example, the reader is referred to Figure 26, Plate V. (opposite page 20), in which the lower pole of a submucous myoma is seen to be deeply injected. On palpation the ovum will be found to have a softer consistence; it is friable, and is easily dislodged from the uterine wall, whereas the myoma has a smooth surface, a hard consistence, and a firm attachment to the uterus.

To differentiate between a molar pregnancy (missed abortion) and a necrotic submucous myoma may be difficult.

The importance in diagnosis of examining histologically all polypoid submucous growths cannot be over-estimated, since a polypus, apparently myomatous, may prove to be a myosarcoma. I was once entrusted by my chief, Dr. Amand Routh, with the examination of a specimen which formed the

third of a series of polypi which had been removed from a patient, and reported that the tissue was extremely necrotic, but did not appear malignant. In a short time another polypus was removed, and the tissue was fresher and less degenerate; it proved to be a sarcoma, and the uterus was removed by panhysterectomy, but the patient died of recurrence before two years had elapsed.

Symptoms, clinical signs, and age-incidence are of little help in the differential diagnosis between submucous myoma and submucous myosarcoma. There is irregular haemorrhage and pain in each case; a blood-stained *watery* discharge is frequent with sarcoma; it is not infrequent with myoma, especially when the growth is commencing to necrose.

The age at which submucous growths are most frequent extends from about thirty to fifty years, and whilst sarcoma, on the average, is seen a little later, many cases occur before that period of life. A certain diagnosis can therefore only be made by *microscopic examination of a portion of the growth*.

In the section on "Infection of Myoma" (page 79) reference was made to the peculiar liability of submucous growths to become septic; this is more particularly the case after the tumour has opened up the external os and occupies a portion of the vaginal canal. In such a position, inspection and palpation are comparatively easy, and ought to lead to no error in diagnosis. The symptomatology is distinctive, and has already been described; the foul discharge may, before examination, arouse suspicions of a cancer of the cervix, but it is most exceptional for a cauliflower-excrescence to be mistaken for a necrosing myoma, when proper examination is made.

It might be thought that a large necrotic polypus in the vagina could not exist without the patient's knowledge, but a case of this kind was sent to me after the patient had undergone treatment by X-rays for a painful joint. As the

joint-trouble would not clear up, the radiologist inquired for symptoms of sepsis ; the patient then confessed to noticing an offensive vaginal discharge. She had a foul necrotic myoma, the size of a cricket-ball, in the vagina, and when this was removed, all her 'rheumatic' symptoms vanished.

Another diagnostic point of the utmost practical importance is the differentiation between an inverted uterus and a myomatous growth in the vagina. An inverted uterus being rare, and a myomatous polypus, the size of a partial inversion, being fairly common, the usual error is to mistake an inversion for a polypus ; and I can recall an instance of this happening some twenty years ago, which ended in disaster to the patient. The converse mistake may occur, as on one occasion when the class was assembled in one of the larger medical schools in London to see an Aveling's repositor applied, but the séance ended in the removal of a myomatous polypus.

When operating for the removal of a large polypus, it should be made an invariable rule to ascertain first by abdominal, rectal, and vaginal examination, the presence of the fundus in the pelvis. With inversion, a funnel-shaped depression will take the place of the absent fundus, whilst *per vaginam* the upper limits of the ring of a partially inverted uterus may be made out either by the finger, or, if the cervix is too tightly embracing the intussuscepted body for the finger to pass, by the use of the sound ; this will be checked at the upper limit of the inversion, but with a polypus it will pass deeply at one side or the other into the cavity of the uterus. It is said that the openings of the tubes can be defined and probed, but with a septic, rough, exposed endometrium this is not always possible. In fact all inspection-signs are deceptive, since an inverted body and a myomatous polypus may be the same size, possess the same colour, produce the same type of bleeding and the same type of foul discharge. The fact that a

submucous polypoid myoma can itself cause partial or complete inversion, when it arises from the *fundus uteri*, must not be overlooked (see Fig. 28, page 22).

Submucous myomas of the uterus can only be confused with growths proceeding from the vaginal wall when the former acquire secondary adhesions in the vagina; these false attachments are due to adhesive vaginitis, are easily broken down by the examining finger, and should cause no serious difficulty from a diagnostic point of view.

Submucous myomas which do not become extruded, though less liable to infection than those which in part occupy the vagina, are nevertheless not infrequently the seat of sepsis. Whether sessile or pedunculated, they enlarge the cavity of the uterus, and tend to establish and keep up a patulous state of the cervical canal, even when they do not act as a mechanical dilator. True endometritis is therefore not an infrequent accompaniment of these growths.

The passage of a sound without antiseptic precautions was in former days a source of infection of these growths: the instrument not only carried in pathogenic and saprophytic germs, but caused abrasion of the protecting endometrial covering, with the result that the injured tumour rapidly sloughed. Even though every aseptic precaution is taken, the passage of a sound is dangerous owing to its liability to cause injury to the mucous membrane which invests the tumour, and it has been frequently shown clinically that these intrauterine submucous growths are particularly intolerant of such injuries as an aseptic sound can produce; subsequent necrosis and infection of the dead mass being generally the ultimate result. If a diagnosis cannot be made without the passage of a sound, it is better to defer its use until the patient is on the operating table under an anaesthetic, when, if the sound discovers such a growth, myomectomy may be carried out forthwith.

Another source of infection of intrauterine submucous

myoma is puerperal sepsis, to which the presence of a necrosing tumour is a predisposing cause. Although the tumour is not *ab initio* the site of the infection, its liability to fatty necrosis (with haemolysis) is so marked that no better nidus could be provided for ascending organisms. Pregnancy is frequently interrupted in the earlier months, when tumours of this kind are present, and puerperal fever results. Figures 139 and 140, Plate XXXIV., facing page 145, show septic myomas which were removed *post abortum*. The diagnosis in these cases is made by feeling the growth through the patulous cervix, when it may present a sufficiently characteristic rounded shape and firm consistence to distinguish it from a piece of ragged friable placenta.

When a large submucous intrauterine myoma becomes cystic, it is easy to make the mistaken diagnosis of pregnancy of a date corresponding to the size of the tumour. In the case of which Figure 57, page 51, shows the specimen, this error was made by myself and three of my senior colleagues. The unmarried patient owned to coitus and thought she was pregnant; the solid portions of the growth were mistaken for foetal limbs, the general consistence was that of a pregnant uterus, a souffle was heard, uterine contractions obtained, and a discharge was put down as due to 'endometritis of the lower zone.' As the os was 4 inches in diameter, and the 'membranes,' after expectant waiting for one week, did not rupture, I was advised to rupture them and empty the uterus. Clear serous fluid escaped directly a puncture was made, but as this soon ceased to flow, the opening was enlarged and a honeycombed loculated growth was discovered. There was no sign of infection, and after the myomectomy recovery was uneventful and the uterus involuted to the size of a parous organ.

This case is mentioned here on account of its diagnostic value; further references to the same case are made at pages 49, 166, and 255, also in legend of Figure 153, page 208.

Sometimes these large tumours are attacked by organisms at their exposed lower pole; this means that the protecting cap of mucous membrane has been abraded or punctured. When this happens, the most rapid and nauseating putrefaction is liable to occur; the rapidity of the process is easily understood when it is remembered that these submucous tumours attain a size reaching up to the umbilical level as much (or more) by cystic formation or liquefaction as by actual physiological new formation. The sodden hyaline tissue is the best possible culture-medium for the invading saprophytes, and these are not long in setting up a fulminating putrescence in the whole growth with severe septic intoxication of the patient.

The diagnosis of a sloughing intrauterine myoma is sometimes self-evident, especially if, as in a recent case of mine in the Charing Cross Hospital, livid greenish-purple tags of stringy tissue, 4 inches in length, hang outside the vulva. In this case the *fundus uteri* reached as high as the navel, and the patient was extremely cachectic and febrile.

The diagnosis is less certain with sloughing intrauterine myomas of smaller size. The smaller size of the uterus may cause the offensive discharge to be put down to infection of an adenocarcinoma of the body, or the history of a miscarriage and irregular haemorrhages preceding may lead to the possibility of chorionic carcinoma being considered; pyometra from stenosis—if the patient has passed the menopause—has to be entertained as a possibility. So that for definite diagnosis of a medium-sized sloughing myoma, exploratory dilatation becomes necessary in certain cases.

(4) **Retroperitoneal and Intraligamentary Myoma** ('*Burrowing Fibroids*').—It has been shown that in the differential diagnosis of subserous, interstitial, and submucous myomas the question of the presence of pregnancy, either intra- or extrauterine, has to be decided. Retroperitoneal

and intraligamentary growths are no exception to this rule.

If a retroperitoneal growth arises from the back of the uterus, it will push that organ forwards, and by burrowing into the recto-vaginal septum, and by steady growth, will push the cervix up behind the symphysis and give rise to general displacement, which, when the growth is softened, gives the physical picture of a diffuse retrouterine haematocoele. The anatomical fact that the myoma has elevated the peritoneum, whilst the ectopic blood-clot has depressed that structure, cannot of course be appreciated clinically; but the fact that the posterior fornix is in each case depressed, and that the posterior half of the pelvis is occupied by a fixed hard mass, which pushes the body and cervix of the uterus upwards and forwards, makes differentiation by vaginal examination very uncertain. The most careful and painstaking judgment, based on all available data, is necessary for accurate diagnosis. The same applies to diagnosis between a myoma in the broad ligament and the rare condition of intraligamentary haematoma, which arises from a secondary implantation of a gestation-sac between the folds of the broad ligament, after a gravid tube has ruptured on its under aspect between the layers of its mesosalpinx. With each condition the uterus is laterally displaced by a fixed mass which occupies one half of the pelvis; if the 'haematoma' is mainly blood-clot, it nevertheless may become surprisingly hard and tense. If the foetus is alive with a quick placenta, neither foetus nor after-birth can usually be felt as such, and the clinical history will have to be relied upon in estimating the probabilities of the case.

Less doubt will be felt over a myoma arising beneath the utero-vesical pouch, until such a growth spreads out laterally into the broad ligament, when it calls for a further description, to be discussed later; but small localised growths arising anteriorly from above the supravaginal cervix are easily

diagnosed on bimanual palpation through the anterior fornix. Those which spring from the cervix itself will be mentioned later on.

Anterior retroperitoneal growths will cause the uterus itself to become retroposed in the same way that some broad-ligament cysts will do. The tense elastic consistence of the latter, in contrast to the hardness of a myoma, affords the physical evidence upon which a diagnosis between the two conditions must be made.

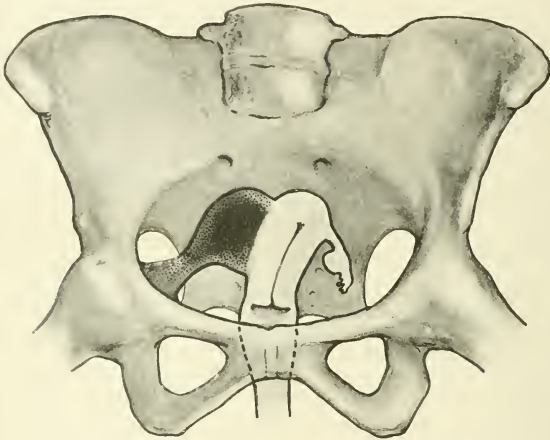


FIG. 151.—Showing nodular parametritis which may be diagnosed as an intraligamentary myoma. (After Winter.)

Winter and Ruge, in their *Lehrbuch der gynäkologischen Diagnostik*, draw attention to the necessity of diagnosing in certain cases between an intraligamentary myoma and a parametritic exudation. They say it occasionally happens that, during absorption of the cellulitis, the outer part of the exudation which is in contact with the pelvic wall is the first to disappear, and the mass contracts towards the uterus, when it will appear as a rounded tumour attached to the womb, and resembles a myoma. The accompanying diagram (Fig. 151), modified from Winter, illustrates what is meant.

Rectal examination is the most helpful guide in distinguishing between a parametric exudation and an intra-ligamentary myoma. As a rule, an exudation widens out fan-shaped towards the pelvic wall, in contrast to the rounded contour of a myoma, and the absence of fixation of the latter to the wall of the pelvis may be discovered by rectal examination. When the two conditions are associated, the diagnosis is very difficult.

The difficulty of differentiating between a fixed intra-ligamentary myoma and a large adherent pyosalpinx is often extreme: the latter may become as rounded as a myoma; it may elevate the broad ligament, so that this structure comes to form a hood over its anterior and upper aspects, with the round ligament running across it, in exactly the same way as it does over a swelling within the folds of the broad ligament. The dense thick walls of a large pyosalpinx and the accompanying cellulitis will give a firm consistence which is very misleading; in the same way a soft myoma may give a false sense of fluctuation. In a case of this kind I measured 4 pints of pus from the pyosalpinx. Smear-preparations revealed streptococci; the organisms were sterile in broth and to aerobic and anaerobic culture on serum-agar and glucose-formate. Clinically, in this case, there was no rise of temperature, the organisms being dead, whilst the long history of chronic pain with exacerbations, and of menorrhagia, was quite in keeping with a degenerate myoma. The error in diagnosis was favoured by the presence of a movable subserous myoma, the size of a goose's egg, which lay on the top of the uterus. The specimen is shown in Figure 120, page 108.

An inflamed tubo-ovarian mass, the outcome of *salpingitis purulenta*, which has not become a sactosalpinx but has set up diffuse cellulitis of cartilaginous hardness, is liable to be mistaken for an infected myoma, on account of the wide attachments to the uterus and the density of the inflamed

tissues. Mention has already been made of the mistakes which may arise in differentiating between ovarian fibroma and solid uterine growths, and although there is no great difficulty, as a rule, in forming an opinion as to the existence of an ovarian cyst, it is not infrequently found that the 'cyst' is a soft myoma of the uterus. Finally, since peri- and para-tubal haematocetes form solid, firm, rounded tumours, myomas of small size must be excluded in the diagnosis of these structures.

Enough has probably been said to show—even without pretending to have done full justice to the subject—that whilst a myoma may be the most innocuous, unobtrusive, symptomless, one might even say, modest of neoplasms, it is nevertheless capable of assuming a versatility of features, by reason of secondary changes, infection, and malignancy, to say nothing of topographical complexities and multiple conformations, so as to surpass all other growths in diversity of symptoms and physical signs.

B. Cervical Myoma

(1) **Interstitial.**—True cervical myomas are comparatively rare. The majority of so-called 'cervix myomas' are corporeal tumours which have invaded the cervix by their growth, *e.g.* Figure 152; they may then become incorporated with one or other wall of the cervix and deflect the axis of the latter, but, with the exception of submucous growths, they do not cause expansion of the muscle-layers of the neck of the womb. Corporeal tumours which grow downwards may descend to a lower level than the cervix itself, so that the convexity of the growth can be felt before the external os is reached by the examining finger, as the above figure shows. This is not a point of diagnostic value, because the same applies to a 'true cervical myoma,' the clinical peculiarities of which are as follows :—



FIG. 152.—Showing a tumour which combined some of the characteristics of a cervical and of a corporeal myoma. It is not a 'true' cervical myoma. A probe is inserted in the cervical canal.

(1) A true cervical myoma, *i.e.* one which arises in the



FIG. 153.—Showing a true cervical myoma opened up from the front. This tumour was removed from a spinster aged 24 years. Two years previously the tumour seen in Fig. 57, page 51, was removed from the same patient by morcellation; see also page 201.

wall of the neck of the uterus, forms a uniform egg-shaped tumour.

(2) Its seat of election is the posterior cervical wall.

(3) It causes a widening and elongation of the cervix, so that the cervical canal may come to measure as much as 5 or 6 inches in length.

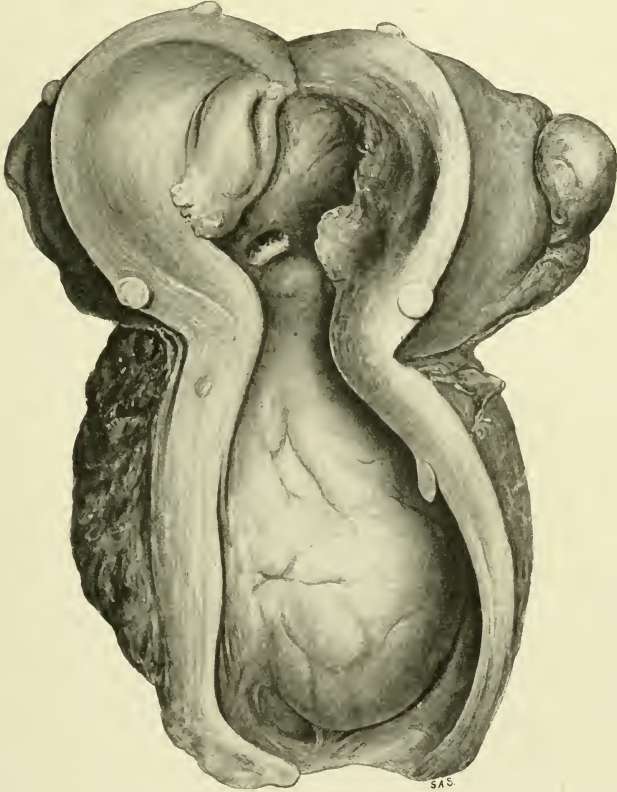


FIG. 154.—Showing a true cervical myoma, with the uterus opened from the front.

(4) Starting as an interstitial growth, it becomes submucous, and tends to open up the external os to a variable degree.

(5) The cervical canal is not only elongated but laterally expanded. See Figures 153 and 154.

(6) The external os is altered in shape, forming a crescent or half-moon, or it will become opened up completely by the lower submucous pole of the growth (Figs. 191 and 155).

(7) The axis of the uterus is frequently altered, so that the os is often felt tucked away, high up under the symphysis or in one or other fornix.

(8) The fundus is felt well up in the abdomen, perched on the top of a globular mass, like an adrenal on a kidney ; very often it can be moved upon the fixed pelvic tumour, and the unsuspecting may regard it as a subserous myoma, but in point of fact this relation forms a striking diagnostic feature of a large cervical myoma (Figs. 29 and 30).

In exceptional circumstances a true cervical myoma has been observed to dilate the cervix so completely as to obliterate the vaginal fornices entirely ; it then becomes impossible to tell where the cervix ends and the vagina begins ; the submucous portion of the tumour lies in the vagina, like the head of the foetus in the second stage of labour. This condition is well shown in Figure 155, which was drawn from a specimen given to me by Stanley Boyd. The peculiar triradiate depression on the lower pole was regarded as the external os, and the tumour was therefore looked upon as lying in the uterus ; this led to the removal of nearly the whole of the vagina during the operation, which was protracted by prolonged and, as it proved, unnecessary dissection. From a diagnostic point of view must be mentioned here the fact that the body of the uterus, as felt *per abdomen*, was not characteristic in this case. It had become retracted, and was drawn into the growth in telescopic fashion, and hence an important abdominal sign was missing on palpation.

It is most exceptional for large cervical myomas to present any irregularities on their surface ; they are generally found to be free from secondary myomatous out-growths, and have the uniform outline and size of a swan's egg or a

cocoa-nut. Figure 29, page 24, shows an exception to this rule. There was a nodular, conglomerate, secondary mass

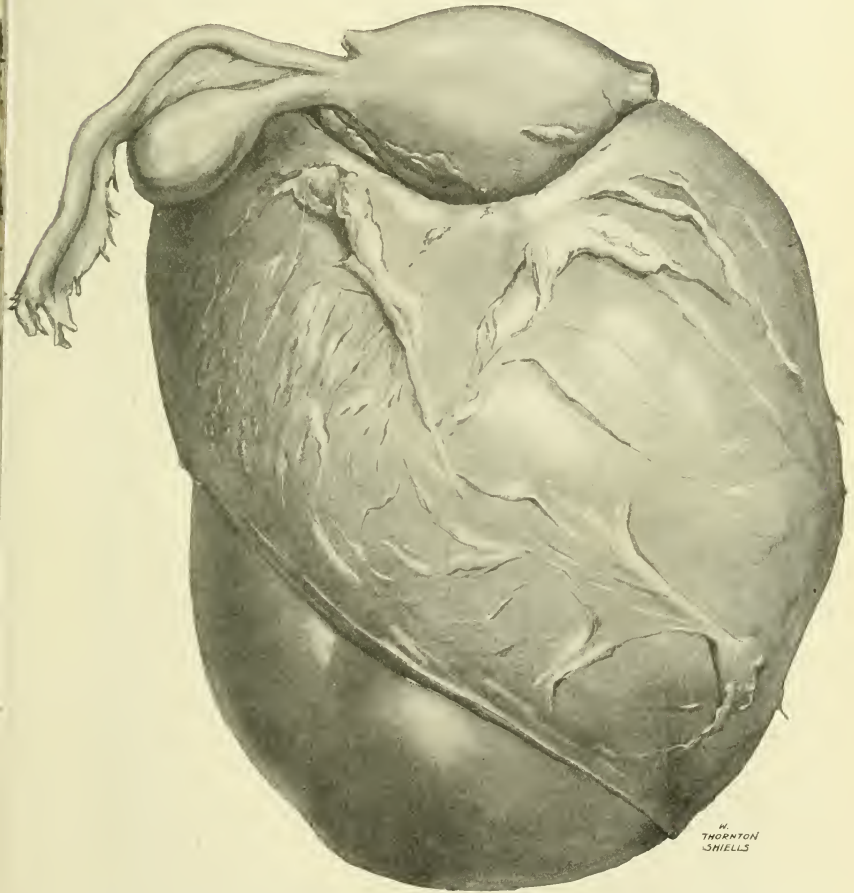


FIG. 155.—Showing a peculiar true cervical myoma. The ensheathing structure is composed partly of cervix and partly of vagina. The remarkable position of the body of the uterus, like the retracted head of a tortoise, is best understood by studying Figure 156. The demarcation between cervix and vagina is lost. (Removed by the late Stanley Boyd.)

projecting outwards into the left broad ligament beneath the

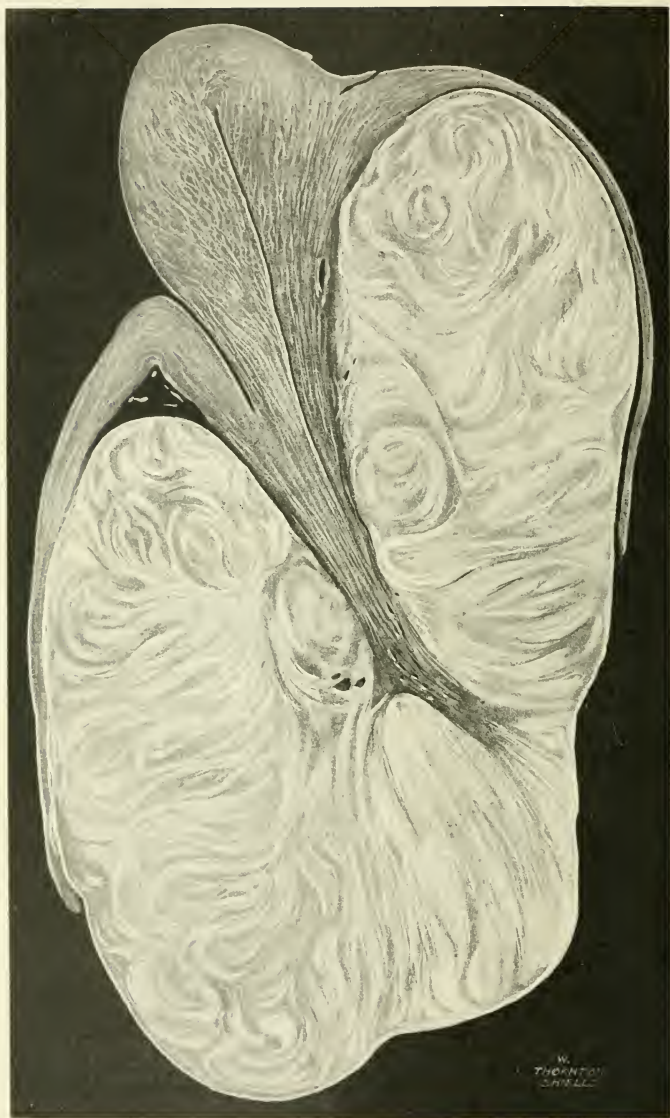


FIG. 156.—Showing a sagittal section of the cervix-myoma seen in Figure 155. The cervical tissue has been elevated by the myoma, so that the body of the uterus appears to have sunk into the tumour. The specimen is, I believe, unique.

level of the ureter, and it was necessary for me to dissect that duct out of the angle between the large uniform myoma and the nodular out-growth, before the tumour could be drawn up and the vagina amputated. The fornices were so filled with the primary tumour that the projecting growth could not be diagnosed.

(2) **Submucous Myoma of the Cervix.**—The above remarks apply to interstitial growths of the cervix. These tumours, when they attain any considerable size, are necessarily covered to a more or less extent by mucous membrane of the canal of the cervix, and in this sense are partially submucous; but they differ entirely in their clinical features from true submucous myomas of the cervix. These latter acquire a pedicle very early, and appear as myomatous *polypi* at the external os uteri. The length of the stalk will vary with the site of attachment; if arising, as is not uncommon, from the upper part of the supravaginal cervix, the stalk elongates until the growth hangs in the vagina, where it may be discovered in a more or less necrotic state. Figure 25, Plate V., page 20, shows such a growth, in which the purple colour due to strangulation of the pedicle has been preserved; the separation occurred spontaneously, the tumour being 'passed' *per vaginam*. The largest cervical submucous polypus I have ever seen was found with a loose attachment inside a dilated os, the tumour itself lying in the expanded vagina. It is represented in Figure 27, page 21. It is more than probable that polypi which are apparently cervical sprang originally from the cavity of the uterus, and that during extrusion the final attachment is that of a pedicle at, or below, the internal os.

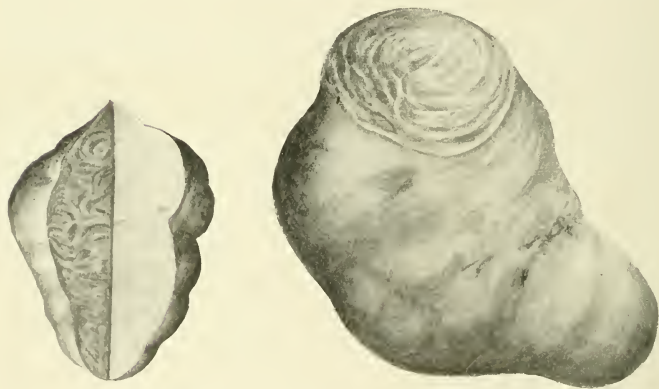
As a rule, submucous cervical myomas do not attain a large size, and Figures 157 and 158 represent the average dimensions, the drawings being made from the actual tumours after removal.

The diagnosis of submucous growths of the cervix is

generally easy, since they can be readily felt. Their extrusion is accompanied by painful uterine contractions during menstruation, and the blood-flow is increased in amount and also prolonged; septic symptoms in the nature of a foul



FIGS. 157 and 158.—Showing pedunculated cervical submucous myomas ('fibroid polypi').



FIGS. 159 and 160.—Showing pedunculated corporeal submucous myomas ('fibroid polypi').
The grooves in these two growths were caused by constriction at the cervix during expulsion.

discharge may follow, also strangulation and necrosis. The uterus itself is generally enlarged, either by endometritis and 'work-hypertrophy' (see Fig. 161), or, in addition, by the presence of other myomas.

(3) **Subserous cervical myomas** in the strict sense of the term do not exist, since the cervix is situated at a distance

from the peritoneum, but out-growths from the cervix into



FIG. 161.—Showing a submucous myoma with its pedicle attached at the site of the internal os. The tumour has expanded the cervix without causing dilatation of the external os uteri. Although its site of origin is, strictly speaking, the lower pole of the cavity of the uterus, the tumour itself represents a submucous cervical myoma. The uterus was removed by my colleague, T. W. Eden, in the Charing Cross Hospital. The patient was a single woman, aged 48 years.

the cellular tissues occur (see Fig. 29, page 24), and these are the analogues of the corporeal subserous myomas.

Clinically speaking, the *interstitial* myomas of the supra-vaginal cervix are the most important.



FIG. 162.—A submucous pedunculated myoma attached to the vaginal portion of the cervix.
(From Eden and Lockyer's *Gynaecology for Students and Practitioners*.)

The vaginal portion of the cervix is very rarely the seat of myoma; a submucous growth may slide down the canal until its pedicle is attached to the 'portio' (see Fig. 162), and more rarely interstitial tumours of small size

may be felt in one or other lip. Such a growth is to be recognised by its solid consistence and rounded shape, whilst the surface over it is quite healthy; it is not likely to be mistaken for an intracervical carcinoma, and it is not so elastic as a tense retention-cyst; moreover, its tendency is to form a prominence on the side rather than on the extremity of the 'portio.'

The Diagnosis of Secondary Changes in Myoma.—

The fate of myoma, as we have seen, is very variable, owing to multiple changes which are prone to occur in large and small growths alike. Although it is impossible to diagnose the nature of these changes from a survey of the clinical data, nevertheless there is no great difficulty in differentiating an uncomplicated myoma from one which is undergoing degeneration or malignancy. In the first place, an uncomplicated tumour may be devoid of symptoms altogether, and it may remain symptomless whilst undergoing hyaline, fatty, and calcareous change; but if fatty necrosis is accompanied by haemolysis ('red degeneration'), the tumour is wont to become harder and to cause pain and tenderness with, in some cases, a rise of temperature. It is reasonable to assume that in necrosis, whether red, yellow, or of any other colour, the rise of temperature (which accompanies local pain and tenderness) is due to the absorption of blood-pigments. It has been suggested that the necrotic tissue itself produces a low form of chemical toxæmia, but this has not been proved; whereas the blood-ferments are known to possess an influence on the heat-regulating centres. At any rate a variable degree of thrombosis is the usual accompaniment of necrosis, and blood-extravasations are also not uncommon. Again, when a cystic myoma causes a rise of temperature, it is discovered that the fluid in the cyst is discoloured from an admixture of blood-pigment. The clinical phenomena of tenderness and pain are probably referable to tension in the capsule of the growth, since a more or less rapid increase in the size of



FIG. 163.—Showing a sarcoma of the uterus and a 'dermoid' of the ovary. The case was diagnosed as one of myoma.

the myoma is one of the signs of degeneration, and also

of sarcomatous transformation. When a necrotic myoma becomes *infected*, the symptoms are much more pronounced, due no doubt to the effect of absorption of toxins produced by the septic germs; what happens in such a case has already been described.

The differentiation between sarcoma and degeneration cannot be made clinically. The case illustrated in Figure 163 demonstrates this point. The drawing shows a sarcoma of the uterus removed from a patient, aged 58, under the impression that it was a degenerating myoma. The symptoms

were irregular haemorrhage and offensive discharge, of two years' duration. There was no loss of weight, and pain was not obtrusive. The diagnosis of sarcoma was made microscopically, and confirmed by a recurrence in the pelvis two years after operation.

Figure 164 shows that the growth is an oval- and round-celled sarcoma.

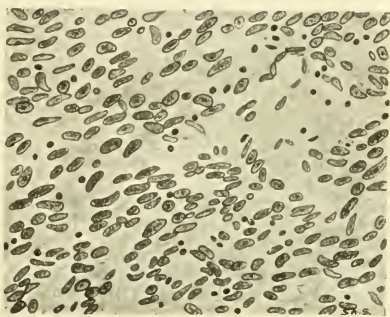


FIG. 164.—Showing the microscopic character of the submucous uterine tumour seen in Figure 153.

CHAPTER XI

TREATMENT OF UTERINE MYOMA

MYOMA of the uterus makes up about 10 per cent of all gynaecological cases, and it is certain that a number of myomas remain undiscovered from the fact that the subjects of the tumours are in perfect health, and have no need to consult a surgeon. Hence it may be stated that the majority of myomatous uteri require no treatment whatever, and it is often best, in certain cases, to keep a patient in ignorance of the fact that such a tumour exists.

Should a myoma be discovered by routine examination, its size and position should be carefully noted, and the patient advised to return for further examination at certain intervals, so that the behaviour of the growth may be watched.

For symptomatic reasons a certain proportion of myomas (the percentage of which has not been worked out) do call for treatment, and this will be *palliative* or *operative* according to the nature of the case.

Palliative Treatment.—Palliative treatment is directed towards effecting an alleviation of symptoms and attempting to reduce the size of the growth. The main symptom which calls for palliative treatment is haemorrhage, and to this may be added, as of secondary importance, the relief of minor pressure-symptoms.

Haemorrhage.—The value of drugs in checking the menorrhagia associated with myoma is the subject of a

wide divergence of opinion among gynaecologists. The drug which has had the most extended trial as a uterine haemostatic is ergot of rye; the prevailing view as to its utility in cases of myoma is that, given *per os*, it is seldom of any use; to be successful it must be given in full doses by the hypodermic method. Haultain recommends the solution formerly used by Simpson, namely, R. Ergotin $\bar{3}$ ii, Chloral. Hydrat. $\bar{3}$ iv, Aq. dest. $\bar{3}$ vi. Twelve drops contain three grains of ergotin, which is an ordinary dose. This amount is injected deeply into the muscles of the buttock, since, if introduced only into the subcutaneous cellular tissue, it is liable to cause abscess-formation.

Another prescription recommended by E. Opitz is: R. Ergotin 4 grains, Acid. Carbol. liq. 2 minims, Aq. 20 minims, to be given by an intramuscular injection once or twice every second day up to sixty injections. Opitz remarks that it is painful, and therefore disliked by patients. He recommends the administration by mouth of 15 to 20 minims of the liquid extract of Hydrastis, or .005 gramme of Stypticin (cotarnin hydrochloride), either drug to be given two or three times daily for eight days before a period, with the object of exciting uterine contractions; but he does not find the size of the growth is decreased to any marked extent by these drugs. 'Lodal,' another cotarnin preparation, given in $\frac{3}{4}$ -1 $\frac{1}{2}$ grain doses, is considered by some authorities to be of value, but I have been disappointed with its use.

Opitz states that interstitial growths are influenced by drugs, but that subserous tumours are not, whilst submucous myomas are driven farther down by their use; in other words, he is convinced of the power of drugs to excite uterine contractions powerful enough to exert a definite influence on myomatous growths. Preparations of ergot, of hydrastis, and the oxidised products of narcein, are the drugs mainly in use at the present day. Mercury and iodides

which were commonly employed twenty years ago are now completely discarded. Some drugs are thought to have the direct effect of promoting absorption of the tumour—calcium chloride has been given the credit of doing so, and Haultain states that “sodium chloride mineral waters have an undoubted effect in this direction.” It is more probable that any good effects which the salts of calcium may produce, are exerted through their action as a general haemostatic ; it is well known that the chloride and lactate of calcium, when taken in considerable doses and for a prolonged period, increase the coagulability of the blood, and thus favour the arrest of bleeding by thrombosis. On these grounds calcium lactate in 10-grain doses, three times a day, may be given during the menstrual periods for a considerable time. The vaso-constricting action of adrenalin has been made use of both by applying the extract locally, and by giving it by the mouth.

It is also now well known that pituitary extract exerts a general effect on the circulation similar to that of adrenalin, and in addition, this substance produces well-marked uterine contractions, so that its use in cases of menorrhagia may prove to be considerable. It should be administered by deep intramuscular injection in doses of 1 c.c. of a 20 per cent solution. Thyroid extract has not been found to be of any use in haemorrhage associated with myoma.

Hot Douching.—*Douching the vagina* with hot water at a temperature of 115° F. is used as a means of checking haemorrhage ; it has the advantage of doing no harm, if only weak solutions of antiseptics are used and the patient is kept in bed ; indeed, when menorrhagia is the only symptom caused by a myoma, rest in bed during the monthly period is sometimes alone sufficient to reduce the flow to limits within which it will do no harm. *Intrauterine douching* with water at 110° F. has been recommended by Scottish authorities. The object of douch-

ing, whether vaginal or uterine, is to stimulate muscular contraction.

Plugging.—Plugging the vaginal canal is a very efficient temporary means of controlling bleeding in cases of hæmorrhage from myoma ; it should be done thoroughly, after a douche has been given. The patient should be placed in the Sims position, the perineum drawn well back, and the *introitus vaginae* opened up ; strips of sterile gauze impregnated with subgallate of bismuth are then passed into the posterior fornix, which is tightly filled, and then the lateral and anterior fornices are tightly packed in the same way, whilst the lower part of the vagina is only loosely filled so as to avoid unnecessary compression of the urethra. A ligature should be tied to the end of the plug or plugs, and the latter are then placed well inside the vagina, with the ligature left hanging outside. The gauze can be left in with perfect safety for forty-eight hours, and on its removal a douche should be given. If, as in rare instances may be the case, the cervical canal is patent enough to allow the passing of gauze into the uterine cavity, this may be done, and it is then as well to soak the end of the strip in 1-1000 sterile solution of adrenalin.

Intrauterine Treatment.—Haultain says he has had marked success with the application of a weak strength of the Edinburgh Solution of Iodine,¹ ʒii of the latter to 16 ounces of water, introduced through a Bozeman's catheter. He allows the whole quantity to pass slowly through the uterus on the second or third day of the period ; it is unnecessary previously to dilate the cervix, as the menstrual softening has rendered the canal sufficiently patulous. Other authorities advise swabbing with very strong solutions of

¹ The Edinburgh Solution of Iodine—

R. Iodine	2 drachms.
Iodide of potassium	1 ounce.
Distilled water	16 fluid ounces.

Dissolve the iodide and iodine in the water with gentle heat and agitation.

iodine, and some even use severe escharotics, such as fuming nitric acid, which in the case of myoma is extremely dangerous. The intrauterine application of super-heated steam, which has been found useful in haemophilic cases by Pinkuss and others, cannot be recommended as a plan of treatment suitable for myomatous uteri.

Incision of the capsule of a submucous tumour is said to lead to a diminution of haemorrhage and a relief of tension. This method of treatment is in direct antagonism to what is known regarding the pathology of submucous myoma. The integrity of the capsule is the only safeguard against the growth becoming septic and undergoing sloughing and gangrene. Hence the mortality of 43 per cent which has followed this ignorant procedure ! (see page 246).

Curetting.—Curetting has a very limited application, but with small interstitial growths it often effects a marked improvement so far as symptomatic haemorrhage and anaemia are concerned. With large tumours the canal is often so distorted as to render a complete clearance of the hyperplastic mucosa impossible, and with certain cervix-myomas it would be impossible to reach the corporeal endometrium at all. I have seen satisfactory results in cases of small intramural growths, and the procedure appeals to me as scientific, since the mucous membrane in cases of interstitial growths is often in a state of oedematous hypertrophy, and is, moreover, frequently the seat of polypoid or fungous hyperplasia and contains thick-walled blood-vessels. The cervix wherever possible should be dilated, until the finger can pass for digital exploration. A small submucous nodule may be felt and removed ; it may prove to have been the main cause of the haemorrhage, and after its enucleation the latter may be permanently checked. Whenever a myomatous polypus is removed, curetting should be done, and whenever curetting is performed, a small submucous growth should be sought for by digital examination. A flushing curette may be used,

and the uterus should be swabbed out after curetting with a strong solution of iodine : the Samaritan Hospital preparation is :—R. Iodine resublimed 1, Iodide of Potassium 1, Rectified spirit 2, Distilled water 2 (= 1-4 Iodine).¹ A narrow drain of bismuth gauze is left in the uterus for twelve hours.

There is one danger in the employment of curetting which must receive comment. When a large submucous growth is present, its integrity as a healthy tumour depends on the entirety of its capsule of mucous membrane ; if this is scraped away down to muscle, the growth is liable to undergo necrosis, and runs great risk of infection. This is the one and only serious objection to curetting, and demonstrates the necessity of selecting the cases for this treatment with due care. This can be done only by giving an anaesthetic, dilating the cervix, and introducing the finger. If a submucous growth is felt, it is better to remove it than to scrape its capsule.

The Electric Current.—The galvanic current was often used in former times for the controlling of haemorrhage ; it was found to produce permanent surface-changes in the endometrium which led to relief from haemorrhage in certain cases. A long positive platinum or carbon electrode was placed over the tumour or on the abdominal wall. In this way from 50 to 150 milliampères were used, the limit being determined by the sensitiveness of the patient. The sittings lasted from five to ten minutes, and then the patient was kept in bed for an hour or more. The application was repeated every seven to ten days, and it was said that in the course of two or three months the haemorrhage ceased.

Apostoli's galvanic treatment and the Faradic current have now ceased to be employed, and they are only mentioned for their historic interest. Another form of electro-

¹ The strong solution of iodine is thought to act as a mild escharotic and also as an efficient antiseptic in cases of chronic infection of the endometrium.

therapeutics has come to the fore in the treatment of hæmorrhage, in the form of the Röntgen rays, and this will be referred to later when discussing the merits of *Radio-therapy*.

The Treatment of Pain and Pressure-symptoms.—Minor discomforts, such as bearing-down in walking or standing, and backache with a general sense of pressure, can often be relieved, when the myomatous uterus is small and retroflexed, by the use of tampons or a Hodge pessary. With a larger uterus also, relief is obtained by pushing it up into the abdomen, if need be, under an anaesthetic, and by the subsequent use of a pessary. Such a procedure should be carried out without employing undue force, for fear of lacerating vessels in possible adhesions. If the tumour appears to be adherent, the attempt to raise it out of the pelvis should be abandoned.

Pain may be due to secondary changes in the tumour such as inflammation, or to pressure upon the viscera or upon nerves; for such cases rest in bed and treatment at a Spa give the best results. *Spa treatment* consists in the administration of large quantities of mineral water, the taking of hot baths, and the giving of hot vaginal douches; this is generally combined with the use of electricity and massage. In England, Woodhall, and in Italy, Salzo Maggiore are suitable spas for the treatment of uterine myoma. *Dysuria* from pressure on the bladder, accompanied by frequent micturition, and rarer cases of *retention* and *incontinence*, are met with just before menstruation, and are no doubt sometimes due to enlargement consequent on temporary congestion of the tumour, and sometimes to the growth having taken up a position causing temporary embarrassment of the bladder. Such cases need the use of a catheter, and the elevation of the tumour, followed by vaginal plugging or the introduction of a pessary to prevent its return to the pelvic position. The success

of pessary-treatment in these cases will depend upon the size of the tumour and the integrity of the perineum: with a large growth or a relaxed vaginal outlet, a pessary will prove useless.

Removal of the Uterine Appendages

Lawson Tait was the first to employ this operation in the treatment of uterine myoma. His first Salpingo-oöphorectomy was performed in 1872, and soon afterwards Hegar advised the same operation at a time when hysterectomy was an exceedingly dangerous procedure. Tait's results, as quoted by Haultain, show that of the first 272 cases the primary mortality was twelve, *i.e.* 4.4 per cent. Of fifty cases whose histories were traced for six years after the operation, in seventeen the tumour had entirely disappeared, in fourteen it had become so reduced in size as to be harmless, and forty-one of the fifty patients were in perfect health. Tait laid stress upon the removal of the Fallopian tube and mesosalpinx as well as the ovary, his view being that it was essential to cut off the nerve-supply as much as possible. Some of the failures with this operation have been attributed to the physical inability to remove the whole of the ovaries owing to the situation of the growth, and subsequent experience showed that for the soft growths, *i.e.* those undergoing some type of degenerative change, oöphorectomy was practically useless.

In spite of the fact that the mortality of the operation was lowered as time went by, the uncertainty as regards results has led to the abandonment of oöphorectomy for uterine myoma. Haultain states that the 'absolute cures' amounted to only 10 per cent.

Cullen gives an interesting table in which the results of twenty-five cases of oöphorectomy performed for myoma of the uterus in the Johns Hopkins Hospital are recorded. In four of the cases no uterine bleeding was noted after the

operation. In two it appeared once, and in two other cases three times ; in one it was regular for a year, and in another case it occurred at irregular intervals for one year. In one instance bleeding persisted at irregular intervals until the uterus was removed four years later ; it was then found that the uterus was densely adherent and "choked the pelvis." One case of *total disappearance* of the tumour was noted. At the time when oöphorectomy was performed, the uterus completely filled the pelvis ; the tubes as well as the ovaries were removed. Two and a half years later the patient was examined. She had gained 40 lbs. in weight ; the uterus was small, anteposed, and no trace of the myoma remained.

Apart from the question of haemorrhage, only ten of the patients in Cullen's tables appear to have been completely relieved of their former pelvic symptoms. Dyschesia, dysuria, and extreme nervousness are among the symptoms noted after oöphorectomy.

I have had no personal experience of this operation, beyond that of assisting senior colleagues at oöphorectomies for myoma performed many years ago ; but there is in my museum a myoma the size of a bantam's egg, which was removed by J. D. Malcolm some years after oöphorectomy had been performed for the same growth, at a time when it was as big as a cocoa-nut. The last occasion when oöphorectomy for myoma was seriously advocated and unstintingly eulogised in this country was in 1902, when Murdoch Cameron of Glasgow said that he found it "highly beneficial in all cases operated on, and the patients themselves testify to the blessings they have enjoyed through its means."

A full discussion of the imperfections of oöphorectomy and of the uncertainties of its results is at present unnecessary, because the operation, as part of the routine treatment of myoma, has now no place in surgery ; nor is it likely, even

in cases where hysterectomy is contra-indicated on general grounds or is found impossible of accomplishment, that, as a means of establishing the artificial menopause, oöphorectomy will ever be preferred to the modern use of radio-therapeutics. Oöphorectomy, however, filled up a very useful niche in the evolution of the treatment of myoma of the uterus ; it gave relief when other palliative measures failed, at an epoch when the prospect of hysterectomy evoked a shudder, and called up visions of the shambles.

Radio-Therapeutics

The treatment of uterine new-growths by Röntgen rays and by the emanations of certain radio-active bodies (radium, mesothorium, thorium X) has received such an impetus during the past two or three years that it has become necessary to dwell at some length upon this subject in so far as it concerns myoma.

The Treatment of Uterine Myoma by X-Rays.—The employment of Röntgen rays has not been hitherto carried out on an extensive scale either in Great Britain, the Colonies, or in America, and no systematic data in English literature are available on which to base an opinion as to its relative value ; but if we turn to the Continent, we find that French and German literature abounds in reports of the experience of gynaecologists in the use of X-rays for myoma. On this subject the contrast between Anglo-Saxon indifference and doubt on the one hand, as opposed to French and Teutonic enthusiasm and optimism on the other, is notable in the extreme. American operators advance their successful results in surgery in extenuation of the lack of enthusiasm for the employment of X-rays for cases of myoma ; and whilst it is open to British surgeons to do the same, the French and German authorities, who are no less successful with the knife than ourselves, appear to be convinced that X-rays supply a want in the treatment

of these tumours, in spite of the success to which surgery has attained in respect to hysterectomy and allied operations. Continental radiologists pay great attention to such important data as the dosage, direction of the rays, etc., and by the universal adoption of a standard unit of radio-activity, they are enabled to estimate the effects of a given 'dose' of applied X-rays, radium, or mesothorium, as the case may be. A great diversity of opinion still exists as to the total number of X (Kienböck) or H. (Holznecht) units which are required to produce amenorrhoea, oligomenorrhoea, or a reduction in the size of a myomatous growth. Two schools of opinion have come into existence, and these may be termed, for our purpose, the *mild* and the *intensive*: the former comprising those who use small doses of rays over a long period of time, and the latter those who employ a strong dose over a time of shorter duration; in short, the Hamburg and the Freiburg schools respectively.

The Hamburg, or mild treatment, has as its chief exponent Albers-Schönberg, whilst Krönig and Gauss are the originators of the more recent Freiburg intensive method.

From these remarks it must not be inferred that all radiologists on the Continent have fallen into line under the banner of Albers-Schönberg or that of Krönig-Gauss.

There is still an extraordinarily wide difference of opinion existing among them as to the necessary number of Kienböck units which should be employed to secure a given therapeutic effect, such as, let us say, the cessation of haemorrhage and the shrinkage in size of a myomatous tumour. This makes the task of trying at the present time to harmonise the dosage of the various workers in radiology almost impossible.

Kirstein in his book¹ draws attention to this variability in technique. That of Runge is mentioned as being mid-

¹ *Die Radiotherapie in Gynäkologie* (Berlin, Springer, 1913).

way in strength between that of Albers-Schönberg and that of Krönig-Gauss, whilst Kirstein's own technique lies between that of Albers-Schönberg and Runge. Fränkel, Kelen, and Heinemann are mentioned as each having his own technique as regards dose, time, number of sittings and so forth, the workers describing the strength of their dosage in fractions of those of the Hamburg or Freiburg schools. One very important point, however, stands out clearly, and that is, the universal employment of a standard of unity as regards dose, which to my mind has the same significance as the pharmacopoeial standardisation of a drug. The X photographic unit of Kienböck = $\frac{1}{2}$ the H. photographic unit of Holznecht, and corresponds to tint B Sabouraud-Noiré.

The Albers-Schönberg technique being mild, limits the whole dose to 150 X, the average total dose for myoma being 50-60 X (Haenisch); the Krönig-Gauss treatment allows of a total strength up to 3000 X = 1500 H. in certain cases; whilst the average total dose for myoma, with the latter technique, is 1800 X.

It may be instructive to mention some of the results that were published during the first thirteen months which elapsed after the discussion at Halle on the subject (May 1913).

1. *The Albers-Schönberg or Hamburg Technique.*—*Dose Average 50-60 X for Myoma. Single-Fire.*—Prochownik¹ gives his experience, which extends over four years, in the treatment of myoma. Out of 180 myomas he selected 45 for treatment by X-rays. *Summary.*—The climacteric was complete in forty; size diminished quicker than after castration and quicker than after the natural menopause. There was no recrudescence of the growths.

Ludwig Mohr of Hamburg.²—This record comprises

¹ *Fortschr. a. d. Geb. d. Röntgenstrahl.* Bd. xx. H. 3, S. 316.

² *Ibid.* Bd. xx. H. 2, S. 105.

796 myomas, 127 of which were still under treatment; the remaining 669 showed 56.2 per cent 'cures,' *i.e.* amenorrhoea or the "desired oligomenorrhoea" was obtained and also cessation of pain. In 17 per cent there was improvement, which meant that oligomenorrhoea was produced in patients for whom amenorrhoea was desired. One striking fact is shown in relation to age, *i.e.* the results improve with approaching menopause. The following statistics are given by Mohr to demonstrate this: 202 cases of myoma of the uterus; of these, those between the ages of thirty and forty gave a result of 46.4 per cent of 'cures,' those between forty and fifty years 80 per cent, and in those over fifty years of age the 'cures' were said to total 93.8 per cent.

Haenisch (G. Fédor).¹—Of 31 cases of myoma and menorrhagia, 24 were 'healed' for periods up to $3\frac{1}{4}$ years; in some cases the myomas were reduced in size, and in others complete disappearance of the growth was noted.

Nemenow of Petrograd treated 19 myomas for haemorrhage and obtained amenorrhoea in 18; a submucous myoma proved refractory; the technique was that of Hamburg, *i.e.* one field 10-12 X, with two to three weeks' pause between the series.

Foges.²—Twelve myomas and four cases of menorrhagia were treated; amenorrhoea occurred in eleven, and in three oligomenorrhoea was established.

Albers-Schönberg³ stated that 75 per cent of myoma-cases treated by his method resulted in complete amenorrhoea or normal menstruation, with absence of all other "myoma-symptoms."

2. *The Krönig-Gauss or Freiburg School.*—Average Dose 1800 X. Total Dose 3000 X. Cross-Fire from Multiple

¹ "Über die Röntgenbehandlung der Uterusmyome," *Zentr. f. Gyn.*, 1913, Jg. xxxvii. S. 594.

² *Wiener med. Wochenschr.* lxiii. 16, 995.

³ *Fortschr. a. d. Geb. d. Röntgenstrahl.* Bd. xx. H. 2, S. 93.

Points.—Paul Haendly.¹—Eighty myoma-cases are recorded. Four fields were employed: result—in sixty cases amenorrhoea was obtained, in six oligomenorrhoea, and in six no result. The tumours varied in size from that of a fist to that of a twenty-four weeks' gestation. In one-third of the cases reduction in size was noted.

Döderlein of Munich, speaking at Halle, referred to the Krönig-Gauss results in Freiburg as giving 100 per cent of 'cures.'

E. Runge² stated that in the Charité Berlin the treatment of 90 myomas yielded 95 per cent of 'cures,' and in 40 per cent there was shrinkage in size. Four of these cases had to be operated upon.

Graessner and Benthous of Cologne³ began with the mild, and then adopted the intensive technique. Their results were as follows: 86 per cent 'healed,' 5 per cent improved, and 15 per cent failures = 106 per cent !!

The *intensive* treatment does not appear to be extensively employed in Austria, nor in Russia, nor in America. In Germany it seems to be gaining ground, although there are still many opponents. Holzbach of Tübingen, at the Halle meeting, pointed out what he described as the defects of the Hamburg (*mild*) technique, saying that recurrent haemorrhage was to be feared by this method, whilst remarkable results had followed the introduction of the Freiburg (*intensive*) technique—this authority, however, contents himself with a maximum dose of 800 X. Gustav Klein at the same meeting spoke in favour of a *smaller* dose, stating that he could always obtain oligo- or amenorrhoea with one-tenth of the Freiburg dose, *i.e.* 50-110 X, 2-7 series, 18-48 sittings.

The inference to be drawn from the above statistics is,

¹ "Die therapeutische Verwendung der Röntgenstrahlen in der Gynäkologie der Univ. F. K. Berlin," *Zentr. f. Gyn.*, 1913, Jg. xxxvii. S. 591.

² 15 *Versam. der deutsch. Gesellsch. für Gyn.*, Halle, May 16, 1913, S. 441.

³ *Fortsch. a. d. Geb. d. Röntgenstrahl.* Bd. xx. H. 3, S. 322.

that X-rays have a powerful influence in controlling the haemorrhage in myoma-cases and that, in about one-third, reduction in size of the growth may be expected. After the above brief *résumé* of the successes which have been claimed for radio-therapy, it now becomes a duty to look at the other side of the question.

Calatayud refers to increased haemorrhage at the onset of treatment, and says it is due to too small a dose. He has noted erythema, brown pigmentation, a falling out of pubic hair, recurrence of haemorrhage, and late dermatitis resembling senile gangrene. A completely sterilised ovary never again becomes functional, and with persons under forty years of age there is no permanent improvement. This is his comment after using the Albers-Schönberg treatment.

Foveau de Courmelles mentions accidental burning as the result of continuous application of high doses, and says that the good effects of the X-rays are not always permanent.

Haenisch had sixteen cases of dermatitis in the treatment of thirty-one patients. He also mentions injury to the bowel and late skin-lesions.

Paul Haendly mentions diarrhoea and dermatitis.

Albers-Schönberg states that skin-lesions may occur as late as six years after treatment.

Fritz Meyer is certain that refractory cases make up a big total.

Ludwig Mohr reports a death seven weeks after treatment, from recurrent haemorrhage. Out of 669 cases erythema occurred in 52, and "severe symptoms" in 97; "disturbance of consciousness" was the result in a case of arterio-sclerosis. Sickness, diarrhoea, and strangury were noted.

Müller reports a case in which after seven months' amenorrhoea the bleeding recurred; renewed application

of 40 X was followed by another attack of haemorrhage which necessitated operation. I have had a similar experience to that of Müller.

Alexander Lorey draws attention to the injuries to neighbouring organs.

H. Voigt in eight myoma-cases noted burning in three, exudation into the pouch of Douglas in one, severe proctitis in two, and collapse in another case.

Arcelin reports desquamation and telangiectasis of the skin.

Claude Regaud in experimenting on bitches found that they died of bowel-injuries before the ovaries were totally destroyed.

Chéron remarks that although the results of X-rays are good, still there are injuries to be considered, *e.g.* endarteritic changes in the blood-vessels. Nogier and Lacasagne have proved this by experiments on dogs.

Deaver of Philadelphia has given it as his opinion that X-rays for myoma are useless.

Indications for the Use of X-Rays. — Albers-Schönberg says 'deep therapy' is indicated when the myoma is not growing rapidly, when anaemia is not increasing, and when there is no disturbance of the circulatory system or of the urinary organs; that it is best for women at the fourth decade of life and still later, as younger women require higher doses.

Laquerrière does not advise its use under the age of forty years, and believes that even between forty and forty-five the results are uncertain.

Calatayud advocates X-ray treatment for myoma only if the patient is haemophilic, diabetic, or albuminuric; also if there is lymphatic disease or *morbus cordis*, and for anaemic patients over thirty-nine years of age.

Gauss and Krinski advocate radio-therapy for myoma without regard to age, anaemia, or size of the tumour.

Contra-Indications to the Use of X-Rays.—

Calatayud gives the following as indications for operation or contra-indications for radio-therapy :—Complications involving the bladder, ureters and rectum ; sarcoma, adenoma, carcinoma ; inflammation or necrosis of the tumour ; pyosalpinx ; acute and subacute pelvic peritonitis ; cystic and calcareous degeneration of the tumour ; pedunculated, subserous, and submucous growths ; very large growths in patients who are under forty years of age.

Weil and Laquerrière reserve X-rays for patients over forty.

Haenisch lays stress upon the exclusion of adnexal disease, and says that great caution is needed with exsanguinated patients. X-rays are useless in submucous, pedunculated, and soft myomas.

Foges insists that the gynaecologist and not the radiologist must fix the indications.

Albers-Schönberg is of the same opinion, saying that the gynaecologist has the last word in fixing the indications and in *the clinical judgment as to the progress*, whilst the radiologist looks after the technique. This authority excludes cases of polypi and gangrene, also cystic, sarcomatous, carcinomatous myomas, and those causing pressure.

It seems clear that only *uncomplicated myomas*, tumours which are movable, well defined, and not softened, are suitable for X-ray treatment. When there is the least doubt in the diagnosis, the employment of the rays should not be considered.

In cases deemed suitable for treatment by X-rays, due regard should be paid to topographical considerations, for reasons which will be given when we come to consider the question of how the effect of the treatment is obtained.

The Treatment of Uterine Myoma by Radium and Mesothorium.—The treatment of myoma by these radio-active bodies has received up to the present but a limited application, as compared with the extensive use of X-rays for the purpose. Oudin and Verchère were the first to use radium for gynaecological diseases in 1906, and their results were marred by accidents. Dominici, by using what he calls the ultra-penetrating or hard *gamma* rays, obtained better results. Wickham, Degrais, and Chéron next published encouraging results, but their observations were confined to patients over thirty-five years of age, and were carefully selected; for example, they excluded cases of marked anaemia, also medium-sized and large tumours. The few experiments made outside France had not attained to more than this, until Gauss commenced to supplement his long X-ray experience by testing the therapeutic value of radium and mesothorium. Space does not permit of an account being given of his interesting experiments on mice and plants: suffice it to say, he had to determine important points as regards *dose* and *filtration*. Each sample of material requires to be submitted to biological tests, owing to the variability of action with these substances.

Gauss' early clinical tests were made by the abdominal route (as with X-rays); but it was soon found to be preferable to place the substance nearer the uterus and ovaries, and the capsules are now inserted in the vagina or cervix, or within the *cavum uteri*.

Krönig and Gauss find that different patients react in different ways to one and the same 'stream.'

The radio-activity of radium and mesothorium is said to be similar in every important detail, but it differs from that of X-rays in that while the latter are only projected forwards, the rays of radium and mesothorium are distributed in all directions, and, moreover, there is a greater preponderance of hard *gamma* rays, so that the rays from radium and

mesothorium possess much greater penetrating power than Röntgen rays. From these facts it would appear that the limitation of the area influenced by radium and mesothorium is a matter of considerable difficulty—Gauss and Krinski admit that it calls for technical measurement, and that more work has yet to be done in connection with it. They indicate that to guard against eventual injury is a question of choice of filter; and of filter-substances, gauze, silk, caoutchouc, paper, aluminium, and lead—the last in varying thickness—appear to be best for deep intensive application, and this is the kind which is needed in the treatment of myoma. Another contrast between the action of radium and mesothorium as compared with that of X-rays is that of rapidity, Gauss stating that the same effects are obtained after *one* application of radium as those seen after *six* applications of X-rays.

Pinkuss, who thinks that the use of mesothorium marks a distinct advance in conservative treatment, says that the hard *gamma* rays are analogous to the hard X-rays, whilst the use of mesothorium is far more comfortable and convenient. This author reports four cases of myoma for which he had employed this substance.¹ The treatment was employed to check hæmorrhage; it was successful in two out of the four cases. One myoma, which was the size of a child's head, required subsequent operation. The menopause, when artificially induced by mesothorium, is milder than that following castration and hysterectomy. Pinkuss concludes by saying that mesothorium will displace operation in certain cases, but that the dose, duration, limitations and *indications* have still to be fixed.

Gauss and Krinski reported at Halle, May 1913, that in Freiburg 42 myomas had been treated with mesothorium and 22 with mesothorium and X-rays combined. No

¹ "Die Mesothorium Behandlung bei hämorrhagischen Metropathien und Myomen," *Deutsch. med. Wochenschr.*, 1913, Jg. xxxix. S. 1041; also ref. *Versam. der deutsch. Gesell. f. Gyn.*, Halle, 1913.

regard was paid as to the age of the patient, the size of the tumour, or the amount of blood lost; the largest myoma reached above the navel, and in the highest grade of anaemia the haemoglobin was lowered to 18 per cent; the youngest patient was twenty years of age. Thirty of the patients had completed their treatment, amenorrhoea being absolute, and shrinkage up to complete disappearance had been obtained. All the patients were able to resume their work; there were transient symptoms which the authors describe as *Mesothorium-kater*, amounting to malaise and slight rise of temperature in 53 per cent of the cases. To produce amenorrhoea in myoma-cases, treatment extending over eighty-three weeks was required for patients between thirty-five and forty years, seven weeks for those between forty-one and fifty years. The average number of series of applications was 2.6, and the average time of contact 176.5 hours.

Mode of Action of X-Rays, Radium, and Mesothorium.—Krönig and Gauss hold that radium acts on the uterine mucous membrane and on the ovaries; radium, they say, is principally haemostatic. The shrinkage in size which is seen by X-ray treatment does not occur with radium; therefore X-rays are preferable for large tumours, but *the combined treatment of X-rays and radium is very promising*: “by this means haemorrhage, which often continues after the first application of X-rays, is brought to a rapid and certain termination.”

The effect of X-rays and radium upon the tissues has been made the subject of histological research, and the following points have been recorded:—

(1) *Ovaries*.—Claude Regaud and Ant. Lacassagne by experiments on rabbits found that the radio-sensibility of the gland begins with the growth of the follicles and reaches its maximum with full follicular maturity. After rupture, *i.e.* during the development of the corpus luteum, radio-sensibility decreases rapidly and old follicles are completely unaltered.

Gauss and Krinski have noted that the follicles are markedly affected by mesothorium and thorium X, and are not decided whether this is the result of the biological action of the rays or due to indirect chemical changes in the cells.

Albers-Schönberg mentions experiments on animals, which prove a decrease in number and a disappearance of follicles (degeneration of primordial follicles), and states that the same has been observed in human ovaries. He regards the reduction in the size of the growth as primarily due to ovarian sclerosis, but also to the effect of the X-rays on the tumour-cells.

Alexander Lorey says there are changes in the follicle-epithelium and in ova, even to complete destruction later on. The same occurs in the stroma; the ovaries diminish in size and are rendered functionless.

Calatayud refers to atrophy of the ovaries together with shrinkage of the tumour, and says the blood-supply to the tumour and uterus is diminished as a result of loss of ovarian function.

Fédor Haenisch attributes the results of the rays to injury to the ovaries and also to direct action on the tumour.

P. Meyer is of the same opinion, saying that X-rays act indirectly on myoma *via* the ovaries, and also have a simultaneous action on the tumour.

Claude Regaud, mentioned above, describes the results of experiments on seven guinea-pigs and three bitches. Of the seven guinea-pigs three were proved fertile after six, nine, and ten months' treatment respectively by rays; four remained sterile. The ovaries of the sterile pigs were examined fifteen to twenty months later, and were found to contain only a few abnormal follicles. The ovaries of the bitch lie deeper than they do in the guinea-pig, and are more mobile, hence difficult to localise; so that in spite of using rays so strong that the three bitches died of bowel-injuries, the ovaries still contained innumerable living

follicles, though some were destroyed. Regaud adds, that in the human subject the ovaries are mobile and still deeper than in animals, so that it is impossible to sterilise them with rays directed only from before backwards. The published cases of 'Röntgen sterility' are, in his opinion, cases where the ovaries were sterile to start with, or were so as a coincidence. In a case of my own, which had undergone twelve weeks' X-ray treatment, one ovary was small and atrophic; the other, which lay deep in the pouch of Douglas, was normal or even hypertrophic.

(2) *The Tumour and other Tissues.*—Calatayud says that X-rays have a direct influence on the tumour, producing nuclear necrosis. The uterine mucosa becomes sclerotic and the endothelium of the vessels atrophic.

Haenisch speaks of a direct action on myoma, but places this quite secondary to the action on the ovaries.

Albers-Schönberg acknowledges the direct action of rays on the tumour-cells.

Lars Edling regards the cessation of haemorrhage with the application of radium as due to mucosal changes, and the shrinkage in size as due to the disappearance of oedema and not to degeneration of muscle-cells in the tumour.

Pinkuss states that a direct influence on the uterine wall or myoma, such as probably takes place with X-rays, has not been proved for mesothorium, so that when he wishes to influence the activity of the ovaries, he prefers to place the tube in the vaginal vault.

Adler of Vienna states that mesothorium (1200 mg.) causes necrosis of tumours, and he has found vacuolation of protoplasm, syncytial fusion of cells, disappearance of nuclei, and very irregular nuclei rich in chromatin; also thickening of vessel-walls and wandering of eosinophile leucocytes, and the formation of granulation-tissue in cancers.

Aschoff found extensive cell-destruction, especially in the spleen of a mouse which was killed in twenty-four

hours by placing the animal in a leaden box, 4 mm. thick, outside which was placed 800 mg. mesothorium.

The therapeutic effect of all the tested radio-active bodies — X-rays, radium, mesothorium — seems to vary directly with the intensity of application and inversely with the duration of time over which the application has been spread, so that, in the words of Gauss, “in the case of a large dose applied for a short time ‘healing’ sets in quickly, whereas the same dose extended over a long period tends on the contrary to aggravate the symptoms of the disease.”

My own experience of the treatment of myoma by X-rays is confined to three cases,¹ and radium I have only used for chronic metritis, carcinoma-cases, or for cases of carcinoma of the body complicating uterine myoma.

As regards the myomas, the first patient was aged 44 years. She had been married sixteen years, and had one child only, who was born one year after marriage; there had been no miscarriage. The patient was a very obese florid subject, and complained of severe losses of blood at her periods, and most obstinate constipation. The uterus was enlarged, but the height of the fundus could not be defined on account of the thickness of the abdominal walls. The cervix was patulous, and a submucous growth was detected. This, together with much fungoid endometrium, was removed under anaesthesia, and the operation was followed by three months’ amenorrhoea, after which regular though somewhat excessive periods followed for a year. At the end of this time the myomatous uterus could be felt in the hypogastrium and was much better defined than formerly.

The os was closed, but regarding the myoma as increasing in size, I prescribed X-ray treatment, and the patient underwent nine sittings of ten minutes’ duration—one sitting every other day, for three weeks; the treatment was discontinued because of the skin-tenderness which it occasioned.

¹ Written in 1914.

The immediate result was a diminution in the amount of the bleeding. Two years later the patient came again, complaining of excessive haemorrhage, but there was no further enlargement of the growth. The patient objects to a tender skin and also to an operation, and prefers to "await the change of life."

The second case was that of a patient, aged 44 years, who had been married fifteen years and was sterile. Three sisters had myomas; two had undergone hysterectomy, and the third, with the largest tumour of all, refused operation, and advised my patient to do the same. The patient had worn a pessary for six years; the periods were not excessive since she had done so, although there had been menorrhagia before that time. The most troublesome symptom was frequency of micturition accompanied with pain, and profuse leucorrhoea was also complained of. There was a myomatous mass to be felt over Poupart's ligament on either side, the uterus was anteverted, and the os was far back. On the left of the uterus was a mobile mass like a pedunculated myoma, and a smaller mass was felt on the right side; the left ovary was enlarged and prolapsed. As the patient stoutly refused operation, I sent her to a radiologist, who treated her for three months. The masses, however, increased rapidly in size, filling the whole hypogastrium and reaching on the left as high as the umbilicus. The periods were profuse on the first day only, afterwards they were scanty; but they now appeared every fourteen days. The bowels became relaxed after the treatment by X-rays. The bladder-symptoms increased in severity with the enlargement of the tumours. I advised operation, and after an independent consultation I removed the uterus by panhysterectomy. The right ovary was lying forwards, due to the rotation of the uterus; it was reduced in size to one-half of the normal, and showed total destruction of Gräafian follicles and shrinkage of stroma. The left

prolapsed ovary was enlarged but healthy. Its position protected it from the single-fire of the X-rays, as the whole tumour-mass intervened. Figure 10, page 9, shows the uterus which was removed in this case.

Summary.—1. Radio-therapy probably acts mainly by destroying the ovaries, but X-rays appear to have a direct influence on the cells of the myoma, as evidenced by the coincident shrinkage under the treatment, which, when it is achieved, is too rapid to be explained by inhibited ovarian activity alone.

2. Radium and mesothorium used alone are not so suitable as X-rays for cases of myoma, as no shrinkage of the growth can be expected.

3. X-rays combined with mesothorium appear to effect more rapid haemostasis than do X-rays when used alone.

4. The French cross-fire combined with the Freiburg intensive technique promises the best results: only by cross-fire can topographical difficulties be overcome.

5. The treatment is of no avail for submucous growths.

6. Radio-therapy should be employed only in cases where the diagnosis of myoma is absolutely certain, and when the tumour is uncomplicated by adhesions, degeneration, and new-growth.

7. The gynaecologist must decide the indications for treatment and watch clinical developments.

8. The contra-indications outweigh the indications for radio-therapy. As Gustav Klein said at Halle, "Myomectomy shall never be thrown into the lumber-room." When the pen has superseded the sword, the scalpel will still be needed for myoma.

The Operative Treatment of Uterine Myoma.—

The steady reduction in mortality from the operations on myoma marks one of the most striking advances in modern surgery. Nowadays a woman need not suffer from

“an issue of blood twelve years,” and spend “all her living upon physicians” without being “healed of any”! Twenty-five years ago the primary mortality of hysterectomy was about 23 per cent, and the operation of salpingo-oöphorectomy was frequently resorted to for the checking of haemorrhage and for reducing the size of the tumour. It is interesting to speculate on what the present position of the surgery of myoma would be if radio-therapeutic measures for stanching blood and for causing the shrinkage of a myoma had followed immediately on the heels of castration by the knife. Whatever may have been the result in that case, it is certain that hysterectomy for myoma has now established itself as one of the most satisfactory operations in surgery, and (for the reasons already given) it will never be deposed (by radio-therapy) from the high position it has attained. The status of hysterectomy was not secured without a struggle: its recognition was extremely slow, and affords one of the best examples of the steady progress of antiseptic and aseptic surgery.

Among the causes which contributed to the initial high mortality may be mentioned:—

1. The restricted indications and the crudeness of the pioneer operation.
2. The imperfect knowledge of the life-history of myoma.
3. Imperfect antiseptics and asepsis.

Causes 1 and 2 worked together, for the impression acted on not many years ago was, that myomas were innocent tumours which could be treated effectually by rest, drugs, and good feeding; consequently surgeons only ventured to remove the uterus because of some urgent necessity, in fact as an *indicatio vitalis*. A short account of the early surgical procedures carried out for the relief of patients suffering from the effects of *myoma uteri* may prove interesting.

Up to 1866 Caternault¹ had been able to collect 76 operations for myoma of the uterus. Fourteen of these were for *submucous* tumours and comprised incision or puncture with non-removal of the tumour—a procedure mentioned under palliative measures. It brought with it a mortality of 43 per cent. The patients died of pyaemia, erysipelas, and haemorrhage. The first two cases, that of Lizar in 1825 and Dieffenbach in 1826, escaped disaster; then came a pause, and the next case in chronological order is that of Deane in 1848, which was also “successful.” Atlee followed by reporting four cases between 1849 and 1851 with two deaths. Baker Brown adopted the operation *as his own* in 1859. Four of his cases, communicated to Caternault by Felix Routh, yielded one recovery and three deaths! Atlee’s method had been to incise the tumour and give ergot to aid its expulsion. Baker Brown went further and nearly anticipated Segond’s morcellement, for he devised a gouge whereby portions of the growth could be removed, and he aimed at producing disintegration, such as ‘Nature’ was capable of achieving. The first and second volumes of the *Transactions of the Obstetrical Society of London* contain an account of his work. He there claims to have had only one accidental death in the twelve or more cases he had operated on up to the year 1860. At this period Barnes and others were using the ligature and bistoury, or Gooch’s cannula and the *écraseur*.

So much for the pioneer attempts to deal with submucous growths. Turning to pedunculated *subserous* tumours, the first operation on record is that of Granville on March 21, 1829.² The patient died of gangrene of the bowel. Next comes a case operated upon by J. L. Atlee in 1843. Death from haemorrhage took place five days after operation. On February 15, 1844, Lane *successfully removed*

¹ *Essai sur la gastrotomie dans les cas de Tumeurs fibreuses péri-utérines*, Paris, 1866.

² *Med. Chir. Trans.*, 1851, xxxiv., Table on page 15.

a fibro-cystic pedunculated myoma from a patient aged 45 years. She died of some bladder-trouble five years later.¹

Six months after Lane's successful *gastrotomy* for *myoma uteri*, J. L. Atlee (August 28, 1844) removed, *per abdomen*, from a patient, aged 24 years, a pedunculated myoma. The tumour weighed one kilogram. *The patient recovered* from the operation, and died of phthisis three years later.

Caternault collected twenty cases of abdominal *myomectomy* up to 1866. Of these eight recovered, twelve died; giving a mortality of 60 per cent.

Coming now to *total extirpation* or *partial amputation* of the uterus, with, or without, removal of the ovaries, the first case recorded by Caternault is that of Parkman.² This operator extirpated the womb of a woman, aged 27 years, for an interstitial myoma. The patient died of haemorrhage in twelve hours.

On November 21, 1843, Heath³ performed a total hysterectomy for a myoma; death from haemorrhage in seventeen hours was the result.

On January 16, 1844, C. Clay removed a myomatous uterus and both ovaries; the result was death from peritonitis in fifteen days. Heath and Clay were the first to cut the ligature short and drop the pedicle into the abdomen.

John Bellinger, in 1846,⁴ performed, according to Kelly and Noble, "the first deliberate hysterectomy." Death followed on the fifth day from peritonitis. The wound was closed, so presumably the stump was left *in situ*.

On June 25, 1853, W. Burnham⁵ opened the abdomen

¹ J. Clay's Table IV. Kiwisch *Clin. Lect.* and Caternault, *loc. cit.* page 28.

² Lyman's *Reports*, Boston, 1856.

³ *Medical Gazette*, London, December 8, 1843.

⁴ South, *Journal Med. and Phar.*, 1847, vol. xi. page 241.

⁵ Nelson's *American Lancet*, 1854. (All quoted from Caternault and impossible to verify.—C. L.)

expecting to find an ovarian cyst ; he removed a myomatous uterus together with both ovaries. The patient *recovered* after a two months' illness. This is the first *successful* pan-hysterectomy on record.

Between 1854 and 1866 Burnham performed hysterectomy nine times, with seven deaths and two recoveries. His subsequent results were fifteen operations with three recoveries.

G. Kimball, on September 1, 1853, *after a correct diagnosis* proceeded to perform a deliberate supravaginal hysterectomy. There followed a protracted illness from haemorrhage ; the cervix was dropped, and the ligatures brought out at the lower angle of the wound. The ligatures were still attached eight months later.

Thus the first two successful supravaginal amputations were performed within $2\frac{1}{2}$ months of each other by different operators, Burnham and Kimball, in the year 1853. In both the cervix was "dropped." Kimball, in all, performed eleven hysterectomies, with six recoveries and five deaths (Kelly).¹

Péan and Urdy, quoted by Stansbury Sutton,² trace the history of *gastrotomy* for the removal of myoma through three distinct periods. The first, down to 1843, comprises those cases in which the abdomen was opened with a view to perform ovariectomy, but finding a uterine growth, the surgeon shrank from the consequences of amputation of the uterus and closed the wound. In the second period, that to 1863 (during which ovariectomy made great advancement), the several surgeons already mentioned in the text, finding uterine tumours where they had expected ovarian growths, had the courage to proceed with hysterectomy. In the third epoch, beginning with April 1863, Koeberlé when in doubt prepared himself for either

¹ *Operative Gynaecology*, vol. ii. page 369.

² Mann's *American System of Gynecology*, page 591.

ovariotomy or hysterectomy. Stanislas Caternault,¹ writing in 1866, says: "No one but Koeberlé has made the removal of uterine myoma a regular surgical procedure. In England and America a few hysterectomies have already been recorded, whilst in France the radical operation has not been seriously considered." This author gives a full record of the first eight cases operated upon by E. Koeberlé of Strassburg. The first operation was on March 14, 1863. It was prolonged for $2\frac{1}{2}$ hours on account of severe hæmorrhage, and the patient died three days later from profound prostration.

Koeberlé's first *successful* operation was performed on April 20, 1865: it was a supravaginal amputation with the removal of both ovaries. Of eight patients operated upon between March 1863 and July 1866, Koeberlé lost five—four from hæmorrhage, and one from ascites and peritonitis, which set in twelve hours after operation for an adherent tumour. The patient survived the operation for eighteen hours. In 1869 Koeberlé's record was nine operations—four recoveries and five deaths.

Stansbury Sutton² states that up to December 3, 1884, Keith of Edinburgh had done thirty-eight hysterectomies at the vaginal junction—thirty-five recovered and three died; and this writer adds that up to 1883 Granville Bantock, of the Samaritan Hospital, London, was having better results with the *extraperitoneal* method than those of any operator following the *intraperitoneal* technique. And it is within my own knowledge that the excellent results with the *serre-nœud* at the above hospital led to this technique being retained longer at that institution than in any other hospital in London.

Cullingworth, quoted by E. S. Bishop,³ in employing the *extraperitoneal* method had two deaths following ten operations.

¹ *Loc. supra cit.*

² *Loc. supra cit.* 591.

³ *Uterine Fibromyomata*, 1901.

Döderlein and Krönig¹ give some interesting statistics of operations for myoma up to 1907. The following is a summary of their most important statements :—

Up to the year 1876, the beginning of the antiseptic era, Zweifel collected 78 cases of myoma-operations, with 41 recoveries and 37 deaths. The best results were those of Péan, who had 11 recoveries in 16 operations ; whilst the other operators with 62 operations had 37 deaths.

From 1878 to 1885 Gusserow collected 359 operations, with 122 deaths = 33.9 per cent mortality.

259 supravaginal amputation of cervix, with 105 deaths = 36.2 per cent mortality ; 64 myomectomies, with 17 deaths = 26.5 per cent mortality.

1891, Hofmeier collected 881 operations of all kinds for myoma by 18 operators, deaths 204 = 23.1 per cent mortality.

1888–1897, Olshausen collected 806 supravaginal, intra-peritoneal operations with 45 deaths = 5.6 per cent mortality ; 520 total hysterectomies with mortality 50 = 9.6 per cent.

1904, Winter grouped together 893 total vaginal operations, with 23 deaths = 2.6 per cent mortality ; 689 abdominal (intra- and extraperitoneal), with 32 deaths = 4.6 per cent mortality.

1907, Döderlein, in the Tübingen Clinic (collected by Sarwey), 463 operations (210 vaginal, 253 abdominal) ; 17 deaths = 3.67 per cent mortality.

It will be seen from the above that between the statistics collected by Hofmeier in 1891 and the year 1897, the primary mortality dropped from 23 to less than 10 per cent. This was no doubt due to the largely increasing popularity of the intraperitoneal method of dealing with the stump, and to the steady advancement towards asepsis. With the publication by Baer of Philadelphia of his method of performing supravaginal hysterectomy, in 1892, this opera-

¹ *Operative Gynäkologie*, Zweite Auflage, page 399.

tion was placed on a solid foundation, and Baer's technique did much to reduce the mortality of 10 per cent, as he found it, to its present-day limits. In relation to the improvements which appeared in the technique of hysterectomy about this time, Kelly states that one of the most revolutionary changes was that of Stimson, who proposed and practised the systematic ligation of the ovarian and uterine arteries in their course as a proper preliminary to hysterectomy; but this is a detail to which, in my own opinion, very few operators pay strict attention, ligation *en masse* being still a common practice.

Karl Fleishmann,¹ dealing with the operative treatment of myoma up to date, gives the following statistics of results:—

251 operations, including 107 supravaginal amputations, yielded a primary mortality of 2 per cent, which when dissected showed abdominal total extirpations with a mortality of 5.2 per cent, supravaginal mortality .9 per cent, conservative abdominal operations 0 per cent.

John B. Deaver in the year 1911 performed total abdominal hysterectomy 31 times, vaginal hysterectomy 4 times, and supravaginal hysterectomy in 74 cases. Total 109; mortality 1 per cent.

My colleague, Alec Bourne, has kindly provided me with the statistics relating to operations for myoma performed at the Samaritan Hospital, London, during three recent years. They read as follows:—

1911	Total operations	85	: recovered	82,	died	3;	mortality =	3.5	per cent.
1912	"	"	95	:	"	88,	"	7;	" = 7.3 "
1913	"	"	64	:	"	64,	"	0;	" = 0. "
= Total mortality for the three years, 3.6 per cent; number of operators ten.									

My own results give 7 deaths in 270 operations = 2.5 per cent mortality.²

¹ *Wiener klin. Wochenschr.* Bd. xxvi. S. 445, 1913.

² These 270 cases occurred in a series of 870 abdominal sections for pelvic conditions in general.—AUTHOR.

The Present-day Operations for Myoma

Koeberlé's serre-nœud, Tait's wire clamp, Kleeberg's ligature, the écraseur, and Gooch's cannula (see Fig. 165) have all been relegated to the dust-heap.

At the present time there are employed :

I. Radical Vaginal Operations for—

1. The removal of small pedunculated myomas.
2. Morcellement and enucleation.
3. Colpotomy and myomectomy.
4. Vaginal hysterectomy { with ligation.
 { with forci-pressure.

II. Radical Abdominal Operations—

1. Myomectomy.
2. Supravaginal amputation.
3. Total hysterectomy.

(The last two operations should be combined with the conservation of at least one ovary wherever possible, or with the transplantation of ovarian tissue.)

Indications for Operative Treatment.—The guiding principle must be *nil nocere*. We must not employ a means of treatment that is more dangerous than the disease which we are called upon to treat. Therefore we ought not to operate upon every tumour we happen to discover. We must, however, remember that 5 per cent of myomas are associated with malignant disease, and we have a right to be influenced in our decision by the fact that the primary mortality after operation has been reduced to 2 per cent.

Definite Indications should in every Case be the Reason for Operation.—In anaemic cases the percentage of haemoglobin should be raised to 50, the erythrocyte count should not be less than 3,000,000. Patients should not be allowed by their medical advisers to get into the deplorably anaemic state in which they are not infrequently sent to hospital.

In view of the excellent results of hysterectomy, anaemic cases with a percentage of haemoglobin of 12, 15, 20, and

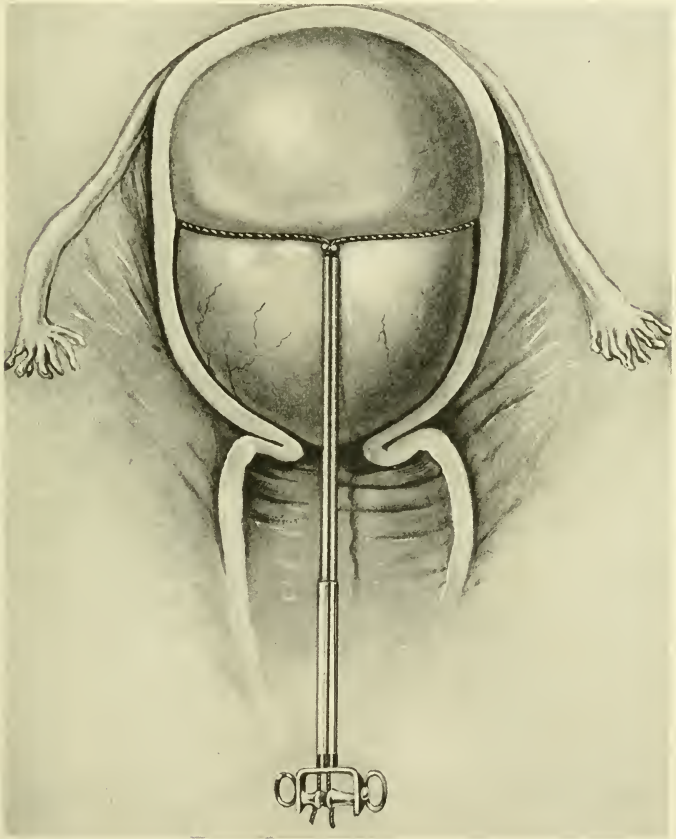


FIG. 165.—Showing the application of Gooch's cannula, now obsolete. The ligature, which was applied to the upper limit of the separated portion of the growth, was removed on the fifth day. Symptoms of blood-poisoning appearing, the tumour was then enucleated, with a successful result (J. Hall Davis, *Trans. Obst. Soc. London*, vol. ii. pages 17-26, 1861).

so on, ought to be unknown. There is no doubt that some women pick up remarkably quickly from severe loss of

blood, but as soon as they are a little better another profuse period causes a set-back, so that the general state is one of chronic invalidism. A certain number of these cases are suitable for treatment by X-rays, but many are not. Submucous myomas whether pedunculated or not should be removed. Cervix-myomas also call for extirpation. Myomas which cause pain, either from the fact that they are degenerate, malignant, or suppurating, or because they are complicated by inflammatory or neoplastic changes in the adnexa, are essentially operation-cases. Myomas which have become adherent from conditions referable to the upper abdomen, such as appendicitis, adherent intestines, etc., are a source of danger and should be removed. Severe pressure-symptoms form another indication for radical operation. Retention of urine, intestinal obstruction, thrombosis of the large veins, and renal disease are among the rarer indications for hysterectomy.

Contra-indications to Hysterectomy.—The majority of myomas need no treatment, and therefore it would be most reprehensible to perform hysterectomy for a symptomless tumour.

An advanced stage of anaemia is a contra-indication to a radical operation until the haemoglobin-content has been raised (*vide supra*). Serious organic disease of other organs, such as advanced cardiac and renal disease, pulmonary phthisis, emphysema, and diabetes, contra-indicate a severe abdominal operation.

Every organ should be thoroughly examined and the urine analysed before proceeding to hysterectomy.

Choice of Operation.—A. **Vaginal Operations:** (1) **Morcellement.**—The absolute indication for this operation is the sloughing, gangrenous, submucous myoma. The putrefactive portions of the growth which occupy the vagina, and sometimes protrude outside the vulva, must be cut away with scissors; the upper intrauterine part of the

tumour often requires removal by first cutting up the growth piecemeal with Segond's instruments. Splitting of the cervix is sometimes necessary before a submucous sessile tumour can be enucleated, or before morcellement is possible.

I have on a few occasions performed vaginal myomectomy by morcellement for large submucous tumours reaching up to the umbilicus, but have been disappointed as regards future fertility after this operation. The youngest case was that of a married woman, aged twenty-two years and six months: a portion of the cystic tumour is shown in Figure 57, page 51. For this case I removed a large cervix-myoma by panhysterectomy two years later (see Fig. 153, page 208).

In another case the tumour was very hard and the operation prolonged; but although the uterus was saved, it proved a useless organ as regards conception.

(2) **Posterior Colpotomy and Myomectomy.**—Following a correct diagnosis for pedunculated subserous myoma lying in the pouch of Douglas as a solitary uterine tumour, myomectomy is a very neat and commendable operation which I can recommend from personal experience (see Fig. 147, page 185). In such a case there is no need for opening the abdomen if the vagina is sufficiently patulous.

(3) **Vaginal Hysterectomy.**—Even the smaller myomas are now generally removed *per abdomen*, since the old objections raised against the upper route, based largely on the risk of incisional herniae and the intervention of peritonitis, are becoming more and more rare owing to improvement in technique, *i.e.* suture in layers, paramedian and oblique incisions (Küstner Pfannenstiel), asepsis, protecting of the wound-edges by rubber or tetra-cloths.

Nevertheless there are still some operators with a preference for the vaginal route, and I for one frequently employ it, largely from the stimulus received from the study of Wertheim and Micolitsch's *Vagino-peritoneal Operations*.

After performing more than 100 vaginal hysterectomies without a death, my confidence in the operation has been assured.

B. Abdominal Operations

(1) **Myomectomy.**—The retention of the uterus and the removal of the myoma would seem at first sight to be the ideal treatment for these growths, but as a matter of practical experience this procedure is found to have a limited field of utility. Myomas are very frequently multiple, and often subserous, interstitial, and submucous growths exist concurrently; and when several tumours are removed from one and the same uterus the latter is reduced to a useless organ, and, moreover, it may become the seat of subsequent growths. Only in cases where there are one or two growths is the operation of myomectomy applicable. It has also been sometimes noted that the uterus after myomectomy becomes sensitive, if not actually painful. Engström, whom I visited in Helsingfors in 1913, stated that he had found myomectomy more dangerous than hysterectomy, the mortality being 5 per cent higher. Exception to the above remarks must, however, be taken in favour of removing pedunculated subserous growths in this way. The tying off of a pedicle and its oversewing is a very easy and rapid procedure, and the uterine body is sometimes scarcely influenced by these growths, so that when no other tumour exists, the removal of a fairly normal organ is not indicated, especially if the patient be advanced in years.

(2) **Supravaginal Amputation.**—This is the operation which has raised hysterectomy to the zenith of its fame, and in this connection the name of Baer of Philadelphia, who showed the danger of constricting the neck of the uterus with ligatures, must never be forgotten. The results from this operation, in the hands of Kelly and

Cullen, at the Johns Hopkins Hospital, Baltimore, from July 1, 1906, to January 1, 1909, were: Cases 192; deaths 2, *i.e.* just over 1 per cent. The cause of death in one case was post-operative intestinal obstruction on the twenty-second day. The other case was that of a woman aged 44 years, with general peritoneal carcinoma as a complication to the myomatous uterus.¹

The majority of surgeons are in favour of this operation. It is undoubtedly a *quicker* operation than total extirpation, largely because haemostasis is simpler and more easily attained, and there is less risk of infection from the vagina. Indeed it is perfectly obvious why this operation is more popular than panhysterectomy: it is the *easier* operation; it only takes half an hour from start to finish when carried out by Kelly's method. The uterus which is figured on page 111 was amputated by Howard Kelly with my assistance in less than sixty seconds; but of course such lightning dexterity must not be the ambition of any but the most accomplished operators.

It is, moreover, claimed that the integrity of the vaginal vault is a matter of importance in married women, and that shortening of this passage is bound to occur if the *portio vaginalis* is removed; but the latter statement is not correct for those cases where the corners of the vagina are joined up to the lateral stumps (round ligaments). John Bland-Sutton says: "I have a decided preference for the subtotal operation, *especially in spinsters and barren wives.*"²

In the statistics quoted above of the Johns Hopkins Clinic all the hysterectomies performed for the three years 1906-1909 were supravaginal amputations ("abdominal hystero-myomectomies").

(3) **Abdominal Panhysterectomy.**—This is not infrequently the operation of *necessity*. It is notably so, when the

¹ Kelly and Cullen, *Myomata of the Uterus*, 1909, page 687.

² *The Position of Abdominal Hysterectomy in London*, 1909.

lower pole of a large myoma has expanded the cervical canal and drawn up the *portio vaginalis* to form part of a capsule.

It is the operation of *choice* in all septic cases, e.g. pyosalpinx, suppurating ovarian tumours, and in infected myomata.

In such cases most operators will prefer to have an open vagina for free drainage, and except in the worst examples this will suffice, and there will be no need to drain *per abdomen*. The question arises, ought this longer and more serious operation to become the routine practice, and ought the subtotal method to be abandoned? Opitz, from an analysis of statistics compiled from German sources, comes to the conclusion that *the risk of the two operations is about the same*.¹ The great argument in favour of total hysterectomy is based on the occurrence of malignancy, especially in the cervix. The rigid adherents of the amputation-method plead that carcinoma of the body can be detected by having the uterus cut open by an onlooker after its removal; the cervical stump can then be removed, if malignancy of the body is discovered. As a counter-argument it might be urged that sarcoma in a myomatous uterus is not so easy of detection as a carcinoma, whilst it is of great importance as regards panhysterectomy. Another point advanced by the supravaginal operators is that cancer of the cervix should be detected before operation, by inspection, or in the case of an insidious intracervical growth its presence should be suspected owing to the character of the haemorrhage. I have found that in certain instances both these tests have failed to suggest the least suspicion of cancer of the intracervical portion, and only on amputation of the cervix was I able to discover the malignant area. I have seen the uterus divided at its neck for sarcoma, in the belief that the disease was

¹ E. Opitz, "Myomoperationen," in Menge-Opitz, *Handbuch der Frauenheilkunde*, 1913, page 617.

myomatous only. Twice at the Samaritan Hospital in one year I saw cancer of the cervix in cases where the uterus had been amputated for myoma. In one I removed the cancerous stump $2\frac{1}{2}$ years after the hysterectomy for myoma, and it proved to be one of the most difficult operations I have ever been called upon to perform; and the patient left hospital with a vesico-vaginal fistula. In the other case nothing but an exploratory laparotomy was done, the case proving hopeless.

Herbert Spencer, in his article on "Hysterectomy" in Allbutt and Eden's *System of Gynaecology*, 1906, collected twenty-eight cases (excluding Péan's "several times") in which cancer or sarcoma developed in the cervix subsequent to supravaginal amputation; and it is well known that Spencer is a strong advocate for the giving up of the amputation-method altogether. Up to 1906 Spencer had removed forty-three myomatous uteri by total abdominal hysterectomy, with one death (from embolism).¹ Up to 1914 I had performed abdominal panhysterectomy for myoma fifty times, with one death, also from embolism. John Bland-Sutton says: "This tragic mode of death [from embolism] is more frequent after total than after subtotal hysterectomy." He mentions also that it occurs in 1 per cent at least of the patients who have abdominal hysterectomy performed for myoma. It occurred in three only out of John Bland-Sutton's own series of 1500 abdominal operations for these tumours, and elsewhere² this author states the number of panhysterectomies he has performed is 200; but we are not told in which series of cases (the amputations or the extirpations) pulmonary embolism occurred.

In the Kelly and Cullen amputation-series it occurred four times in 901 cases.

¹ *Loc. supra cit.* page 904.

² *The Position of Abdominal Hysterectomy in London*, 1909.

Since my sad experience with cancer of the cervix following supravaginal amputation, I have, as a routine, removed the neck of the womb; but for spinsters and elderly married nulliparae, *i.e.* in patients in whom the risk of cancer occurring in the cervix is reduced to a minimum, the retention of the simpler and more expeditious operation will, as a rule, not only suffice, but will prove the best procedure from every point of view. The cervix should be amputated low down, and perfect haemostasis should be assured.¹ I am well aware that the advice to retain the supravaginal operation will be regarded as retrograde by many critics. Spencer wrote in 1906² that "the operation of removal of the whole uterus is destined to replace the supravaginal amputation, as the intraperitoneal treatment of the stump replaced the extraperitoneal," that is to say, absolutely. This prediction has largely come true as far as German operators are concerned, but that the supravaginal operation will be reserved for certain elderly cases I have not the slightest doubt.

The Ovaries in Hysterectomy

In the technique adopted by Baer, and published in 1892, total ablation of the ovaries was practised. Five years later John Bland-Sutton advocated their retention wherever such a course was possible, on the grounds that the possession of these organs after hysterectomy secured for the patient "a more rapid and satisfactory convalescence," and "rescued her from the inconvenience of an acute menopause."³

At this time (1897) John Bland-Sutton deemed it essential to leave both ovaries, but in writing again upon the same subject in 1909 he states: "Since 1906 I have modified

¹ Bland-Sutton, *Fibroids of the Uterus*, 1913.

² Allbutt and Eden, *System of Gynaecology*, page 901.

³ *Trans. Obst. Soc. London*, vol. xxxix. page 296, paragraph 6.

the method by leaving only one ovary, even when both are healthy, and find that the immediate good consequences of the operation are in no way impaired."¹ The same author brings up the subject once more in 1913, saying it is now admitted by those surgeons in London who have had much experience in hysterectomy for fibroids, that the immediate results of preserving at least one healthy ovary in this operation are admirable, especially to women under fifty years of age; for the retention of an ovary is of striking value "in warding off the severity of an artificial menopause" (Crewdson Thomas).

John Bland-Sutton is also of the opinion that the retention of an ovary is important from the point of view of sexual relations in women who are married, and for those who are single, from the point of view of nubility. John Bland-Sutton has found a retained ovary with a ripe corpus luteum in a patient upon whom he had performed subtotal hysterectomy nine years previously.

Kelly and Cullen's view is that when the appendages are normal, it is our duty to save the ovaries on both sides if possible. They give a table of 56 cases in which one or both ovaries had been retained. Only patients up to forty-one years of age were written to with regard to post-operative symptoms; 51.8 per cent of the patients suffered from hot flushes of varying severity and duration. These in most instances appeared at the time the menstrual flow would normally have been present. In four the hot flushings did not appear for *several years after operation*, when the ages of the patients were 49, 43, and 42 respectively, so that this phenomenon strongly suggested the onset of the *normal menopause*. In 48.1 per cent of all the cases no hot flushes were noted. In two cases there was bleeding from the nose (? vicarious menstruation). In four vaginal bleeding

¹ *The Position of Abdominal Hysterectomy in London, 1909.*

² *Loc. supra cit.*

occurred ; in one of these menstruation reappeared three years after operation, and continued each month for two years.¹

In one of my own cases a slight show of blood each month indicated that the ovaries were active five years after high amputation of a large myomatous uterus.

At the present time opinion is not unanimous either in London or in the English provinces on the subject of saving an ovary : three operators of large experience are known to me as making it their practice to remove both organs completely. My own feeling is one of profound respect for the part played by ovarian tissue in convalescence after hysterectomy in the case of younger women.

With regard to the value of the appearance of the menses after abdominal operations for myoma, opinions have differed considerably. My colleague, Alban Doran, considered it of importance that a portion of the mucous membrane of the body should be retained, and practised the Abel-Zweifel technique in order to secure the continuance of the menstrual flow.

Jung seems to favour the same view, since he stated at Halle (May 1913) that several of his patients menstruated after operation. He made use of this fact as an argument against producing amenorrhoea by X-rays. It would be difficult to prove that any physical advantage accrued from the Abel-Zweifel partial hysterectomy, and as regards the mental effect, if a patient is told that she will never menstruate again it does not appear to be a cause of worry to her.

¹ *Myomata of the Uterus*, Kelly and Cullen, pages 603-605.

PART II
ADENOMYOMA

CHAPTER I

ADENOMYOMA

I. INTRODUCTION

THE term 'adenomyoma' implies a new formation composed of gland-elements, hyperplastic cellular connective tissue, and smooth muscle. Such a 'tumour' or mass of tissue is not confined to the female genitalia: so far as the adenomatous elements are concerned, the same type of tumour-formation is to be found also in the digestive tract (bowel and stomach), and some observers claim that analogous conditions can exist in the gall-bladder, in the kidney, and elsewhere. There is no doubt, however, that the female pelvic organs form the site of election of epithelial *myomatous* tumours, and it is in connection with the uterus, tubes, and adjacent structures that these 'adenomyomas' have received particular attention.

Until the year 1894 there are very few reliable records of myomas containing cysts lined by epithelium. Cullen mentions that about one hundred had been recorded under various titles up to 1896, but only a few of the most important need here be given. In 1882 Babes¹ described an intramural myoma lying in the fundus of the uterus of a patient aged 91 years. It contained cysts lined with low cubical epithelium "derived from embryonic germs." In 1883 Diesterweg described two polypi on the posterior uterine wall as containing cysts lined with ciliated epithelium

¹ "Über epitheliale Geschwülste in Uterusmyomen," *Allgem. Wiener med. Ztschr.*, 1882, xxvii. pages 36-48.

and filled with blood. Two years later a similar tumour, the size of a man's fist, was removed; it also contained cysts lined by ciliated epithelium.¹ Schroeder in his *Handbuch der Krankheiten der weiblichen Geschlechtsklagen*, describes a cystic polypus containing ciliated glands, which C. Ruge and Schroeder thought were snared uterine glands. Breus² records a case of a voluminous tumour which contained 7 litres of fluid, and on section presented many cysts lined by ciliated epithelium. The general structure was that of a myoma which had spread out into the broad ligament. There was a second growth, the size of a child's head, in the posterior wall of the uterus, and this communicated with the cavity of the uterus by a canal.³ There were spaces lined by ciliated mucous membrane, and these were all in communication one with the other. Breus regarded it as a tumour of Gartner's duct.

It was in the year 1896 that full interest in the subject was aroused by the appearance of Friedrich von Recklinghausen's magnificent work, *Die Adenomyome und Cystadenomyome der Uterus und Tubenwandung*.⁴ Prior to this date the same author had published two instructive articles, one in 1893, *Über die Adenocysten der Uterustumoren und über Reste des Wolfschen Organs*,⁵ and one in 1895, *Über Adenomyome des Uterus und der Tuba*.⁶

This observer's final conclusions were that adenomyomas should be divided into two classes:—

(1) Those situated at the periphery of the uterus and in the tube (see Figs. 166, 167, 168). (2) Those arising centrally (see Fig. 169, page 270, also Fig. 224, page 392). The former were derived from a numerical increase of the Wolffian tubules, and the latter from the uterine mucous

¹ "Ein Fall von Cystofibrom uteri verum," *Zeitschr. f. Geb.*, 1883, Bd. ix, S. 191.

² *Über wahre epithelführende Cystenbildung in Uterusmyomen*, 1894 (Wien).

³ See also Figures 225 and 226, pages 395-396.

⁴ Berlin, Hirschwald, 1896. ⁵ *Deutsche med. Wochenschr.*, 1893, S. 825.

⁶ *Wiener klinische Wochenschr.*, 1895, No. 29, S. 530.

membrane. Von Recklinghausen considered that the latter were rare and that they were prone to undergo cancerous degeneration, since he had seen three cases in which this malignant change had occurred.¹ His investigations were based on the examination of thirty-four uterine and tubal growths. He stated that these growths were only found in the uterus and tubes and in places where foetal elements (*e.g.* the round ligament) contained well-marked layers of muscle-tissue. They were mainly intraperitoneal, of limited size, generally in the peripheral muscular layers, encroaching on the peritoneum and exciting round-celled infiltration in the neighbourhood, as evidenced by connective-tissue adhesions. He noted that cystadenomyoma may form and spread deeply even in the connective tissues. The tumour,

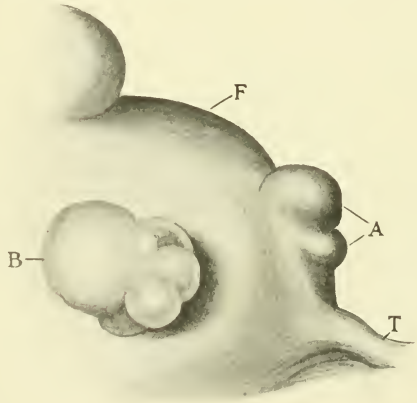


FIG. 166.—Showing *A*, solid adenomyoma situated near the uterine cornu ; *B*, small peripheral cystic adenomyoma ; *T*, Fallopian tube ; *F*, uterine wall. (After Ribbert.)

he said, had the appearance of an infiltrating fibroid diffusing itself in the muscle-walls. Four varieties were described by von Recklinghausen :—

(1) *Hard*, in which the muscle-tissue is in excess of the gland-elements.

(2) *Cystic*, with spaces visible to the naked eye, possessing gland-tissue and muscle in equal amounts.

(3) *Soft*, in which the gland-tissue appears microscopically as islands and is the predominating feature.

¹ See Author's conclusions on the question of malignancy, page 432.

(4) *Telangiectatic*, soft, very vascular growths, which are almost devoid of cysts.

Von Recklinghausen noted that adenomyomas were commonest in the *posterior wall* of the uterus, and when they occurred in the tube the ventral aspect of the proximal

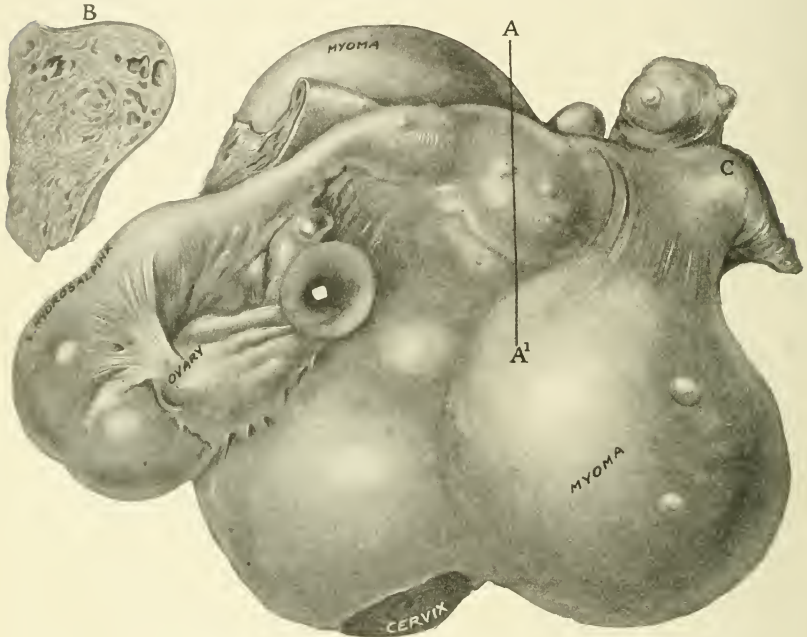


FIG. 167.—Showing adenomyoma of both uterine horns; discrete myomas, diffuse adenomyoma of uterus. ($\frac{2}{3}$) (Reproduced from Cullen's *Adenomyomata of the Uterus*, Fig. 65, page 240. By permission.)

A.A' = line through which section *B* was made; *C* = right-sided smaller cornual adenomyoma. *N.B.*—The gland-spaces in *B* are largest at the periphery. This is the type of growth on which von Recklinghausen based his Wolfian theory. It also corresponds with Chiari's and von Franqué's "salpingitis isthmica nodosa," but, in addition, there is a diffuse adenomyoma of the whole corpus uteri.

end of the tube (tubal angle) was the site of election. Histologically he regarded these masses as 'organoid tumours'¹ in which the whole structure of a glandular apparatus could be traced, and he made use of Mihálovic's

¹ As opposed to 'histoid' tumours.

description of the component parts of the mesonephros in order to show the resemblance of these growths to this foetal organ. Thus in an adenomyoma, just as in the mesonephros itself, there were to be seen—

(a) Narrow, straight canals with ciliated epithelium analogous to *collecting tubules*. (b) Wide tortuous tubes with lower epithelium—*secreting tubules*. (c) Distension of tubules—*ampullae*. (d) Rounded ends—*end-bulbs*. (e) Fusion of many tubules to form a principal canal. Parallel col-

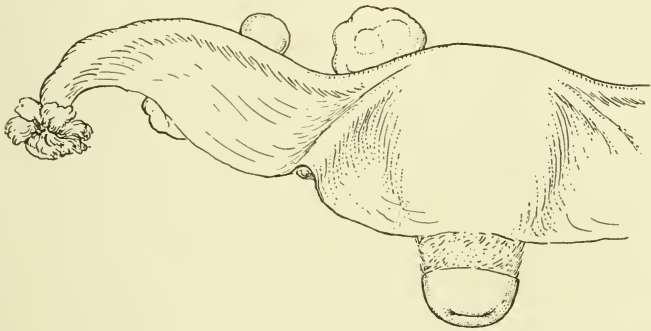


FIG. 168.—Diagrammatic representation of a small cornual adenomyoma containing cystic gland-spaces which are shown in Fig. 39, Plate VI., page 45.

lecting tubules often opened only upon *one side of a principal canal*, producing a pectinate arrangement like that seen in the parovarium and in the paroöphoron. (f) The canals showed:—

(1) A discrete arrangement (*zerstreute Ordnung*), being independent, free, and separate; these were fewer in number.

(2) The more numerous showed an aggregate arrangement (*geschlossene Ordnung*), all running into one another.

Another typical feature was the *cytogenous connective-tissue* which covered the canals and in which they lay embedded (His's lymphadenoid ground-substance). Around cysts it was reduced to a minimum, the epithelium lying

directly on the muscle. Rounded elevations within some of the cystic spaces were regarded as *pseudo-glomeruli*, and to them was attributed the function of secretion and of allowing diapedesis of red discs, which latter were found, together with yellow and brown pigment ("Herzfehler-

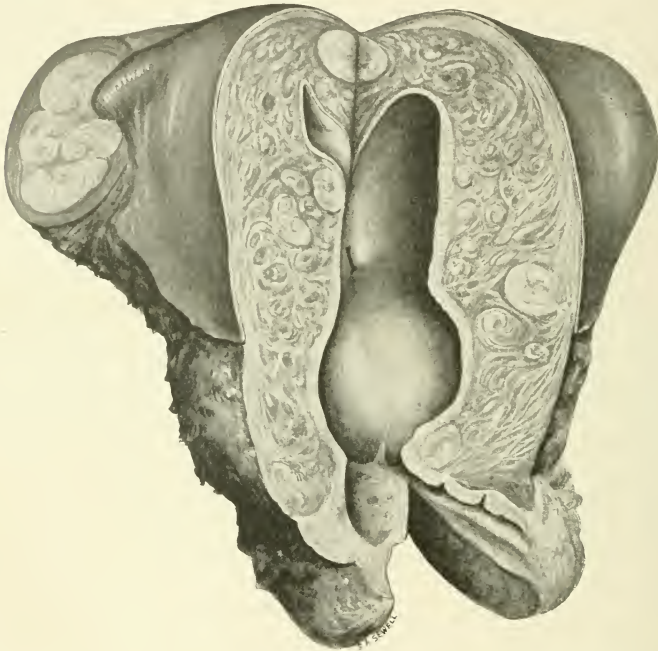


FIG. 169.—Showing a diffuse adenomyoma of the uterine body involving the entire walls.

zellen") and hyaline bodies, in the stroma surrounding the cysts (see Figs. 170 and 171).

Von Recklinghausen argued that as there were no glands in the oviducts, these adenomyomatous structures found at the tubal angle could not arise from tubal mucosa, but were derived from the Wolffian duct. The description he gives of his second variety, *i.e.* the *centrally situated growth*,

holds good to this day. It was a case of a large adenomyoma of the anterior uterine wall supplied by W. A. Freund. It lay "like a hard fruit-stone in a soft fleshy shell." On its mucous surface were seen about eighty ingrowing crypts; into these the mucous membrane passed,



FIG. 170.—Showing 'pigment-bodies' within the gland-tubules of an adenomyoma. (From F. v. Recklinghausen's monograph, *Die Adenomyome und Cystadenome des Uterus*, Taf. xi. Fig. 1, Case xvi. Adenomyoma of the right tubal angle and hydrosalpinx. From a patient who died of syphilitic pachymeningitis and leptomeningitis cerebri.)

a = dilated glands; *p* = 'pigment-bodies'; *m* = muscle.

dipping for 10, 15, 30 mm. into the growth. There were no peritoneal adhesions.

Two years later, at a meeting of the medical section of the Naturwissenschaft Medicinischer Verein, held in Strassburg, December 3, 1898, we find von Recklinghausen advancing his theory to explain an adenomyoma situated

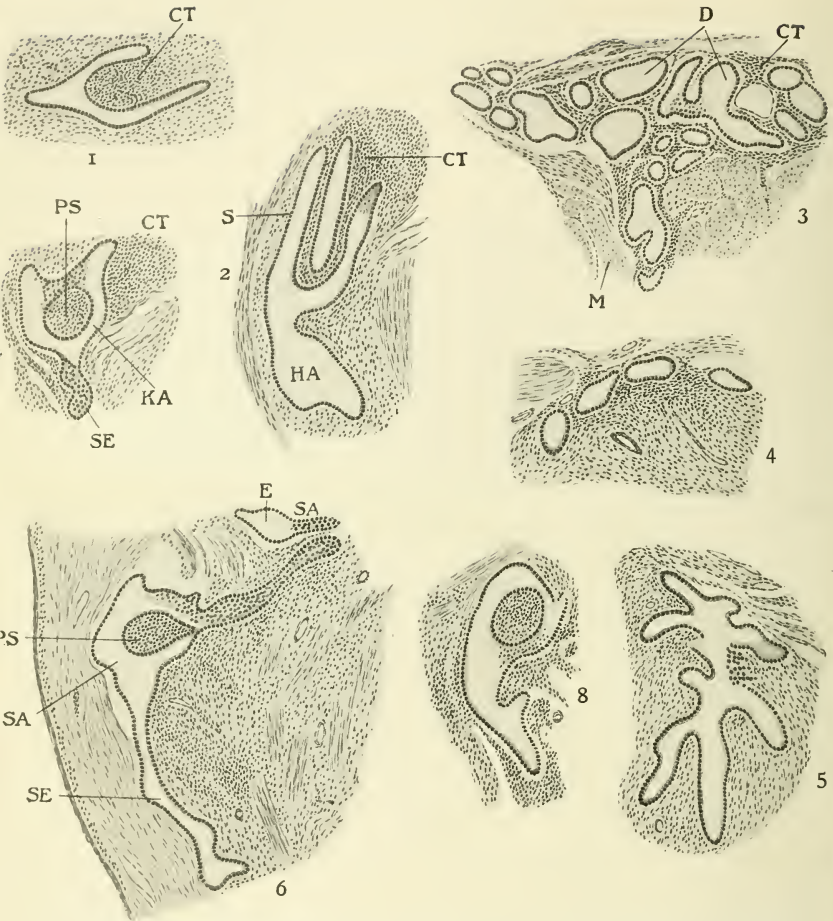


FIG. 171.—Showing eight sections from the periphery of an adenomyomatous nodule drawn by Ludwig Pick to demonstrate the "organoid" morphology which these growths were supposed to possess.

(From Ludwig Pick's article, "Ein neuer Typus des voluminösen paroöphoralen Adenomyoms," *Archiv für Gyn.* Bd. liv, S. 117.)

1. Split between two parallel limbs, supposed to represent a "loop" of a Wolffian tubule. CT=commencing formation of cytogenous tissue. 2. A sinuous branched "principal ampulla," HA; with three parallel "collecting tubules," S. 3. Island without marked "ampulla." D=dilated gland-tubules; CT=cytogenous tissue; M=muscle. 4. "Gänsemarsch" or single file of four tubules. This is a process of the "collecting tubules" seen in Fig. 6. The tubules are lying in cytogenous tissue. 5. Shows a "principal canal" which is provided with numerous branches. 6. Slightly tortuous "secretion-tube" (SE) expanding into an irregular "ampulla" (SA). In this "ampulla" lies a "pseudo-glomerulus" (PS), and from it a "collecting tube" (SA) runs parallel for a short distance and then terminates in an olive-shaped "end bulb" (E). 7. Twisted "secreting tubule" (SE) with "end-bulb ampulla" (KA); in this is a "pseudo-glomerulus" (PS). CT=cytogenous tissue. 8. The same as 7 from another aspect. 6, 7, and 8 are figures representing that part of the growth which lay directly underneath the peritoneum.

at the base of the right *labium majus*, which was said to have a definite connection with a hypertrophic round ligament.

The patient was a V-para, aged 49 years, who had worn a truss for three years, and had noticed the growth for a year and a half. Its size was $3\frac{1}{2} \times 3 \times 2$ cm. It became *painful during menstruation*. It consisted of gland-

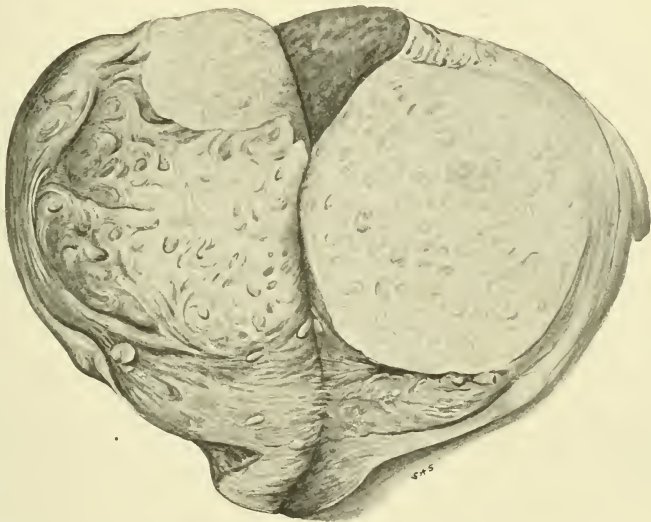


FIG. 172.—Showing an adenomyoma in the posterior wall of a uterus which has preserved its normal contour. The uterus has been opened from below.

spaces surrounded by a cytogenous mantle, and contained cystic spaces.

The author remarked that the occurrence of these glandular invasions in tumours which lie outside the inguinal canal, at the point of attachment of the round ligament to the *os pubis*, afforded valuable support for that theory which refers this kind of growth to an origin from *mesonephric elements*. Since the round ligament, according to Wieger, sprang from the distal end of the kidney, passed

by the ovary as the true ovarian ligament to reach the uterine end of the tube, and from thence became the round ligament of the uterus, it could carry with it separated portions of the Wolffian body even to its distal parts in the depths of the *mons Veneris*. It was much more difficult to understand how the round ligament could annex and incorporate gland-elements from the uterine canal or from the canal of Müller's ducts.

Inasmuch as the round ligament arose from the whole streak of the Wolffian body, it was a natural conclusion to assume that these bodies supplied the gland-tissue. The mechanism of transportation of the gland-elements to a distance found a good analogy in the male sex, where the descent of the testicle was effected by the *gubernaculum Hunteri*.

This is an example of the close reasoning so characteristic of von Recklinghausen, which brought him so many adherents. In fact, even to this day it is complained that "the Wolffian theory dies hard" (Bland-Sutton). For example, Meyer, although he holds strong views of his own, admits that Gartner's duct may give rise to adenomyoma in the adult uterus. Ludwig Pick (who, like Breus and Voigt, held this view theoretically before von Recklinghausen's work appeared) stated in 1897 that the mesonephric origin of adenomyoma was now definitely established by fundamental proof,¹ and he illustrates in his article, *Ein neuer Typus des voluminösen paroöphoralen Adenomyoms*, all von Recklinghausen's points of detail, including the 'collecting tubules' and 'pseudo-glomeruli,' etc. (see Fig. 171). Pick was evidently a thorough convert to the Wolffian theory, and he took his stand on von Recklinghausen's "statement of facts" in spite of the long array of supporters of the Müllerian theory.

Up to 1896 the *Müllerian* origin of adenomyoma

¹ *Archiv für Gynäk.* Bd. liv. S. 119.

had been generally accepted. The supporters of this view included Diesterweg, Schroeder, C. Ruge, Babes, Schottländer, Hauser, Strauss, Orloff, Ricker (for the uterus), and A. Martin, Orthmann, Chiari, Baraban, Pilliet (for the tube).

II. THE INFLUENCE OF VON RECKLINGHAUSEN ON THE QUESTION OF AETIOLOGY

After 1896 von Recklinghausen's views caused a change of opinion in regard to the derivation of the epithelium of adenomyoma; the older Müllerian theory lost favour, and we find several cases recorded as *Wolffian* or *paroöphoral*. A few examples illustrating this fact may be given. Pfannenstiel mentions a case of a true adenomyoma of the posterior vaginal wall, and another in the inguinal canal of the same patient, which he regarded as being derived from the remains of the paroöphoron.¹ Schickele² mentions a growth in the recto-vaginal septum at the level of the *portio vaginalis*, which he said arose from Wolffian remains, and added that he regarded a labial growth described by Cullen as being mesonephric also. Aschoff³ described an almond-shaped growth of the left *labium majus* as of Wolffian origin; he also mentioned an interesting case of an *adenofibroma in combination with a parovarian cyst*, neither having any connection with the uterus, and therefore shown topographically to be Wolffian in origin.

Hartz⁴ records a retroperitoneal tumour, the size of a man's head, in the region of Douglas's pouch; it was adherent, and pushed the uterus to the right, also elevating the pelvic colon. Rabl and Hartz agreed that it arose from Wolffian remains.

Krönig⁵ describes "*ein retroperitoneal gelegenes voluminöses*

¹ "Über die Adenomyome des Genitalstranges," *Verhandl. der deutsch. Gesell. f. Gyn.*, Leipzig, 1897, S. 195.

² *Zentr. f. all. Path. und Anat.*, 1904, xv. S. 275.

³ *Monatsschr. f. Geb. u. Gynäk.*, 1899, Bd. ix. S. 25.

⁴ *Ibid.*, S. 813.

⁵ *Hegar's Beiträge*, 1901, Bd. iv. S. 61.

Polycystom entstanden aus Resten des Wolffschen Körper." The tumour was pedunculated and adherent; it pushed up the uterus, adnexa, and sigmoid; it contained a litre of brownish-red material, and the cysts were lined by low cubical epithelium. The structure showed 'Herzfehlerzellen' and 'pseudo-glomeruli,' and was therefore considered to be Wolffian in origin.

Nebesky¹ mentioned a voluminous peripheral tumour of the posterior uterine wall which he considered arose from the paroöphoron (Wolffian).

Füth² recorded the case of Ouren of Trondhjem, Norway. It was a retroperitoneal growth situated in the recto-vaginal septum. Schickele reports this author as holding this growth to be of mesonephric origin, but on looking up the original papers I find Füth inclined to the view "that it cannot be denied that the gland-elements arose from Müller's ducts."

Neumann³ advanced "proofs" in favour of the Wolffian theory.

III. THE DECLINE OF THE WOLFFIAN THEORY AND OF EMBRYONIC THEORIES IN GENERAL

Cullen was the first to lay emphasis on the origin of adenomyoma from the mucous membrane of the uterus. His first observations were made in 1894 and published in 1896.⁴

Pick quoted Cullen's work, and by admitting a difference "between the mucosal and the paroöphoral adenomyomas" acknowledged the accuracy of Cullen's finding;

¹ "Kasuistischer Beitrag zur Kenntniss der Adenomyome des Uterus," *Archiv f. Gynäk.*, 1903, Bd. lxxix. S. 339.

² "Zur Kasuistik der Adenomyome der Uterus," *Zentr. f. Gynäk.*, 1903, Bd. xxvi. S. 626.

³ "Über einen Fall von Adenomyoma ut., etc." *Archiv f. Gynäk.* Bd. lviii. S. 594.

⁴ "Adeno-Myoma Uteri diffusum benignum," *Johns Hopkins Hospital Report*, vol. vi. page 133.

but like von Recklinghausen he erroneously regarded the type described by Cullen as being the exception rather than the rule.

Shortly after the appearance of Cullen's first article, and immediately following on that of Pick, there appeared a very important contribution from the pen of R. Kossmann of Berlin, entitled *Die Abstammung der Drüseneinschlüsse in der Uterus und der Tuben*, 1897.¹ The views of von Recklinghausen, which had been ably supported by Pick and the other authors given above, were most vigorously opposed by Kossmann. Von Recklinghausen had argued against the Müllerian theory, on the ground that the spread of adenomyoma did not occur along the whole length of Müller's ducts, but stopped short at the internal os, implying thereby that all Müllerian inclusions arose from the mature uterine mucosa (a point to which Kossmann immediately took exception). Why was it that the cervix which was supplied with the largest glands failed to produce adenomyoma, and why were the tubes which were devoid of glands the site of election of these growths?—thus questioned von Recklinghausen. Kossmann answered that, as a matter of fact, *cysts* of the cervix were common, *myoma* of the cervix was relatively rare; it was therefore not surprising that no cervical adenomyoma had been found.

Then as regards the tube, Kossmann drew attention to the glandular inclusions he had met with in *sactosalpinx haemorrhagica* and in *sactoparasalpinx serosa*, to show that the pathological tube could supply what the healthy tube did not, viz. gland-elements within muscular tissue. Kossmann's explanation of these inclusions was, that they were derived in 4-10 per cent of cases from accessory tubes and were therefore Müllerian, so that the absence of glands in a normal tube was no argument against the Müllerian theory. The other arguments of von Recklinghausen

¹ *Archiv für Gynäk.*, 1897, Bd. liv. S. 359, 381.

were based on the *localisation* of the tumour in relation to the mucosa; he had said that it was only seldom connected with the mucosa, that it was mostly met with in the outer muscle-layers, that in the interstitial part of the tube it lay outside the tubal muscle altogether, and that sometimes it was even completely subserous, *i.e.* between the folds of the mesosalpinx. Kossmann attached no importance to these arguments. Large growths occupied *all* the layers of the uterine wall. The continuity of the tumour with the mucosa may be cut off in various ways, and it will fail completely when *accessory Müllerian glands* within the uterine wall are the source of the growth.

The last of von Recklinghausen's arguments was the localisation in the dorsal wall (see Fig. 166, page 267), but Kossmann had himself shown exceptions to this being a "regular occurrence" (von Lockstaedt's and Neumann's tumours were in the anterior wall, so was one of von Recklinghausen's) (see Fig. 226, page 396). Whilst admitting, however, that the exceptions were not numerous, Kossmann added that the dorsal wall was the site of election for myoma also. Why should this preference for the posterior wall be advanced as an argument against the Müllerian theory? In similar manner Kossmann assails von Recklinghausen's imaginary picture of the minute anatomy of adenomyoma, and utterly tears in shreds the pretty 'organoid' tumour with its 'Gänsemarsch,' 'Pigment-Körper,' 'Pseudo-glomeruli' and 'collecting tubules.' Kossmann's own theory was that these growths arose from *accessory Müllerian ducts* lying in the uterus and in the tube. He states that he could not convince Robert Meyer, who "held fast to the correctness of von Recklinghausen's hypothesis."¹

¹ *Archiv für Gynäk.* Bd. liv. S. 382.

IV. THE GRADUAL ASCENDANCY OF CULLEN'S MUCOSAL THEORY. THE RELATIONSHIP OF THIS THEORY TO INFLAMMATION

Although Kossmann was instrumental in destroying the enthusiasm displayed for the Wolffian theory, his own substitute appears to have proved far less popular. In 1902 Baldy and Longscope,¹ who strongly supported Cullen's views, remark, "It seems unnecessary to insist, as Kossmann does, upon an *accessory* Müllerian duct"; but they further add, "The theory which von Recklinghausen holds, appears improbable for the vast majority of cases." The above authors quoted the very interesting work which had already been done by von Franqué upon adenomyoma of the Fallopian tube.² This observer early came to the conclusion, which afterwards received strong support, notably from Robert Meyer, that the essential epithelial features of these growths were derived, not from accessory tubes, as stated by Kossmann, but from the mature *mucous membrane*, by a process of *inflammation*. In answer to the question, Why does the mucosa infiltrate?—and there are plenty of naked-eye demonstrations of the fact that it does do so—von Franqué led off by demonstrating the process in the Fallopian tube in cases of salpingitis nodosa (see Fig. 181, page 309). He found adenomyoma of the tube in cases of chronic, partly healed, tuberculous salpingitis; and in the chronic inflammation of the tubal mucosa he traced the epithelial elements of the tumour to an infiltrative proliferation of the tubal epithelium in the inflamed wall. Von Franqué admitted that the Wolffian theory explained a few of the cases, whilst inflammation accounted for most. Felix Legueu and Marien of Montréal, as representatives of the French school, had adopted the same view as regards the *inflammatory origin* for

¹ *Amer. Journ. Obst.* vol. xlv. p. 801.

² O. v. Franqué, "Salpingitis nodosa isthmica und Adenomyoma tubae," *Zeitschr. f. Geb.*, 1900, Bd. xlii. S. 41.

uterine growths.¹ They described an adenomyoma of the uterus in which chronic inflammation of the mucous membrane was said to have been noted, and they inferred a causal relationship between the two. So far as I can find, this is the first time that the inflammatory factor was suggested in the causation of the *uterine* 'growths,' and it will be noted that this was only one year after von Recklinghausen's Wolffian theory was published. That it received no immediate support seems obvious, for as late as 1902, Baldy and Longscope of Philadelphia stated that "little weight can be attached to these conclusions" (so far as the uterine growths were concerned), "since chronic endometritis is not particularly common in connection with these tumours." These authors, however, cautiously avoid criticising von Franqué's later work (1900) on the same process occurring in the tubes.

It is possible to trace a gradual shifting of the point of view of the origin of adenomyoma from foetal relics (the dystopic epithelium of Meyer) to mature mucosa (orthotopic epithelium of Meyer), but in collating the investigations up to the year 1904, Schickele still held to the Wolffian theory as expressed by von Recklinghausen;² and in *Virchow's Archiv*, Bd. lxiv., this author (Schickele) again calls attention to von Recklinghausen's point that the tube has no glands from which such a growth as an adenomyoma could arise. After this we hear less and less about the foetal remains; in fact there appears a whole array of opponents to the Wolffian theory, and, as stated before, Kossmann's substitute of the accessory Müllerian ducts as an aetiological explanation for the majority of adenomyomata was likewise soon discarded—if, indeed, it ever received any confirmation at all. Kossmann's work stands out as an admirable example of destructive criticism, but as a con-

¹ *Ann. de gyn. et d'obstét.*, 1897, page 134.

² *Zentr. f. path. Anat.* Bd. xv. S. 261.

structive effort it cannot be said to have succeeded. In ramming von Recklinghausen's craft, Kossmann sank his own also.

In the next year (1898) we find Paul von Lockstaedt of Königsberg describing his seventh case as derived from *mucous membrane*, and his fifth case as being serosal (peritoneal) in its origin—this author thereby refusing to accept the foetal-relic explanation altogether; and he moreover agrees that Legueu and Marien's case was “undoubtedly from the mucosa of the uterus.” Lockstaedt remarks that “the number of *mucosal* growths in comparison with that of the so-called paroöphoritic (*Wolffian*) adenomyomas has greatly increased.”¹

In this great *Streitfrage* it is particularly interesting to watch the evolution of the important part played by Professor Meyer of Berlin, and his final conclusions carry the greater weight from the fact that all through the controversy he kept an open mind, ready to receive new impressions, and to accord fresh findings their full value; being untrammelled by prejudice, he was candid enough to admit a change of views as occasion required, and he seemed able to do this without loss of dignity or prestige. As already mentioned, Kossmann failed to make a convert of him, and in 1897 Meyer opened an excellent discussion, *Zur Genesis der Cystadenome und Adenomyome des Uterus*, which is recorded in full.² He then explained some of his cases on von Recklinghausen's theory, but stated that as his (Meyer's) first case was opposed to the *Wolffian* hypothesis, “this opposition occasioned his further work” (*l. inf. cit.*²) (page 349).

It is clear that at this time (1897) Meyer's opinion was equally divided between the *Wolffian* theory of von

¹ Paul von Lockstaedt, “Über Vorkommen und Bedeutung von Drüsen-schläuchen in den Myomen des Uterus,” *Monatsschr. für Geb. und Gynäk.*, 1898, Bd. vii. S. 188.

² *Zeitschr. für Geb. und Gynäk.* Bd. xxxvii. S. 343.

Recklinghausen and the mucosal theory of Cullen, for of his six cases of cornual adenomyoma he states that three were of Wolffian and three of mucosal origin.¹

The mucous-membrane origin of adenomyoma, which, as previously stated, Cullen was the first to emphasise, received increasing support, and steadily supplanted the foetal-relic hypothesis. In 1900 Gottschalk² described a cystic tumour in the region of the epoöphoron; the author found out-growths of tubal mucosa on serial section, and therefore concluded that the mucous membrane of the Fallopian tube gave rise to the cystic growth in the mesosalpinx. The same view was supported by Opitz.³ This observer also found glands in the tube-wall arising from the mucosa, and he denied the Wolffian hypothesis, advancing the view that the *peripheral growths* arose from the *serosa* and the *deep* ones from *mucous membrane*. These remarks were made in a discussion at the Berlin Obstetrical Society, and Meyer, who took part, said that he would not admit the mucosal theory as proved (1900), for he held the view that a tumour of the Wolffian duct could invade and incorporate itself with the lumen of the tube in the same way that it was known to invade the mesosalpinx: *i.e.* the tumour could spread inwards as well as outwards, and thus continuity of gland-spaces with the tubal mucosa was no proof that those gland-spaces arose from the mucous membrane; nevertheless Meyer characteristically remarks that von Franqué's work had had the effect of shaking his faith in von Recklinghausen's theory. The positive evidence of von Franqué had done for Meyer what the iconoclastic criticisms of Kossmann had failed to do, *i.e.* led him to realise that the Wolffian theory was not fully comprehensive.

So far as I can find, the last time that Robert Meyer

¹ *Zeitschr. für Geb. und Gynäk.* Bd. xxxvii, p. 349. ² *Ibid.* Bd. xlii. S. 616.

³ "Über Adenomyome und Myome der Tuben und des Uterus," *ibid.* S. 617.

championed the cause of the mesonephric hypothesis of von Recklinghausen was in 1903—he advanced this theory to explain *Eine unbekannte Art von Adenomyom des Uterus*, and he added *Eine kritische Besprechung der Urnierenhypothese von Recklinghausens*¹ (see Figs. 232, 233, 234, pages 404, 405, 406).

In trying to place before the reader a chronological review of the researches carried out in connection with *uterine* and *tubal* adenomyoma, we shall probably have only one more occasion seriously to consider the Wolffian theory, viz. an article by Schickele in 1904. Otto von Franqué's work on the tube in 1900 became the mainspring of much subsequent research in tubal pathology, and his article, *Salpingitis nodosa isthmica und Adenomyoma tubae*,² should be studied by all who are interested in the subject of adenomyoma. Von Franqué's conclusions were that a *pre-existing inflammation* explained the origin of most of the 'growths,' but that von Recklinghausen's hypothesis must be held as the elucidation of the few. We shall discuss these conclusions again when we come to consider Meyer's later papers, but since, for the moment, interest was centred in the tube, I have tried to find collateral evidence in support of von Franqué's findings.

V. CHRONOLOGICAL HISTORY OF THE INFLAMMATORY THEORY OF MUCOSAL INVASION

Three years before von Franqué's work was published, there appeared a paper in the *Prager Zeit. f. Heilkunde*, by H. Chiari, entitled "Zur pathologischen Anatomie des Eileiterkatarrhs" (1887). Chiari found that the lumen of the tube sent projections of mucous membrane into the muscularis. The connection was cut off in some, but the

¹ *Zeitschr. für Geb. und Gynäk.*, 1903, Bd. xlix. S. 464.

² *Ibid.* Bd. xlii. S. 42.

cysts which had formed were regarded by him as mucosal in origin. The cysts lay under the peritoneal coat of the tube. In the same year (1887) Martin¹ noted the same changes as Chiari had done, although there was not so extensive a spreading of the glands. In 1891 Baraban² attributed a mucosal origin to the epithelium in his *uterine* growth, and considered that the associated muscular and connective-tissue hypertrophy supported this finding. In 1894 Pilliet³ took the view that the cysts and glands of adenomyoma were of mucosal origin. Orthmann, in his *Beiträge zur normalen Histologie und zur Pathologie der Tube*,⁴ agreed with Chiari and with Martin.

Opitz's work in this connection has already been mentioned (*vide supra*) and also Gottschalk's, both of which were published in 1900.

E. Kehrer⁵ described a malformed uterus with tuberculous salpingitis and a cornual adenomyoma. He considered that the latter arose from the inflamed tuberculous membrane of the tube, and says, that the site of election is the *pars isthmica* in gonorrhoea and the *pars intramuralis* in tuberculosis.

In 1902 Lubarsch⁶ noted the same mucosal inclusions in the muscularis of the tube in cases of tuberculous and chronic gonorrhoeal salpingitis.

In 1903 Heine described many cases, under the direction of Opitz, as arising from the tubal mucosa.⁷

In the same year Meyer again took up the question and published an important article, *Über Adenomatöse Schleimhautwucherungen in der Uterus und Tubenwand*.⁸

¹ "Über Tubenkrankung," *Zeitschr. für Geb. und Gynäk.*, 1887, Bd. xiii. S. 299.

² "Cystome utérin multiloculaire," *Rev. méd. de l'Est*, 1891.

³ "Fibromyome de la trompe utérine," *Bull. de la Soc. Anat. de Paris*, 1894, page 554.

⁴ *Virchow's Archiv*, Bd. cviii. S. 165.

⁵ "Pathologisch-anatomischer Beitrag zur sogenannten Salpingitis isthmica nodosa," *Hegar's Beiträge*, 1901, Bd. v. S. 57.

⁶ *Ergebnisse d. allgem. Path.*, 1902, Jg. vii. S. 882.

⁷ "Ein Beitrag zur Entstehung der Adenomyome der weiblichen Genitalien," *Inaug. Diss.*, Berlin.

⁸ *Virchow's Archiv*, 1903, Bd. clxxii. S. 394.

Previously to this, Meyer had fully described adenomatous mucosal growths in the uterine wall.¹ He had since then met with three other cases, the morphology of which was in complete accord with his earlier observations.

The part of Meyer's article dealing with the tube is of especial interest for the moment ; that dealing with the uterus will be mentioned later.

On adenomatous growths in the tube-wall Meyer said : "Large adenomatous tumours in the wall of the tube are little known considering the frequency of their occurrence." The tubal growths proved even more conclusively than those of uterine origin that the physiological border-line is not respected by the invading epithelium. The invasion-process had been studied by Kehrer in gonorrhoeal and tuberculous cases. Meyer studied the question by examining thirty-one cases of chronically-diseased tubes, regardless of the causation of salpingitis. In nineteen he found *salpingitis follicularis*. In three cases it was very marked ; the tubes were like a sieve, and there was extreme muscular hypertrophy at the cornual end. In six instances the glands reached to the outer layers of muscularis, and twice they reached deeply into the mesosalpinx. This was not only the case with gonorrhoea and tuberculosis, but in other conditions, such as hydrosalpinx, tubal gestation, ovarian disease, and also in connection with myomatous and carcinomatous uteri. The findings corresponded to those described by von Recklinghausen as adenomyoma arising from mesonephric rests at the tubal angle (see Fig. 182, page 310). But, said Meyer, "it is a definitely *post-foetal* phenomenon : all stages are present, from the cutting off of a single cyst in the mucosa (*salpingitis pseudo-follicularis*) and the intrusion of single short follicles in the muscularis (*salpingitis follicularis*) to an enormous adenomatous branching through

¹ "Über Drusen, Cysten und Adenome in Myometrium bei Erwachsenen," *Zeitschr. f. Geb. und Gynäk.* Bde. xlii. xliii. xliv., 1900-1901.

all the layers of the tube-wall and into the broad ligament." "It was true that the normal tube had no glands, but the pathological tube was different—it could make them." Meyer convinced himself that a single process of epithelium (gland-runner) could send out branches in all directions. He likened the sprouting-faculty of the epithelium to "water under a high pressure bursting out in jets to form a fountain; the epithelium of an inflamed tube is under such a pressure, and is ready to make use of the smallest aperture for proliferation and for spreading through countless interstices." All that is wanted is a tiny granulation-area or a track of round-celled infiltration, and then the epithelium bursts its basement-membrane and begins to invade the muscle-wall along the inflammatory track. The point of entrance may, later on, be closed in by new connective tissue, and the continuity of the mucosa is then restored. The complete snaring, or cutting off, of the invading follicle is thus brought about, and thence onward a total independence of the imprisoned epithelium is effected. This point was also noted by von Franqué. The reason for the ingrowth of epithelium was found in the pre-existing *inflammation*.¹

As the association between adenomyoma and inflammation was first worked out in connection with the tube, we have dealt purposely with that organ first, and have endeavoured throughout to follow a chronological order. It now remains to examine how the irritative or inflammatory view fits in with growths which arise in the body of the uterus.

It is clear that the inflammatory genesis was very destructive to the theory of foetal relics, although the supporters of the Wolffian theory logically objected that

¹ The literature on the inflammatory genesis of these 'tumours' includes up to 1914, in addition to those already given: Santi (*Zeitschr. f. Geb.* lxxi.), Volk (*Gynäk. Rundschau*, 1912, ix.), Maresch (*Salpingitis Nodosa*, 1908), Renisch (*Zeitschr. f. Geb.* lxx.), Wallart (*Zeitschr. f. Geb.* lxxiii.), Ribbert (*Geschwülstlehre*, 1914).

foetal epithelium would behave like that in the adult under the same inflammatory irritation ; nevertheless von Franqué's work not only shook Meyer's belief in embryonic 'rests,' but its influence affected other workers also : *the theories of inflammatory causation and mucosal origin became almost synonymous and inseparable.*

Meyer¹ thus deals with the causation of *uterine adenomyoma* :—

The mucous membrane sends hyperplastic and hypertrophic glands into the muscularis, whilst the surface-layers are not as a rule hyperplastic, and may even be atrophic. Large areas of mucosa are found in the muscularis. They arise from various points, they spread in the *corpus uteri* from below upwards, and are most extensive in the cornua (both superficially and deep) (see Fig. 173). The inner and middle muscular layers are the parts principally invaded ; the periphery is generally free from growth except at the fundus.

A marked complexity of mucosal structure is present. First, there are single long utricular spaces derived from branching of the invading masses, or arising directly from the mucous membrane of the cavity of the uterus. When



FIG. 173.—Drawing from a microscopic slide ($\times 5$). Showing the muscular wall of the uterus invaded by large areas of mucosa. The upper edge of the section represents the cornu uteri.

¹ *Loc. supra cit.*

they proceed from the latter situation they follow the muscular interstices and lymph-vessels ; they do not penetrate the lymph-spaces : the lymphatic endothelium is a barrier to this benign invasion. These single utricles seldom branch. Secondly, there are seen complex glands, which spread by branching and often by cystic dilatation. The stroma of the invading mucosa is of great significance : it clothes all the epithelial spaces ; it is spindle-celled and thick, but never sarcomatous. Only in a few instances are the glands altered by projections and diverticula in such a way as to "make malignancy certain." When this happens we see an adenoma becoming a carcinoma (six years later Meyer altered his mind on this point). In some cases the peripheral part of the growth becomes malignant ; in fact we can have a *malignant* intramural adenoma with a relatively healthy mucosal surface. The invasion is *post-foetal* ; it is a disease of the adult uterus. Meyer examined one hundred uteri from foetuses, newborn children and girls up to the age of fourteen years ; he found that mucosal projections were seldom seen, and then only singly, whereas in adults he obtained twelve cases of marked invasion by the mucosa up to 1903. Meyer inquired of the supporters of the foetal theory, What properties has the foetal mucosa which the adult mucosa has not ?

The epithelial invasion is favoured by the absence in the uterine wall of a true submucosa. Granted that mechanical lesions, such as might be caused by therapeutic means, or by gestation or parturition, were present, neither a small muscular interstice, open on the mucous aspect, nor the interfascicular connective tissue was capable of offering resistance to the ingrowth of epithelium. It is noticeable that in the consideration of *uterine* mucosal growths, Meyer dwells on *mechanical* rather than on *inflammatory* lesions, but perhaps he intends the one term to include the other.

In 1903 Thomas Cullen (U.S.A.) published a report in Berlin on nineteen cases of diffuse adenomyoma of the uterus, and pointed out that in the majority of these cases the process was still limited to the uterus; he was thus able definitely to determine the origin of the glands from the mucous membrane of the uterine cavity "in most of the cases."

At the present day (1914) Ribbert of Bonn takes exception to the view that a pre-existing inflammation is essential to mucosal invasion. He figures in his work *Geschwülste* a uterus containing five growths, three of which were intramural myomas and two were adenomyomas (see Fig. 174). The latter, according to this author, were discrete myomas invaded by mucous membrane; they showed no sign whatever of inflammation.

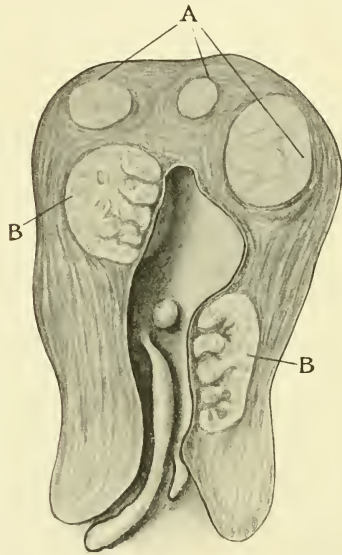


FIG. 174.—Uterus showing two adenomyomatous growths. (After Ribbert, *l.s.c.*)

A = myomas; B = adenomyomas. There are three polypi, but the endometrium was said to be devoid of inflammation.

There were, however, in addition to the above, three submucous growths, one being a long polypus. There is no doubt that many observers would regard the polypi as having to do with *endometritis*.

VI. SPORADIC EFFORTS TO REVIVE THE EMBRYONIC OR CONGENITAL THEORIES

In 1904 G. Schickele of Strassburg, in *Die Lehre von den mesonephrischen Geschwülsten*,¹ made a sharp attack upon

¹ *Zentr. f. allg. Path. und Anat.*, 1904, Bd. xv. S. 261-302.

the mucosal theory, and quite late in the day took a final stand in defence of von Recklinghausen's hypothesis. In his bibliography there are one hundred and eighteen references up to 1904. Many cases recorded as mucosal are regarded by Schickele as mesonephric.

With regard to the tubal growths, this critic says that

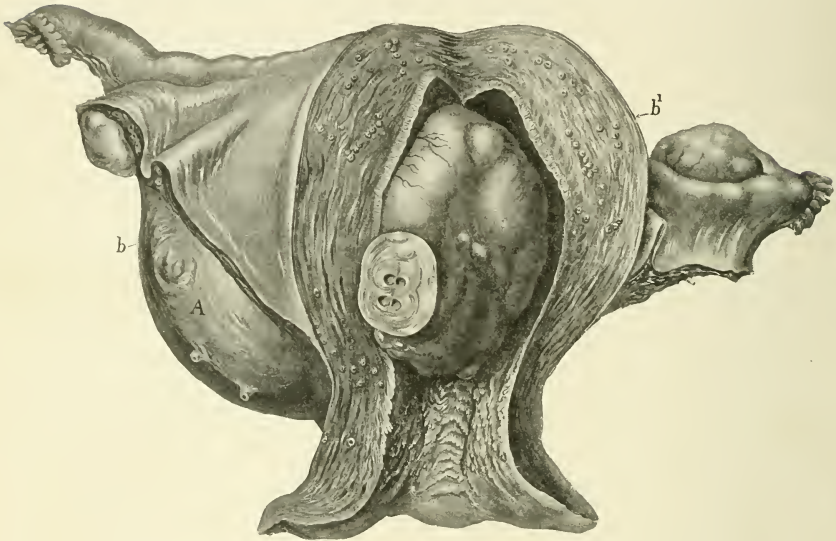


FIG. 175.—An intraligamentary and also partly submucous cystic adenomyoma.
(Reproduced from Cullen's Fig. 43, page 151. By permission.)

A = portion of "growth" occupying the right broad ligament; *bb¹* = line through which transverse section was taken which is shown in Fig. 239, page 416, where its cystic characters are made apparent. Schickele stretches the Wolffian theory to such a degree as to make it embrace such a growth as this.

the supporters of the mucosal theory cannot explain why the interstitial part of the tube is the site of election, nor why relatively few processes of invading mucosa can be traced to the lumen; and as regards the uterus, he adds that mucosal invasion certainly *does not occur in the uterine wall* (page 285, *l.s.c.*). Schickele regarded Cullen's mucosal growth (Figs. 175, *b*, and 239) as mesonephric. Referring to cornual tumours, Schickele wrote: "When I try to take an impartial

view of the published cases, I am compelled to state that the mucosal theory is not proved." Multiple communications with the lumen of the tube constituted no proof to his mind; the presence of inflammation, and the continuity of the tubal lumen with intramural gland-spaces did not disprove the Wolffian theory; congenital *rests* could also cause inflammation or be associated with it. Schickele, after eighteen months' incredulity, had encountered a mucosal adenoma of the tube in a woman aged 36 years. The glands radiated outwards from the lumen, like a rosette, into the muscle-wall, but Schickele protested against anything like a definite arrangement (organoid system) of the glands being recognised. The same was to be said with regard to the cases of Meyer, Lubarsch, Altertum, Wolff, Stein and Sellheim. There was not the slightest resemblance between their cases of tuberculous salpingitis and von Recklinghausen's 'organoid' tumour. Having at last found one case of mucosal tumour, Schickele re-examined all his old mesonephric cases for the sake of comparison, and found the mucosal tumour quite different from those derived from the embryonic rests. Schickele waged a closely-reasoned and logical fight for an old cause, but he could not stem the tide of events, and his arguments in their turn were refuted and set at naught.

In the same year, 1904, J. G. V. Meyer, assistant in Menge's Clinic at Leipzig, described a very interesting case.¹ The patient was an unmarried woman, aged 41 years, who had given birth to a child sixteen years previously. For three years she had suffered during the menstrual periods, from pelvic and sacral pain, and menstruation was very profuse. Anaemia was marked; the uterus was retroverted and flexed. The tumour lay in the upper part of the uterus, below the level of the round ligaments; it caused two symmetrical swellings, one beneath

¹ "Über Adenomyoma Uteri," *Zeitschr. f. Geb.*, 1904, Bd. liii. S. 167.

each cornu. The growth was not encapsuled. There was no connection between it and the mucosa to be found on serial section. The growth lay *below* the round ligaments and therefore was *not* Wolffian. The simplest explanation was, that the epithelial processes sprang from *embryonic Müllerian rests* in the uterine wall. J. G. V. Meyer's views on the origin of uterine adenomyoma in general are as follows :—

- (1) In the majority of cases they are of *mucosal* origin.
- (2) In small subserous growths, an origin from the *peritoneal* coat of the uterus must be thought of.
- (3) When arising in the lowest part of the body of the uterus, and in the cervix, *Gartner's duct* will supply the epithelium.
- (4) Very rare tumours situated above the insertions of the round ligaments may be safely regarded as *Wolffian*.
- (5) There are cases in which a decision as to origin is impossible.

VII. (A) THE SEROSAL THEORY OF IWANOFF ;
(B) EPITHELIAL HETEROTOPY OF ROBERT MEYER

So far we have dealt with the genesis of adenomyoma in relation to foetal relics and post-foetal out-growths from the mucosa. We now come to the consideration of another possible source for the epithelial inclusions, viz. the peritoneal epithelium.

N. S. Iwanoff was the first to lay stress on the fact that the cystic spaces in a fibromyoma originated in some cases from ingrowing processes of epithelium derived from the serous coat of the tumour.¹ This author states that he had previously published a paper in Russian, in which he advanced microscopical proof that the glands in an adenomyoma were

¹ "Drüsiges cystenhaltiges Uterusfibromyom compliciert durch Sarcom und Carcinom," *Monatsschr. für Geb. und Gynäk.*, 1898, Bd. vii. S. 295.

derived from the serosal epithelium. Iwanoff also held the view that the carcinomatous part of a growth which he described in the paper in the *Monatsschrift (l.s.c.)* was the result of *malignant* changes occurring in the adenomyoma; he therefore called the growth *Adeno-fibromyoma cysticum sarcomatodes carcinomatosum*.

The serosal theory had the support of Pick, Opitz, Aschoff, Borst, Heine, von Rosthorn, Renisch, and Robert Meyer. W. N. Orloff in his *Zur Genese der Uterus-myome*¹ mentioned that he found myomas with gland-spaces mostly underneath the *serosa*, but in his conclusions he stated that the epithelium arose from embryonic cells which had wandered in between the muscle-bundles. It is incorrect to credit Orloff with being a supporter of the serosal theory, as some writers do. Robert Meyer showed, as many other observers since have done, that epithelial *heterotopy* or displacement can occur in the *serosa* as well as in the *mucosa*. For an intelligent appreciation of how serosal growths arise, a short account of 'epithelial heterotopy' (epithelial invasion) as explained by Meyer is here given.

Wherever it occurs this phenomenon, to which R. Meyer gives the name of 'heterotopy,' is a kind of healing process—in fact, Ziegler called it a 'regenerative process.' There is nothing malignant in the epithelial invasion. "The old and never-proved fable, that the transgression of the physiological boundary [basement-membrane] signifies malignancy, must at last be brought within proper limits." The scattered heterotopic epithelium *can* become cancerous, but the proof that it does so is hard to demonstrate.² The point to remember is that a penetration of the basement-membrane is no unequivocal sign of malignancy; to this must be added a biological abnormality of the epithelial cell, before we are brought face to face with a malignant process.

The cause of this infiltrative activity on the part of

¹ *Zeitschr. für Heilkunae*, 1895, S. 312-338.

² See remarks on page 432.

epithelium is a pre-existing *inflammation*. In chronic inflammation the invading epithelium runs along the vessels, plasma-cells abound, remains of old tissue are found in the so-called 'stroma of the growth'; strands of elastic fibres exist in it, mostly of course in connection with the blood-vessels, but also in the centre of the 'growth' apart from these vessels. In fact, the elastic constituents vary with the amount found in the original tissue. Granulations, areas of round-celled infiltration, proliferating connective tissue, are all permeable to benign invading epithelium.

'*Adenomyomas*' are examples of an epithelial invasion of inflammatory infiltrated tissue. We see this same process at work in the 'glandular hyperplasia' of the mucous membrane of the uterus. Glandular endometritis is, according to Meyer, *intramucosal* epithelial invasion of inflammatory origin. 'Erosion' of the cervix is another example on the part of epithelium to go a-trespassing in an attempt to heal, by covering over, an inflammatory focus. In inflammation we have the following sequence: (a) injury, (b) regeneration, and (c) infiltrative growth of epithelium. When epithelium takes a large share in the inflammatory process, we have parenchymatous inflammation; when it does not, the inflammation is interstitial. The process of epithelial invasion is, at first, a demonstration of healing, in 'adenomyoma' it has run riot and causes injury instead; the evidences of the injury being muscular hyperplasia, haemorrhage, and pain. Endothelial lymph-spaces are proof against heterotopic invasion. Heterotopy of epithelium is not a pre-cancerous condition. Secondary carcinoma is not proved (Meyer). Epithelial heterotopy can occur in dystopic (embryonic) as well as in orthotopic (post-foetal, mature) epithelium. This behaviour of epithelium is not confined to any particular tract or part of the body, but it has been more particularly studied in the genital tract, the alimentary system, the appendix (Lubarsch), gall-bladder (Lubarsch),

kidney (Lubarsch), liver (Lubarsch), and skin (Friedlaender). In the Fallopian tubes it is especially common (in the form of mucosal heterotopy) in cases of tuberculosis and gonorrhoea. In the uterus the invasion of mucosa is favoured by the absence of a submucosa, and it can give rise to mucosal centrally situated growths, also to serosal peripherally situated ones. *Heterotopy of serosal epithelium is the probable explanation of the existence of the epithelial spaces and cysts in*

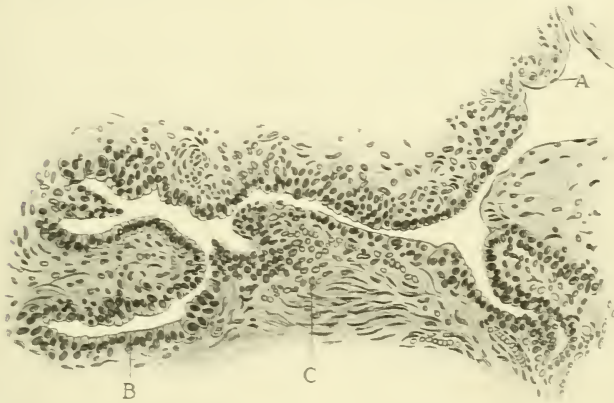


FIG. 176.—Showing invasion of the underlying tissues by peritoneal epithelium.

(After Sitzenfrey, *Zeitschr. für Geb. und Gynäk.* Bd. lxiv. Fig. 3, page 551.)

A = flattened epithelium, i.e. the 'endothelium' of the peritoneum; B = columnar epithelium; C = connective-tissue cells commencing to form the cytotogenous tissue.

most of the extrauterine swellings found between the rectum and the genital tract.

There is no doubt whatever about the possibility of the so-called 'endothelium' of the peritoneum being able—when excited by inflammation, or under the influence of pregnancy (Alfieri)—to alter the character of the flattened cells so that they become cylindrical and columnar (see Figs. 176, 177, 178). This has been proved by repeated investigations carried out by reliable observers. Moreover, it has also been conclusively shown that the connective

tissue which surrounds the 'endothelial' inclusions can be excited to a hyperplasia which causes it to assume the characteristic histological features of the stroma of the

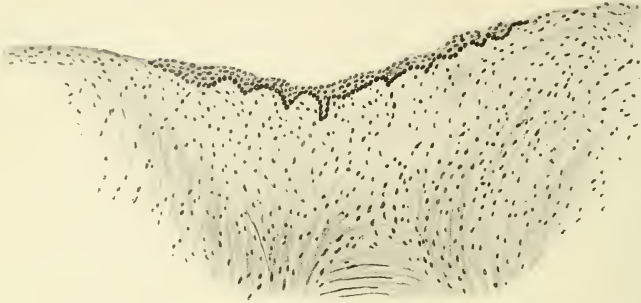


FIG. 177.—Showing the early stage of epithelial down-growth into the subjacent tissues from the peritoneum. (After R. Klages, Fig. 9, Tafel v., *Zeitschr. für Geb. u. Gynäk.*, 1912, Bd. lxx. S. 858.)

uterine mucosa. It has further been shown that in 'tumours' of undoubted serosal origin the 'cytogenous' or 'lymphadenoid tissue' (which is nothing more than the original connective tissue of the invaded area) can, under the influence of pregnancy, show *decidual reaction* (see Figs. 215, 216, pages 363, 364).



FIG. 178.—Showing the transition of flattened peritoneal 'endothelial' cells into columnar cells. (After Klages, Fig. 8, Tafel v., *l.s.c.*)

This necessarily means that nothing but the *topography* of the 'tumour,' nothing but laborious research entailing the cutting of serial sections in great numbers, can settle the question as to the *starting-point* of the glandular inclusions for many of the cases of 'adenomyoma.' Decision will often be difficult even with the full data of histological facts before us. As an illustration of what I mean, take a case such as that shown by Archibald Leitch at the

Royal Society of Medicine, July 1914, where a localised growth was adherent to the back of the uterus and to the anti-mesocolic border of the sigmoid colon. There are three possible sources for the epithelial inclusions in such a case:—

(1) The uterine mucous membrane; (2) the peritoneum; and (3) the lumen of the bowel.

The epidiascope showed that the epithelium invading the bowel diminished in quantity from without inwards, and reached only as far as the submucosa, so that it was a fair assumption that an origin from the bowel-epithelium might be excluded. The section of the implicated uterus kindly given me by Leitch does not extend through to the mucous membrane, so that there is no histological proof that the invaginations spring from the uterine mucosa; therefore two possibilities remain: the 'tumour' may be serosal (peritoneal), or mucosal (uterine).

VIII. CASES OF ADENOMYOMA REPORTED AS OF SEROSAL (PERITONEAL) ORIGIN

Iwanoff in 1898¹ described his case of adenomyoma complicated by carcinoma and sarcoma as arising from the *serous coat* of the uterus; the case will again be referred to under "Malignancy and Adenomyoma." R. Meyer² described a case in which there was a ventrofixation of the uterus and removal of the right appendages, in 1897. The scar was subsequently excised because of great pain. The fundus and abdominal wall were then found to be connected by a nodular mass. Epithelial glands lay around the silk ligature which united the uterine serosa to the abdominal wall, and there were several glands in the muscle of the anterior abdominal wall. These came from the *peritoneum*

¹ *Monatsschr. für Geb. und Gynäk.* Bd. vii. S. 295.

² "Über eine adenomatöse Wucherung der Serosa in einer Bauchnarbe," *Zeitschr. f. Geb.* xlix., 1903, 32.

of the uterus or from that of the parietes. Meyer says the transition from endo- to epithelium is not degenerative as Ribbert thinks, but is an expression of "surface expansion."

Richard Klages wrote in 1912 on *Ein Adenomyom in einer Laparotomienarbe nebst Bemerkungen zur Genese dieser Geschwulstsbildung*.¹ The case was that of a middle-aged woman who had had many attacks of pelvic peritonitis. In March 1903 the right tube and ovary and also the appendix were removed, and the womb sewn to the abdominal wall. For two years the patient had noticed a gradual thickening and redness at the lower end of the laparotomy scar; this was noticeable *especially during menstruation*, when the redness increased and the scar became painful. The pain was of a pricking, tearing character, and ultimately the patient could not bear the pressure of her clothes on the swelling. On re-admission to hospital the diagnosis lay between keloid and neuroma. On removal, the lump was larger than a walnut, and proved to be an adenomyoma united to the uterus by a pedicle which included a portion of omentum. Topographically it could not have arisen from embryonic germ-cells. There was no communication, Klages said, between the mucosa of the uterus and the tumour (the uterus was not removed). This author adopted the same view as Meyer did, viz. that the epithelial inclusions were *serosal*, and he quoted one of Heine's cases as also derived from the peritoneum.² To explain the muscular and connective-tissue elements, Klages adopted the view of Opitz as to the aetiology of myoma. This theory has already been referred to in Part I., which deals with myomatous growths.³ The gist of this hypothesis is, that just as early connective tissue can elaborate or evolve muscle-fibres out of itself wherewith to clothe the Müllerian ducts and eventually to form the

¹ *Zeitschr. f. Geb.* Bd. lxx. S. 858.

² Heine, *Inaug. Diss.*, Berlin, 1903.

³ Part I. chapter i. page 1.

uterus, so can the connective tissue which remains in the uterine wall generate muscle-fibres to form myomas in mature life. The muscular and connective tissue, therefore, in the above extrauterine 'growth' came from the uterus, according to Klages's view.

With regard to the behaviour of peritoneum under the influence of an inflammatory excitation, Klages writes (see Figs. 177, 178, page 296) "that the transition of flat peritoneal epithelium into cubical or cylindrical can occur, has been repeatedly proved, and notably so by Opitz and Robert Meyer." In Fig. 178, page 296, the author clearly shows this transition in the shape of the epithelial cells. Opitz had found that where the peritoneum lies in natural folds, as it does at the tubal angles, the initial condition already exists for the down-growth of epithelial elements. Fig. 177, page 296, shows this. A deep process has started to grow down, and Klages says "such a demonstration cannot be thrown overboard." The peritoneum itself arises from coelomic epithelium, so why has it not the same properties in regard to adenomyomatous growths as the epithelium of Müller's ducts, which are a product from the same source?

Klages quotes Iwanoff, Fabricius, R. Meyer, and Pick as authors favouring the serosal origin.¹

Friedrich Jacobs² records four cases of adenomyoma, in two of which the gland-elements were traceable to the *peritoneum*.

Case 1 was a node, the size of a cherry, in the broad ligament. The tumour contained gland-spaces surrounded by cytogenous tissue. The epithelial inclusions were traced to the peritoneum.

Case 4 was a growth the size of a walnut; it lay in paravaginal tissue and was adherent to the ischial spine.

¹ Fabricius, *Archiv für Gynäk.* Bd. i. S. 386.

² "Über einige adenomatöse Tumoren aus den weiblichen inneren Genitalorgane," *Beitr. z. Geb.* Bd. xix. S. 143, 1913.

It contained connective tissue, muscle and follicles, lined by cylindrical epithelium. Jacobs regarded the origin of the epithelium as unknown, but stated that probably it was vaginal, and due to some former injury to the *vagina* during parturition. The serosal source will be further considered in dealing with extrauterine adenomyoma. Other examples of reputed serosal adenomyomata will be found under "Adenomyoma of the Recto-Genital Space" (see pages 345, 346).

CHAPTER II

CLASSIFICATION OF UTERINE ADENOMYOMA

I. THE CLASSIFICATION OF CULLEN

IN writing upon the *Origin of Adenomyoma of the Uterus* in 1908, Cullen (pages 193 and 194) leaves the question of the inflammatory origin severely alone; the serosal origin is therefore of necessity not discussed, and up to that date this well-known author had met with no case of 'adenomyoma' in the recto-genital space. The only extrauterine cases which Cullen had seen were those of the utero-ovarian and round ligaments, and of these he gives a good account on pages 250-259 of his monumental work, *Adenomyomata of the Uterus*, 1908.¹

Cullen's work afforded the most comprehensive and conclusive proof of the fact that most uterine 'adenomyomas' are of mucosal origin. He says: "We have had fifty uncomplicated cases of *diffuse* adenomyoma of the uterus, some very extensive, others in their early stages. In every one of these cases we have been able by persistent search to trace uterine mucosa into the myomatous tissue. In other words, islands of mucosa in the diffuse myomas originated from the mucosa lining the uterine cavity in every case." Furthermore, Cullen states that it is not necessary that the uterine glands be traced by continuity

¹ Cullen has since the above date described several cases of 'adenomyoma' of the recto-genital space (see pages 360 and 361) and also several 'adenomyomas' of the umbilicus (see Appendix V. page 573).

in order to establish the mucous-membrane origin. The islands of glands lying deep down in the muscle of a myoma correspond identically with those seen in cases in which the continuity is traceable, and, moreover, they are precisely the same as in normal uterine mucosa. They are surrounded by a stroma *identical with* that surrounding uterine glands [cp. remarks on the stroma, pages 295, 296].

“In some cases *miniature uterine cavities* are scattered throughout the myoma. Now if portions of this uterine mucosa be far removed from the parent mucosa we should still expect them to retain their function, and this they do. In nearly every instance in which cyst-spaces are present, the cavities are, in part or almost completely, filled with blood, and even in the small and undilated glands, blood is frequently present, or the epithelial cells contain blood-pigment, the remnants of old haemorrhages.” To clinch his argument he cites the case of Whitridge Williams, who in examining the uterus of a patient entering hospital in a desperate condition, and dying two hours after labour, found that it was the seat of a diffuse adenomyoma, and that the stroma of the adenomyomatous islands had become converted into typical decidua.¹

Cullen's view evidently is, that there is a pre-existing myoma, which, for a reason he does not explain, becomes invaded by processes of mucous membrane entering 'chinks' or interstices; hence he has no difficulty in accounting for the origin of subperitoneal and submucous growths. He puts it thus: "It is so easy to understand how interstitial myomas become subperitoneal and submucous, and yet in considering the *subsequent* history of adenomyoma the majority of authors have forgotten to apply the same principle. When the growth becomes subperitoneal, we should expect its glandular elements gradually to lose their continuity with

¹ J. Whitridge Williams, "Decidual Formation throughout the Uterine Muscularis," *Transactions of the Southern Surgical Association*, 1904, vol. xvii.

those of the mucosa, and such is the case. Hence the confusion as to their origin." A good example of this "confusion" of authors is afforded by Ernst's description of a tumour removed by Wyder.¹ Behind the left *cornu uteri* was attached a pedunculated cystic tumour; the stalk was as thick as a man's thumb and 2 cm. long. The tumour was the size of a child's head. It was myomatous and cystic; the cyst contained brown fluid. The glands were of no special organoid type. Those in the anterior wall of the cyst Ernst regarded as paroöphoral, and those in the pedicle as uterine in origin! As examples of the subperitoneal variety Cullen instances Lockstaedt's case (see page 278), and as demonstrations of the intraligamentary variety he cites the case of Breus (see page 266), and also that of Krönig.² I might give another example, published since Cullen wrote his article, *i.e.* that of Theodore Döderlein and Max Herzog,³ in which, after an incomplete abortion, the placenta was found inside a cystic intraligamentary adenomyoma which communicated with the main uterine cavity by an opening admitting two finger-tips (see page 381).

From a personal experience gained by the study of fifty-six adenomyomas Cullen divided these growths into—

(1) Those in which the uterus preserves a relatively normal contour (see Fig. 172, page 273).

(2) Subperitoneal or intraligamentary adenomyomas.

(3) Submucous adenomyomas (Fig. 224, page 392).

(1) The uterus may be normal in size or two or three times the natural dimensions. If large, it is frequently invested with adhesions. One wall (more frequently the posterior) (see Fig. 248, page 435) is the seat of a diffuse muscular hyperplasia, and into this thickened musculature it is often possible to trace invasions direct from the mucosa (see Fig. 173, page 287), and, in advanced cases,

¹ *Zentr. f. Gynäk.* xxxiii., 1909, page 459.

² See page 275.

³ *Surgery, Gynaecol. and Obstet.* xvi. page 14, 1913.

cystic spaces open on to the mucous surface (see Fig. 224, page 392, and Fig. 179). The mucosa itself is often thickened, but may be atrophic. Small myomas may be present in other parts of the uterine wall; they stand out as much paler and more definitely circumscribed rounded structures, and present a strong contrast to the diffuse pinkish hyperplastic area which makes up the 'adenomyoma.'

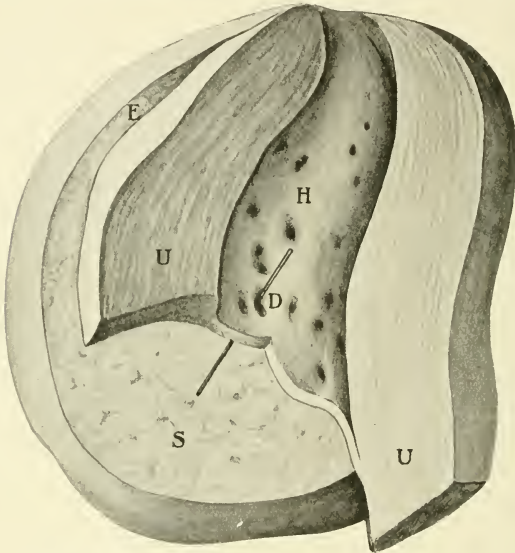


FIG. 179.—A round encapsuled tumour the size of a small fist situated in the lateral wall of the uterus. It is being invaded by mucosal crypts. There was no evidence (according to Ribbert) of a pre-existing endometritis. Ribbert advances this case as an argument against the inflammatory origin of adenomyoma. (Ribbert, *Geschwülste*, 1914.)

(2) Subperitoneal and intraligamentary (sessile and pedunculated) adenomyomas.

Of fifty-six cases Cullen found subperitoneal growths in eight. Three were removed without the uterus, so were presumably small. They are often situated at or near the cornua, although Bauereisen described a subperitoneal adenomyoma arising from the anterior wall at the level of the

internal os (see Fig. 225, page 395). This case bore out Cullen's view that even in pedunculated growths the inclusions are of mucosal origin, for Bauereisen found glands in the pedicle communicating with the uterine cavity. This explanation does not apply to all, especially such as arise where the Wolffian and Müllerian ducts cross, *i.e.* at the *cornu uteri*. Robert Meyer's remarkable case of a large cystic adenomyoma with intracystic growths proves this point (see Figs. 232, 233, 234, pages 404-6). In Meyer's case the left Fallopian tube ran *through* the short pedicle of the growth, and the latter was composed of a fibro-muscular canal lined with cubical epithelium. From the walls of this canal, fibro-muscular nodules grew into cystic dilations of its lumen, making up a picture like that seen in coarse intracystic papilloma of the breast. Meyer attributed the muscle, as well as the epithelium, to an origin from Wolffian elements, and stated that the uterine musculature took no share in the formation of the growth.

Again, Meyer has shown that some subperitoneal adenomyomas owe their inclusions of epithelium to the serosa; these, he says, are "of no great size" as a rule, but there are many exceptions, notably those of Nebesky, Füh, von Franqué, and von Rosthorn, all of which were extensive. In one case Meyer describes nearly the whole of the back of the uterus as covered by a 'mucous membrane' (compare Fig. 230, page 401); and by a low magnification the serosa could be seen sending down-growths deep into the uterine muscle.

(3) Submucous adenomyoma. Cullen in his series encountered seven cases of submucous growths. In one instance the glands had become cystic, and the tumour "was riddled with miniature uterine cavities continuous with the uterine mucosa" (compare Fig. 231, page 402). The cases of Diesterweg and Schroeder (*l.s.c.*) were poly-poidal submucous growths.

In 1906¹ Frank Taylor showed an adenomyomatous polypus of the cervix for which Herbert Spencer preferred the name "adeniferous fibroid polypus"; both Spencer and Routh were familiar with this kind of polypus, and the priority claimed by Taylor was not admitted. Such growths are easy to understand if regarded from the point of view adopted by Cullen.

Schroeder's view that a 'fibroid' in its growth embraced the glands, was soon shown to be contrary to all known facts. I personally agree with Spencer and Routh that these growths should be excluded from the category of adenomyoma, the more so as the literature on the latter is already becoming very extensive without the inclusion of polypi. With large *sessile* submucous growths it is another matter altogether, as I hope to show later (see Fig. 224, page 392).

II. A NEW CLASSIFICATION OF ADENOMYOMA

These clinical 'tumours' ('adenomyomas'), as has already been mentioned, are found in the Fallopian tube. They also arise in other situations, so that it will prove convenient to classify them under the primary headings of Uterine and Extrauterine Adenomyomas. The former have been discussed already. We will now consider the extrauterine adenomyomas.

They comprise the following :—

- (A) Adenomyoma of the Fallopian Tube.
- (B) Adenomyoma of the Round Ligament.
- (C) Adenomyoma of the Ovarian Ligament.
- (D) Adenomyoma of the Broad Ligament.
- (E) Adenomyoma of the Recto-Genital Space.
- (F) Adenomyoma of the Alimentary Tract.
- (G) Adenomyoma of the Umbilicus (Cullen).

¹ *Trans. Obstet. Soc. Lond.* vol. xlviii. pages 12-15, 1906.

EXTRAUTERINE ADENOMYOMA

(A) **Adenomyoma of the Fallopian Tube.**—The Fallopian tube, as has been frequently stated before, was the structure utilised by the supporters of the combined inflammatory and mucosal theories to overthrow the hypothesis of von Recklinghausen (Wolffian) and that of Kossmann (accessory Müllerian ducts).

The work of Chiari in 1887 has already been briefly mentioned. Of 760 *post-mortem* specimens of thickening of the Fallopian tubes, in six instances histological investigation led this observer to the conclusion that these swellings were the outcome of a chronic salpingitis, which he explained by stating that during an acute inflammation there was sufficient intratubal tension to force portions of the mucous membrane into the oedematous muscle-wall. The extruded portions of mucosa at first retain their communication with the lumen of the tube, but later on they become isolated, and form the gland-spaces which are found in the wall of the tube. These 'adenomas,' by setting up irritation, produce hypertrophy and hyperplasia of the muscle-tissue; and to this inflammatory *histoid* node the name of *Salpingitis isthmica nodosa* was given by Chiari. This research was immediately supported by Martin (1887), Orthmann, Werth, and Schauta, and was followed in 1900 by the researches of Opitz and von Franqué; and by those of E. Kehrler in 1901, Lubarsch in 1902, Heine and Robert Meyer in 1903, Hoehne in 1905—who proved by injection of gelatin-Berlin blue (see Fig. 180) the connection between the lumen and the branching intramural tubules¹—Krömer in 1906, Maresch,² and finally by an American investigator, M. Rabinovitz, in 1913.

Rabinovitz, in speaking of von Recklinghausen's work, says the latter "attempted completely to overthrow the

¹ *Archiv für Gynäk.* Bd. lxxiv. S. 1-47.

² *Diss.* Berlin, 1908.

inflammatory theory, and enunciated the *congenital* origin of *salpingitis nodosa*." It will be remembered that this was in 1896, *i.e.* nine years after the inflammatory theory had been enunciated by Chiari.

It was von Franqué's work and that of Opitz which

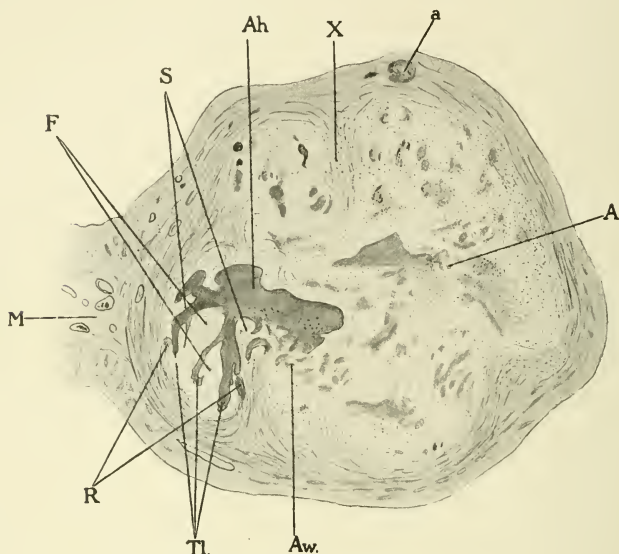


FIG. 180.—Fallopian tube injected by Hoehne.

Tl=injected lumen of tube with two large branching mucosal depressions; *R*=ring of invaded muscle-tissue; *Ah*=abscess-cavity lined by heterotopic epithelium; *S*=ruptured muscle-layer containing folds of heterotopic mucous membrane in its clefts; *F*=an abscess-cavity which is in connection with the lumen; *Aw*=injection spreading out in a diffuse manner in the tube-wall; *A*=larger abscess in the posterior and upper part of the tube-wall; *a*=peripheral section of the abscess-tract. *X*=an incomplete septum consisting of uninvaded tubal muscle; *M*=mesosalpinx.

brought back the prestige which the inflammatory theory had temporarily lost, by the charm and interest aroused for the fascinating hypothesis of von Recklinghausen. A comparison of von Franqué's drawing of *salpingitis isthmica nodosa* (see Fig. 181) with that of von Recklinghausen's mesonephric tubal growth (see Fig. 182), and those of Jacobs (see Figs. 183, 184, 185, page 311), will probably

convince the reader that all the drawings illustrate one and the same thing. In fact, R. Meyer once said when demonstrating an inflammatory tubal node, "This is von Recklinghausen's Wolffian tumour."

'Adenomyoma' of the tube is therefore better termed

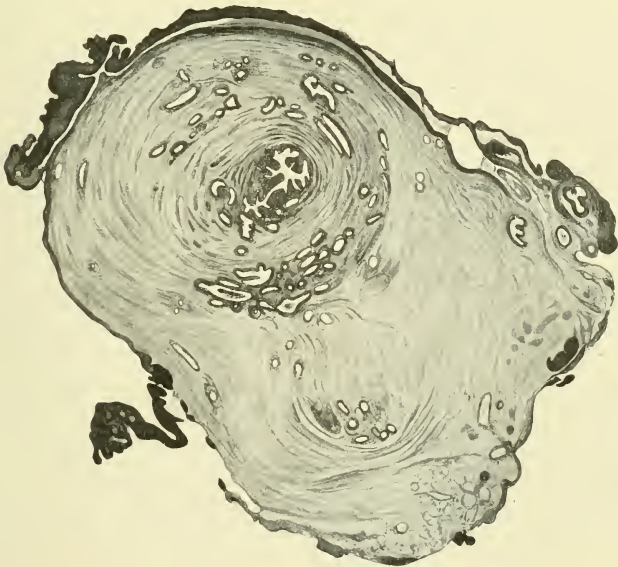


FIG. 181.—Showing *salpingitis isthmica nodosa*. (After Otto v. Franqué, *Zeitschr. f. Geb. u. Gyn.* Bd. xlii., 1900, Taf. iii., Fig. 3, page 38.)

Adenomyositis tubae, or, as Rabinovitz terms it, *Adenomyosalpingitis*. Rabinovitz could find no evidence of embryonic 'rests' in ten cases he examined. His work entirely confirmed the inflammatory nature of these nodes.

(B) **Adenomyoma of the Round Ligament.**—In 1883 Säger collected twelve cases¹ of tumours of the round ligament. Many of these were cystic, and were regarded clinically as *hydrocele muliebris*, but on critical examination

¹ *Archiv für Gynäk.* Bd. xxi. S. 279.

they were found to belong to the class of *embryonic* swellings (Emanuel).

Tumours occur in three sections of the ligament, *i.e.* (1) between the uterine cornu and internal abdominal ring (intraperitoneal); (2) in the canal of Nuck (intra-



FIG. 182.—Section of Fallopian tube from a case of adenomyoma of both tubes. On the right side there was a hydrosalpinx. (After von Recklinghausen, who considered this to be an organoid growth formed around *BT* which he describes as the ‘tube.’)

BT=tube with narrow lumen and thick mucosa; *C*=cyst lined with ciliated epithelium.

canalicular); (3) extraperitoneal, in the region of the *mons Veneris*. To these, Sanger added a fourth class: (4) those growths in the adjacent abdominal wall more remote from the canal of Nuck. Sanger had seen no example of the intracanalicular variety.

Some confusion has arisen between true growths of



FIGS. 183, 184, 185.—Three sections from a case of *salpingitis nodosa*. 183 shows a large cyst which has developed from the heterotopic mucosa. 184 shows multiple ramifications of complicated mucosal diverticula which explain how easily an ectopic gestation might be caused in such a condition. 185 shows epithelial budding in some of the peripheral follicles. This is extremely common in tuberculous cases and may form the starting-point of a carcinoma. (After F. Jacob, *Beiträge z. Geb. u. Gyn.* Bd. xix. H. 1, Figs. 8, 9, 10.)

the round ligament and cystic swellings of the *processus vaginalis peritonei*; but, in 1903, Emanuel¹ had collected seventy-six true growths of the round ligament—fifteen of these were myomas or fibromyomas and some proved to be ‘adenomyomas’; to the latter Emanuel added four cases of his own. This author’s four cases contained cysts with cubical epithelium. He regarded the cubical epithelium as springing from endothelium, and preferred to look upon his specimens as *myoma lymphangiectodes* rather than adenomyomas—the epithelial character of the cells lining the spaces was due, according to Emanuel, to a change in the endothelium of the lymph-channels.

Agnes Bluhm² described a case in which a tumour the size of a plum lay at the distal end of the round ligament. It contained cystic spaces surrounded by cytogenous tissue, and answered to von Recklinghausen’s description of Wolffian tumours.

F. Weber³ describes a tumour of the left round ligament, which was situated at the external ring. It was the size of a hen’s egg, and consisted of fibro-muscular tissue and a number of large and small cystic spaces. This author, like Emanuel, attributed the epithelial elements to the lymph-vessels. Adenomyomas of the round ligament have also been described by Engelhardt,⁴ Rosinski,⁵ and Cullen.⁶

Cullen stated that until the publication of his case in 1896, adenomyoma of the round ligament seems to have been unknown; since then similar cases have been reported, notably by Pfannenstiel, *Über die Adenomyome der Genitalstranges*; ⁷ Blumer, “A Case of Adenomyoma of the Round Ligament”; ⁸ R. Meyer, *Über Drüsen, Cysten und*

¹ *Zeitschr. f. Geb.* Bd. xlviii. page 383, 1903. ² *Archiv f. Gynäk.* Bd. lv., 1898.

³ *Monatsschr. für Geb. und Gynäk.*, 1899, Bd. ix. S. 596.

⁴ “Noch 1 Fall von Adenomyom des Lig. rot.,” *Virchow’s Arch.* Bd. clviii. S. 556.

⁵ “Lymphangiectatisch Adenomyom des Lig. rot.,” *Zentr. f. Gynäk.*, 1899, S. 1545.

⁶ *Johns Hopkins Hosp. Bull.*, 1896, vol. vii. page 112.

⁷ *Verhandl. der Deutschen Gesell. f. Gynäk.*, 1897.

⁸ *American Journal of Obstetrics*, 1898, page 37.

Adenome im Myometrium der Erwachsenen;¹ L. Aschoff, *Cystisches Adenofibrom der Leistengegend*;² Von Herff, *Über Cystomyome und Adenomyom der Scheide*,³ and Ludwig Pick, *Die Adenomyome der Leistengegend und des Scheidengewölbes; ihre Stellung zu den paröphoralen Adenomyomen der Uterus und Tubenwandung von Recklinghausen's*.⁴ Tietmeyer⁵ described a tumour the size of a hen's egg, which proved to be an adenomyoma, and was situated on the left side of the *mons Veneris*.

The youngest case on record is that of Nokolaysen (Sänger)—the child was $4\frac{1}{2}$ years old; the next is that of A. Martin, in which the patient was nineteen years of age. Emanuel mentions a cystic tumour of the round ligament in a *child*, recorded by Brohl, but I cannot find the reference.

Tumours appear to be three times as common in the *extraperitoneal* portion of the round ligament as in the *intra*peritoneal situation.

On page 32, Part I., mention was made in relation to *myoma* of the round ligament, that it is difficult to determine how to classify haematoma of this ligament, and reasons (based on arguments adduced by Cullen) were advanced in favour of their being haemorrhagic adenomyomas. Two such cases are mentioned by Emanuel as being *extraperitoneal* and one as being *intra*peritoneal.

The last was the case of A. Martin; it is quoted by both Cullen and Emanuel, and is of sufficient importance to receive further notice. Martin⁶ mentions that a patient aged seventy years came to him with a rapidly-growing tumour. On opening the abdomen he removed 12 litres of chocolate-coloured fluid from a tumour springing from the left round ligament. The growth was attached to the ligament by a definite pedicle. The pedicle contained several small cysts filled with clear fluid. One of these

¹ *Zeitschr. f. Geb. und Gyn.*, 1900, Bd. xliii. S. 130 and 329.

² *Monatsschr. f. Geb.*, 1899, Bd. ix. S. 25.

³ *Verhandl. der Deutsch. Ges. f. Gynäk.*, 1897. ⁴ *Archiv f. Gynäk.* Bd. lvii. S. 461.

⁵ *Dissertation Griefswald*, 1903. ⁶ *Zeitschr. f. Geb. u. Gynäk.* Bd. xxii. S. 444, 1891.

was lined by cylindrical epithelium. Cullen says "it is quite probable that this was an adenomyoma of the round ligament situated nearer the uterine horn than usual. The process [of formation] appears to be analogous to the cystic development in subperitoneal or intraligamentary adenomyomas of the uterus." Emanuel hesitates to make a definite pronouncement on the nature of these haematomas, but Gottschalk, arguing from the hollow area in the pedicle of a blood-cyst, refers them to dilatations of the blood-vessels, *i.e.* he regards them as examples of telangiectasis.

Schramm¹ had an almost identical case, and from the presence of cystic spaces in the pedicle, came to the same conclusion as Gottschalk (*vide supra*).

Lichtenstern and Hermann² had a case of this kind, excepting that here the blood-cyst became infected with the *bacillus coli*, and an abscess formed.

Many other cases of cysts and cystic tumours occur in the records of the pathology of the round ligament, but it is difficult to arrive at definite conclusions as to their aetiology.

Although most cases of adenomyoma of the round ligament are extraperitoneal, that of Martin, mentioned above, was intraperitoneal, as was also that of Ulesko-Stroganowa,³ who described a tumour at the uterine end of the left round ligament the size of a fist. It was cystic, and its walls were composed of muscle and fibrous tissue; it was lined by ciliated epithelium, and the author regarded her case as being certainly of mesonephric origin, and Vassmer agreed with her.

E. Venus showed two cystic adenomyomas of the round ligaments at the Gynaecological Society in Vienna, Nov. 8, 1910. One was attached to a uterus which was removed on account of carcinoma. The cysts contained blood and had an epithelial lining to their walls.

¹ "Ein neuer Fall von Haemat. Lig. rot.," *Zentr. f. Gynäk*, 1896, S. 1139.

² "Zur Pathologie des rundes Mutterband," *Monatsschr. f. Geb.*, 1902, Bd. xv.

S. 414.

³ "Contribut. à l'étude des cystes, etc.," 1897 (quoted by Emanuel).

Elizabeth Weishaupt described two cases of intraperitoneal adenomyoma in *Archiv f. Gyn.* Bd. xcix. S. 491.

At the Gynaecological Society of the Netherlands (May 1904) Semmelink and de Joselin de Jong showed a remarkable case of general adenomyomatosis of the internal genitalia, in which the Fallopian tubes alone escaped from involvement in the infiltrative process. The case will be

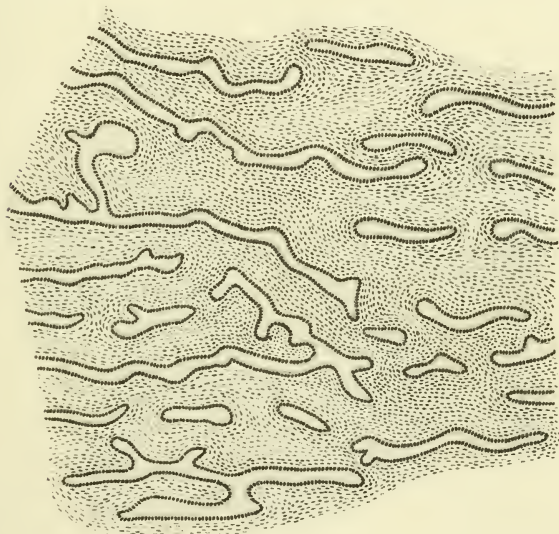


FIG. 186.—Section of the lining membrane of the left-sided fundal cyst (1 cm. in thickness). It was considered to belong to the left round ligament. (After Semmelink and de Joselin de Jong, *Monatsschr. f. Geb. u. Gyn.*, 1905, Bd. xxii. S. 240.)

found recorded under “Cystic Adenomyoma” (see page 399). In this section is to be mentioned the fact that the right round ligament in this specimen contained an adenomyoma with a cyst in its centre. The lining of this cyst was composed of tissue resembling uterine mucous membrane (see Fig. 186). The authors point out differences in the microscopic characters between this gland-tissue and that of the normal mucous membrane of the uterus. They found that

the glands differed in their greater width, absence of basal membrane, and more irregular form. My own opinion is that if Mallory's or Schridde's stains had been used the basal membrane would have been demonstrated; and no

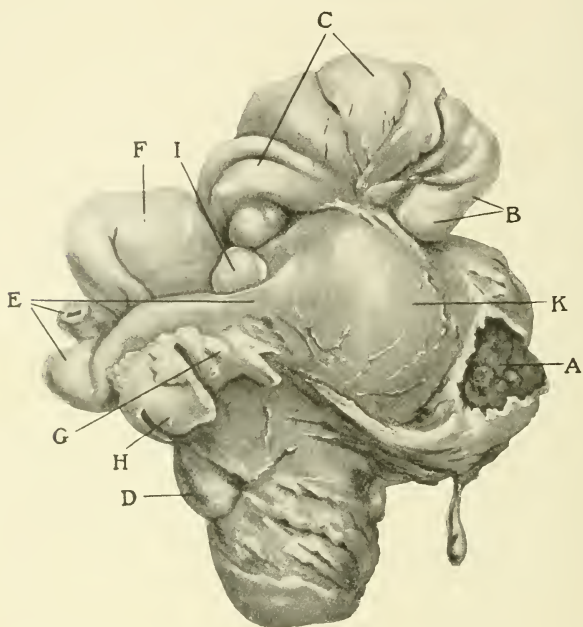


FIG. 187.—Cystic adenomyoma of the left side of the fundus uteri and cystic adenomyoma of the right ligamentum rotundum. (After Semmelink and de Joselin de Jong, *l.s.c.*)

A=cystic tumour of the left side of fundus uteri; *B*=left tube; *C*=left cystic ovary; *D*=adenomyomatous node between corpus uteri and cervix; *E*=right tube; *F*=right cystic ovary; *G*=right round ligament; *H*=cyst of right round ligament; *I*=solid round myoma in the fundus uteri; *K*=fundus uteri.

value can be attributed to the size and shape of the glands as points of distinction from those of the uterine mucosa. Nevertheless I quite agree with the authors that this round-ligament tumour did not arise from the uterine mucous membrane.

They point out that von Recklinghausen's essential morphological features were wanting, *i.e.* there were no pseudo-glomeruli, no pectinate gland-formation, and no

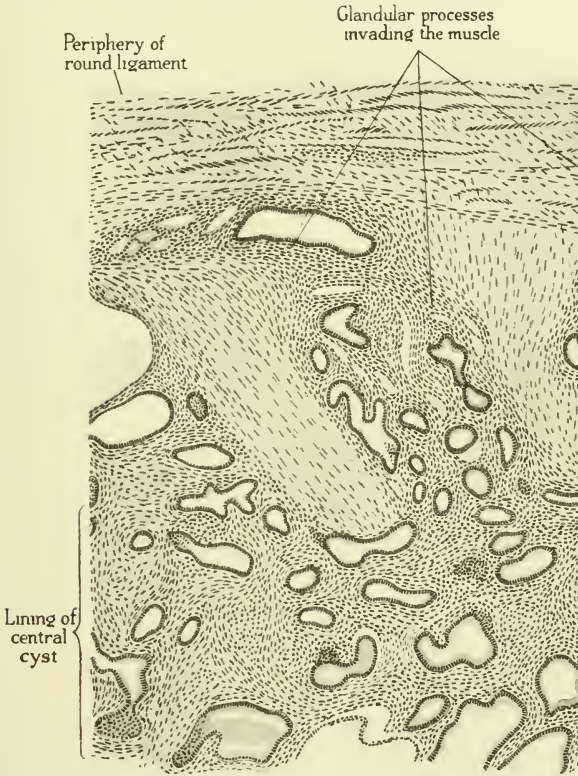


FIG. 188.—Adenomyoma of the right round ligament; see letter G in Fig. 187. The glandular growth has left tongues of muscular tissue between the invading processes. (After Semmelink and de Joselin de Jong, *L.s.c.*)

pigment-bodies. In their opinion these features are not essential to a Wolffian tumour. The round-ligament adenomyomas are mesonephric in origin, according to Semmelink and de Joselin de Jong, for *topographical* reasons. These

authors rightly say that topography and not morphology is the determining factor.

Figs. 187 and 188 show adenomyoma of the right round ligament (at its uterine end) in the case of Semmelink and de Joselin de Jong.¹

Malignant Adenomyoma of the Round Ligament.—The only case I have been able to find is that of Dubar, *Carcinome muqueux développé dans le canal inguinal du côté droit.*²

The patient was aged 29 years. There was an epiplocele of the right canal of Nuck, which was removed one year after it was discovered on account of pain and increase in size. An irregular hard swelling was then found to occupy the upper two-thirds of the right *labium majus* and to extend into the right inguinal canal. The tumour was adherent to the pubic bone, and the glands in Scarpa's space were enlarged. After removal, the mass was the size of two fists; microscopically it showed a carcinomatous structure and was myxomatous at its periphery. Dubar believed that the origin was from the Wolffian body, and Emanuel, in quoting the case, says "the possibility of an origin in an adenomyoma of the round ligament cannot be excluded."

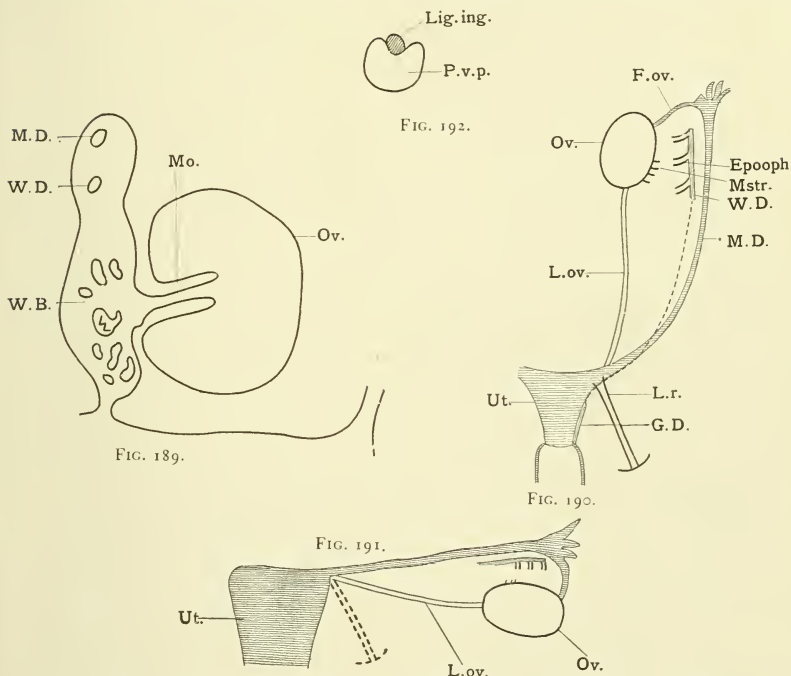
Origin of Adenomyoma of the Round Ligament.—Two important papers bearing on this point have been written by Fränkl and by Elizabeth Weishaupt.

Fränkl's views were expressed at the Gynaecological Society in Vienna, Dec. 12, 1911, and appear in the *Zentr. f. Gynäk.*, 1912. He regards round-ligament adenomyomas as mesonephric, and showed three models to demonstrate his view (see Figs. 189, 190, 191, 192). He states that the caudal pole of the Wolffian body presents a short duplicature—the *plica inguino-mesonephrica*—and in the anterior border of this fold the round ligament develops. On the ventral and median surface of the Wolffian body the genital glands

¹ *Monatsschr. f. Geb.* Bd. xxii., 1905. ² *Bull. méd. du Nord*, Lille, 1890.

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are developed and run as two folds, towards the head and towards the tail-end. At a later stage of development the caudal pole projects and becomes the *plica inguino-mesonephrica*, and in this lies the round ligament. Müller's duct has not yet developed. The round ligament develops



FIGS. 189, 190, 191, 192.—Diagrams (after Fränkl) relating to the development of the round ligament and ovarian ligament.

M.D. = Müller's duct; *W.D.* = Wolffian duct; *W.B.* = Wolffian body; *G.D.* = Gartner's duct; *Ov.* = ovary; *Ut.* = uterus; *Mo.* = mesovarium; *L.ov.* = ovarian ligament; *L.r.* = round ligament; *Lig. ing.* = inguinal ligament; *P.v.p.* = processus vaginalis peritonei.

very soon after the appearance of the Wolffian body, and in a further growth of the embryo it is found in the region formerly occupied by the parenchyma of the Wolffian body. From such a close relationship it was only likely that, pathologically, we should meet with traces of the Wolffian

body in the round ligament. Fränkl went further, and demonstrated reasons for his view that these growths stand in close relationship to distorted development of the uterus.¹

Elizabeth Weishaupt² says these tumours are *not* due to embryonic remains. She takes the view of Robert Meyer as applied to all extraperitoneal myomas, viz. that they are of serosal origin, the epithelium, in the case of round-ligament tumours, coming from the *processus vaginalis peritonei*. Cullen,³ who will have nothing to do with the serosal theory, says the controversy lies between supporters of the Wolffian theory and those of the Müllerian theory; and he favours the Müllerian origin for symptomatic reasons, *i.e.* enlargement during menstruation, and also from the fact that he regards the blood found in these growths as being menstrual. Personally, I am more impressed by arguments based upon developmental research than by those founded upon symptomatology only.

Clinical Aspect of Adenomyoma of the Round Ligament.— Extraperitoneal cystic growths will generally be diagnosed as hydroceles of the canal of Nuck. I made this mistake with a case of this kind, and only discovered its true nature by microscopical examination, when von Recklinghausen's *Pigmentkörper* and other features put me right. They may also be mistaken for inguinal glands, especially if they are adherent, as in a case recorded by Mary Scharlieb.

Intraperitoneal growths have been mistaken for ovarian cysts.

Enteroceles and epiploceles have to be differentiated from intracanalicular growths. The nodules grow slowly, and, as before stated, they are most likely to be first

¹ Fränkl, "Adenomyoma ligamenti rotundi bei Uterus bicornis unicollis myomatosisus," *Gynäk. Gesellsch. in Wien*, Dec. 12, 1911; also *Zentr. f. Gyn.*, 1912, Bd. xxxvi. S. 652.

² "Ein Fall von extraperitonealem Adenomyom und zwei Fälle von intraperitonealem Myomen des lig. rot., etc.," *Archiv für Gynäk.* Bd. xcix. S. 491.

³ *Adenomyoma of the Uterus*, page 252.

obtrusive in ripe sexual life ; they may reach a considerable size, but are usually small. At first, they cause no annoyance, but later become painful, especially during menstruation, when the lump increases in size. Microscopically they are benign, and *contain muscle, which a hydrocele does not*. They should be removed if they cause pain.

(C) **Adenomyoma of the Ovarian Ligament.**—If, as Wieger says, this structure is the continuation upwards of the round ligament, *i.e.* if it is a portion of the fibro-muscular band which runs from the mesonephros to the uterus, and from thence continues onwards as the round ligament of the uterus, we should expect it to behave in relation to neoplasms in the same way as does its distal part, the round ligament. This supposition is not borne out by fact, for, as we have said before, most of the tumours of the round ligament are extraperitoneal, and in this situation tumours are more frequent than in the ovarian ligament. Probably the liability to injury, in the more exposed situation, affords some explanation for this.

According to Emanuel, no case of adenomyoma of the ovarian ligament has been found, but he overlooked the case of Cullen, an illustration of which is here reproduced from Cullen's Figure 41, page 142¹ (see Fig. 193). This tumour is described as an "Adenomyoma springing from the left utero-ovarian ligament." The description of the macroscopic appearances reads as follows: "Perfectly independent from the uterus and attached to the utero-ovarian ligament on the left side, is a myoma, 6 cm. in length, 4 cm. in breadth, and 3 cm. in thickness. Projecting slightly from the surface are a subperitoneal cyst 1 cm. in diameter, and numerous smaller ones. On making sections of the nodule we find in the lower part cystic spaces reaching 1.5 cm. in diameter. Sections through the middle portion show cystic spaces, some 1 mm., others

¹ *Loc. supra cit.*

2 mm., and some 4 mm. in diameter. Sections through the attachment of the myoma to the utero-ovarian ligament reveal a cystic space, 7 mm. in length, and approximately 3 mm. broad. It has a definite yellowish lining and encloses chocolate-coloured contents ; several of the spaces

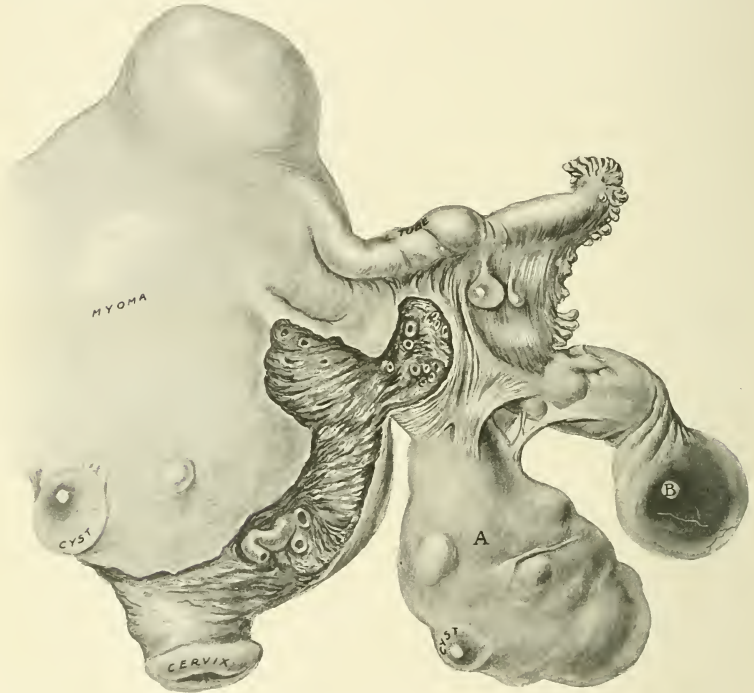


FIG. 193.—Adenomyoma springing from the left utero-ovarian ligament (T. S. Cullen). The uterine mucosa trespassed to some extent into the muscular wall. Cullen says : “It seems reasonably probable that the adenomyoma of the utero-ovarian ligament [here displayed] at one time lay next to the uterine mucosa, and that it gradually pushed outwards until it became subperitoneal and to all intents and purposes lost its continuity with the uterus.” [In my own opinion this is pushing the mucosal theory too far. The glands in the growth are much more likely to be of Wolffian or even of serosal origin.—C. L.]

are filled with a brownish putty-like material and have yellowish margins. The ovary contains a cystadenoma.” Cullen regarded this case as an example of a subperitoneal

adenomyoma which had migrated from the uterus to the utero-ovarian ligament. With this opinion I cannot agree.

Robert Meyer described a case of *Adenofibrom des ligamentum ovarii proprium*, the details of which are as follows:—

The uterus contained a myoma which extended between the layers of the left broad ligament. The Fallopian tube was elongated and stretched over it. The left ovary lay with its upper pole under the ampulla of the tube, whilst its lower pole was in contact with the intraligamentary portion of the myoma. The left ovarian ligament was 9 cm. long; it united the lower pole of the ovary to the uterus, where it became flattened out and lost. At its distal end it had no connection with the myoma. *The ovarian ligament was as thick as a man's finger; it contained small cysts with red-brown contents, also a cystic canal 1½ cm. in length.* The epithelial cells were arranged in single layers; the cells were cylindrical in the glands and low in the cyst. The whole of the thickened ligament was made up of this adenofibromatous tissue.

Meyer first thought (1899) that the ovarian ligament could transport Müllerian 'germs' from the uterus into the Wolffian area. In 1903 he said this idea was wrong, and he concluded that the gland-spaces in this ligament were Wolffian.

Sitzenfrey¹ has described two cases of adenomyoma of the ovarian ligament. In the first case the gland-spaces ran from the hilum of the left ovary along the whole length of the enlarged ligament to reach, and penetrate, the wall of the uterus (see Fig. 194). On the right side, the ovarian ligament contained glands which ran into the uterine wall. Sitzenfrey regarded the gland-structures as Wolffian (epoöphoritic).

This same author's second case was that of a tumour 7 × 7.5 × 5.25 cm. in size, which sprang from the posterior

¹ *Zeitschr. f. Geb. und Gynäk.* Bde. lxiv. and lxvii.

surface of the right ovarian ligament at its junction with the ovary (see Fig. 195). The mass was rounded and irregularly lobulated. The growth was composed of canalised tortuous cords—a curious structure like that described by R. Meyer in his “unknown variety of adenomyoma of the uterus.” At the uterine end of the same ligament was a ‘myoma,’ the capsule of which also contained glands lined by ciliated epithelium.



FIG. 194.—Transverse section through the left half of the corpus uteri and through the left ovarian ligament, $2\frac{1}{2}$ cm. underneath the insertion of the left Fallopian tube. (After Anton Sitzenfrey, *Zeitschr. f. Geb. u. Gyn.*, 1909, Bd. lxiv. Fig. 10, page 566.)

1 = uterine mucosa; 2 = uterine muscle; 3 = thickened left ovarian ligament; 4 = nodal swelling on posterior surface of ovarian ligament; 5^a = adenomatous tissue in ovarian ligament; 5^b = another collection of gland-tissue; 6 = ovary; 7 = round ligament. Between 6 and 7 the mesosalpinx is situated.

Oskar Fränkl also described a case of *Adenomyoma ligamenti ovarii*.¹ The patient was aged 44 years, VI-para; the last confinement took place ten years before operation. Complaint: pain in the left abdomen and sacrum, increased by exertion; chronic constipation, dysuria, leucorrhoea.

¹ *Archiv f. Gynäk.*, 1911, Bd. xciii. S. 659.

Examination : cystocele, prolapse of posterior vaginal wall. Uterus normal in size, anteflexed, semi-fixed posteriorly. Under anaesthesia, the uterus was found to be enlarged, and there was a *soft cystic tumour on the right side*. The left adnexa were free. There was an offensive uterine discharge. Vaginal total extirpation with removal of the right-sided cyst was carried out.

Histology of Tumour.—It showed an irregular arrangement of glands invested by a matrix of smooth muscle ; the



FIG. 195.—Adenomyoma of the right ovarian ligament seen from behind.
(After Sitzenfrey, *Zeitschr. für Geb. u. Gyn.*, 1910, Bd. lxvii.)

peripheral glands were wide, the central narrow. The gland-system coursed along the whole of the ligament and ran parallel to its long axis (Fig. 196). A point of importance was the fact that *the glands did not penetrate either uterus or ovary*. There was a *cytogenous mantle around the glands* (Fig. 197). Fränkl set himself the task of investigating whether this was a stationary or an actively growing process, and made a model by which he satisfied himself that it was a *wachsendes Drusenest*. He then criticised both Meyer's and Sitzenfrey's cases and pronounced two out of three, at

least, to be definitely Wolffian. In discussing his own case, he says, the cytogenous mantle was of no diagnostic value in determining the origin of these growths.

The Origin of the Epithelium in Adenomyoma of the Ovarian Ligament.—According to Fränkl the genesis of the epithelium in these adenomyomas can only be settled by a careful study of the development of the ovarian ligament itself. He quotes Wieger's view (on which my

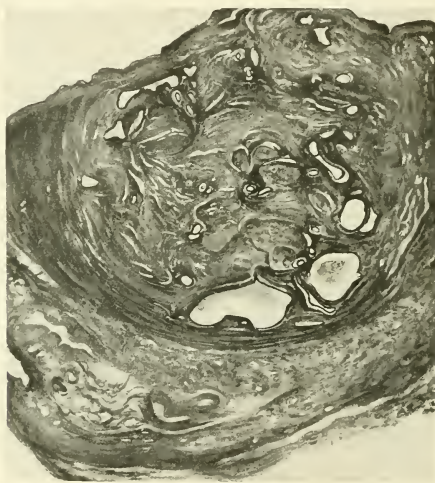


FIG. 196.—Transverse section through the ovarian ligament (under a low-power objective) showing an adenomyomatous structure with the glands running parallel to the long axis of the ligament. (After Fränkl, *Archiv f. Gynäk.* Bd. xciii. Taf. xiii. Fig. 1.)

opening remarks were based). Wieger found in embryos 10 cm. long, a cord which ran from the lower pole of the ovary to the *cornu uteri*, where it crossed the tube and then became bent at an angle of 120 degrees and continued its course onwards as the round ligament of the uterus. The portion between ovary and uterus corresponded later to the ligament of the ovary, and this together with the round ligament represented the *gubernaculum Hunteri*. Fränkl

showed that the ovarian ligament arises as a thickening of the caudal (later median) border of the mesovarium (Fig. 189, page 319) and has no genetic relationship whatever with the round ligament which arises, according to him, as a thickening in the posterior wall of the *processus vaginalis peritonei* (*ligamentum inguinale*, Fig. 192, page 319).

Fränkl considers that the tumour, in his case, arose from that part of the Wolffian system found at the hilum of

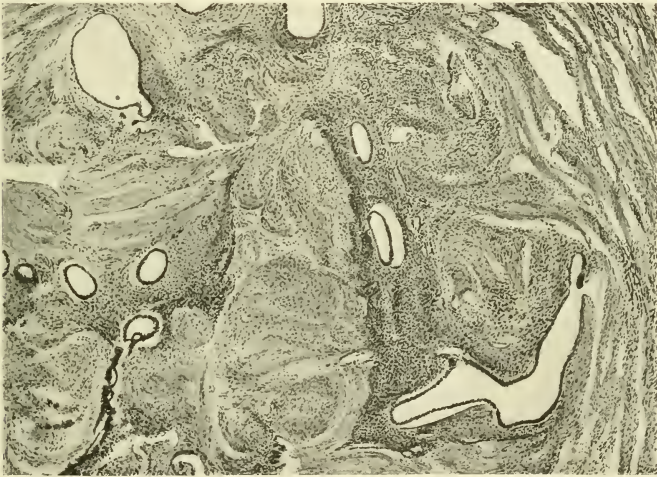


FIG. 197.—Section taken from the peripheral part of an adenomyoma of the ovarian ligament, showing dilated gland-tubules and cytotrogenous tissue. (After Fränkl, *l.s.c.*)

the ovary and known as medullary cords, whilst in the case of Meyer and Sitzenfrey the tumours arose from portions of the *Wolffian* duct.

Adenomyomatous elements within the substance of the ovary have been described by Cullen. I suppose he would refer these to the paroöphoron.

The following drawing (Fig. 198), showing adenomyoma of the hilum of the left ovary with a process of growth dipping into the ovarian stroma, is from the case of Semmelink

and de Joselin de Jong (*l.s.c.*). This ovary was adherent to a uterine adenomyoma; its ligament contained no growth, so that it was an interesting speculation as to whence the tumour sprang. The authors said the structure was similar to that of the uterine stroma, but after discussing the mucosal, serosal, and Wolffian sources of origin, they finally

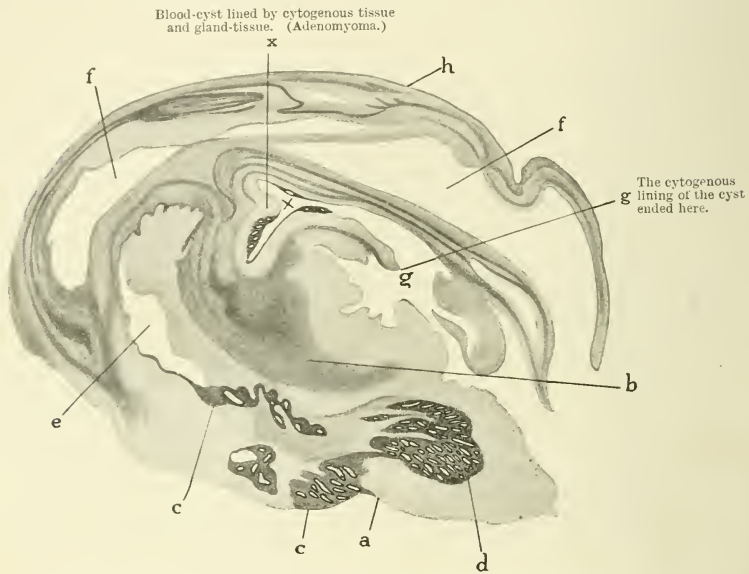


FIG. 198.—Left cystic ovary, showing invasion by an adenomyoma. (After Semmelink and de Joselin de Jong, *Monatsschr. f. Geb. u. Gyn.* Bd. xxii. Fig. 7, page 244.)

a=hilum of ovary; *b*=ovarian stroma; *c*=adenomyomatous glands (found to be surrounded by cytogenous tissue when seen under a higher power); *d*=adenomyomatous tissue; *e*=large spaces which were filled with blood and into which the mouths of the adenomyomatous glands opened; *f*, *g*=other large spaces probably connected with *e*; *h*=external wall of ovarian cyst.

favoured the view that it was Wolffian on topographical, in preference to morphological, grounds.

Pick described a case of direct adenomyomatous formation in the epoöphoron by which he considered he had put the coping-stone on the proof of von Recklinghausen's theory. He found in the right *hilum ovarii*, where the

epoöphoron lies, a tumour the size of a cherry, which caused a bulging of the posterior leaf of the mesosalpinx. The structure of this growth agreed with von Recklinghausen's description of an organoid tumour containing a principal canal, secreting and also collecting tubules.¹ Such a situation stamps the growth as Wolffian, apart from the morphological considerations.

(D) **Adenomyoma of the Broad Ligament.**—Cases of adenomyoma have been described as arising in the broad ligament. For those who accept the Wolffian theory as holding good for some of these growths there is no difficulty in understanding that adenomyomas can arise from the epoöphoron within the folds of the mesosalpinx. Many of the growths which may have arisen in this way also implicated the uterus, and thus the genesis became a debatable point, but Robert Meyer showed a *small* adenomyoma of the parametrium, at the April meeting of the Berlin Obstetrical and Gynaecological Society, 1908. This small growth was traceable to the duct of Gartner.

Jacobs² described the first of his three cases as being a node the size of a cherry lying in the broad ligament; the node contained gland-spaces surrounded by a cytogenous mantle. The serosa was found to dip into the mass, and Jacobs considered that the epithelium was of peritoneal origin. Since Meyer's work on epithelial heterotopy became generally known, it is a striking fact that the serosal origin for adenomyoma has become more the vogue. Jacobs, however, had a very open mind, for of the other two cases described at the same time as the above serosal growth in the *ligamentum latum*, he attributes the second to "*salpingitis nodosa* of Maresch" (inflammatory origin), and the third to a "probable congenital Müllerian origin."

In Semmelink and de Joselin de Jong's case, already

¹ L. Pick, "Ist das Vorhandensein der Adenomyome des Epoöphoron erwiesen?" *Centr. f. Gynäk.* 1900, No. 15, S. 389.

² *Beitr. zur Geb.*, 1913, Bd. xix. H. 1, S. 143.

referred to, the new growth spread on the right side between the uterus, tube, and ovary into the right broad ligament; from thence it ran into the hilum of the ovary, and even into the ovarian substance. It reached as far as the cervix on the anterior surface of the uterus, and also covered the whole of the back of the uterus like a free exposed mucous membrane. The mucous membrane of the cavity of the uterus was not found to have any communication with this growth. The authors regarded it as *mesonephric* in origin (see Fig. 199).

Discussion on Aetiology.—‘Adenomyoma’ is an infiltrative process, but is histologically benign. It is destructive only in so far as it alters the tissues invaded, but this it does in a totally different way from that of a malignant growth. Being infiltrative, it has the faculty of spreading into adjacent tissues at a distance from a given point of origin. Applying this propensity to the broad ligament, we find that this structure is not infrequently involved by the spread of ‘adenomyoma.’ The commonest example is that of adenomyositis of the tube (see Otto von Franqué’s drawing, Fig. 181, page 309).¹ If Leitch’s view of his “migratory adenomyoma” is correct,² then in his case of adenomyoma of the broad ligament there was a spread from the cervix along a narrow pedicle to a growth which flourished in the base of the left broad ligament. This view is not out of harmony with an inflammatory genesis, for the predominant mass might have been a nodular parametritis which was being absorbed on the pelvic and uterine (outer and inner) aspects, thereby leaving a median lump into which inclusions of epithelium passed along the old inflammatory track from an injured cervix.

Epithelial heterotopy is particularly common in the cervix, as instanced by the covering over of an inflamed area by the columnar epithelium derived from the canal or

¹ *Zeit. f. Geb.* xlii., 1900.

² *Proc. R. Soc. Med.*, July 1914.

the glands in cases of so-called 'erosion' (pseudo-adenoma), and if a cervix be sufficiently lacerated and infected as to produce a parametritis, the resulting epithelial heterotopy

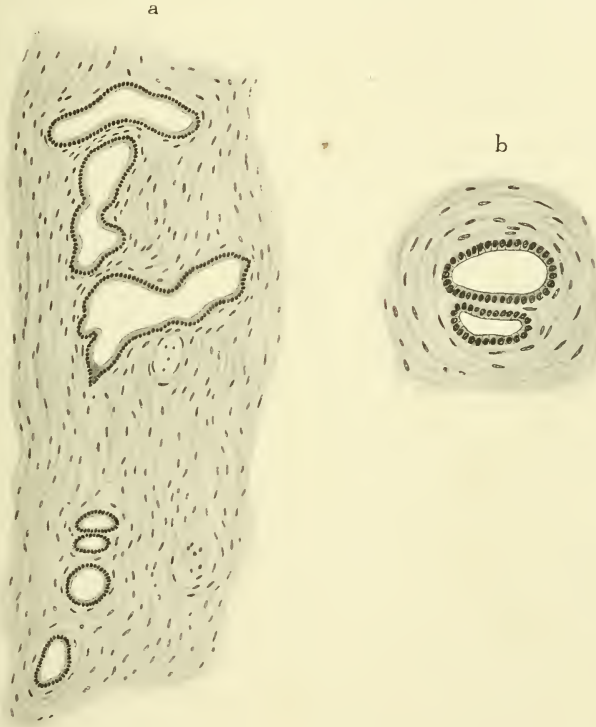


FIG. 199.—Adenomyoma of the broad ligament. (After Semmelink and de Joselin *de* Jong, *l.s.c.*)

a = invasion by adenomyoma of the lateral part of the right broad ligament. The stroma consists of hyperplastic muscle. *b* shows two gland lumina. The gland-epithelium lies direct on the muscle of the stroma. There is no cytotogenous tissue present. This case was regarded by the authors as being mesonephric in origin.

may exceed its reparative function and start an adenomatous growth within the parametric exudate.

We have seen that there are two distinct ways in

which the broad ligaments may become the seat of adenomyoma:—

(1) By the growth arising *in situ* from foetal relics (epoöphoron and Gartner's duct).

(2) By extension of an inflammatory process *plus* epithelial heterotopy from an adjoining structure (parametritis and lacerated cervix).

There is yet a third method. Uterine adenomyomas have been described in which the tissues of the 'tumour' have become so excessively cystic that, by fusion, large cysts have formed, which have reached out laterally into the broad ligaments, and have preserved their connection with the uterus in the form of a canalised isthmus. Other cases are mentioned in which the growth, though solid, has done the same thing, *i.e.* opened up the leaves of the broad ligaments, just in the way that (as Cullen says) an intramural myoma is liable to do. In tumours of this kind, Cullen tells us, he has been able to trace the continuity of the mucous membrane; thus mucosal, foetal, and serosal 'growths' may all find representatives within the folds of the broad ligaments.

The sites of election within the ligament will obviously be at the top and at the bottom, *i.e.* in the mesosalpinx where we have growths arising from salpingitis and also from the epoöphoron, also in the cellular tissues around Mackendrodt's cervical ligaments where parametritis with epithelial heterotopy is liable to occur. The base of the broad ligament is frequently involved by a lateral spread of a process starting in the recto-vaginal septum.

(E) **Adenomyoma of the Recto-Genital Space.**
—The literature on adenomyoma of the recto-genital space is already quite extensive, and the condition is now sufficiently well recognised to prevent the error of treating it as a malignant process—an error which more than one operator excusably made, before the true benign

character of an infiltrating adenomyoma was properly understood.

L. Pick,¹ in speaking of the diffuse character of "adenomyomas of the posterior vaginal fornix," said that they gave the idea of malignant growths, but farther on he speaks of the condition as being benign throughout.

The question of how to deal with the rectum was made the subject of discussion by Fühth at the 84th *Versamm. deutsch. Naturforsch. und Ärzte* in Münster, Sept. 1912,² and the conclusion arrived at was that although an excision of the rectum might appear to be indicated, the patients get well without it (*i.e.* if a portion of infiltrated bowel is left behind).

The following is a short account of forty-seven cases which I have collected, and which form a suitable introduction to the summary which follows:—

Case 1. In 1897 Pfannenstiel³ demonstrated (at the Congress in Leipzig) a specimen of a 'fornix adenomyoma.' It was the size of a walnut. The growth was adherent to the deep aspect of the posterior vaginal fornix and lay near the uterus. Small cystic puckerings existed on the vaginal surface (cp. Figs. 201, 202). The tumour was made up of muscle-tissue infiltrated with gland-spaces, some of which contained pigment-bodies and 'pseudo-glomeruli.' A similar growth was removed from the external ring. Pfannenstiel regarded both tumours as Wolffian in origin.

Case 2. At the same Congress von Herff⁴ showed two vaginal tumours removed during vaginal hysterectomy by Fehling. The growths were typical adenomyomas; von

¹ *Virch. Archiv*, 1899, Bd. clvi. S. 507.

² *Zentr. f. Gynäk.* xxxvi. S. 1356.

³ Pfannenstiel, "Über die Adenomyoma, etc.," *Verhdlg. d. Deutschen Ges. f. Gynäk.*, Leipzig, 1897, S. 195.

⁴ Von Herff, "Über Cystomyome, etc.," *Verhdlg. d. Deutschen Ges. f. Gynäk.*, Leipzig, 1897, S. 189.

Herff considered that the glandular elements might possibly have come from the Wolffian duct.

Case 3. In 1898 L. Pick recorded a case from Landau's Clinic. The patient was aged 31 years, III-para. The tumour lay above the posterior fornix; it was the size of a plum, and slightly movable, but the vaginal wall was firmly fixed to it; the mucous surface of the vagina was smooth and intact. Histologically the growth consisted of muscle and branching gland-tissue; it resembled the growths shown by Pfannenstiel and von Herff.

Case 4. G. Schickele¹ described a small hard growth the size of a nut; it lay in the upper half of the posterior vaginal wall, and the vaginal mucosa was movable over it, but the growth was very adherent to the rectum, so that a part of the bowel was removed with the tumour. This was regarded as a metastasis from a primary growth, and the uterus was removed on the assumption that it was the seat of the hypothetical primary malignant focus, but it contained nothing abnormal. The case was one of an 'adenofibroma,' the greater part of which lay in the recto-vaginal septum, and the smaller part in the submucosa of the vagina. Schickele regarded the mass as arising in the distal pole of the Wolffian system.

Case 5. L. Pick in a short account² described a case in which a chronically inflamed adnexal tumour, the size of a plum, projected (as in my first case, see page 352) into the vagina from the recto-vaginal septum. It had no definite limitations. It was hard and shaped like a mushroom. Pick spoke of it as a mesonephric adenomyoma of the same type as one which he had recorded in 1898.

Case 6. H. Fütth³ in 1903 published the case of Ouren

¹ "Weitere Beiträge zur Lehre von den mesonephritischen Tumoren," *Beitr. z. Geb.* Bd. vi. S. 449.

² "Über Adenocystomata, etc.," *Arbeiten aus d. path. Inst. zu Tübingen*, Bd. iv. H. 3, 270.

³ "Beitrag zur Kasuistik der Adenomyome des Uterus," *Zentr. f. Gynäk.*, 1903, Bd. xxi. S. 626.

of Trondhjem in Norway. The patient was a nullipara, aged 32. The symptoms had lasted for five years; they began with severe pain after a menstrual period, and continued as persistent dysmenorrhoea. In April 1902 appendectomy was performed, but gave no relief. The patient suffered from constipation and became anaemic; the hymen was intact and the cervix eroded. The posterior vaginal vault was depressed and there was an *ulcerated surface* the size of half-a-crown on the posterior vaginal wall, extending nearly to the external os. A fixed growth the size of a fist lay behind the cervix and uterus; it extended on the right to the pelvic wall, on the left it projected only slightly beyond the cervix. *The rectal mucosa could be moved over the growth.* A malignant tumour, probably ovarian, was diagnosed. Füh removed the growth by Wertheim's total hysterectomy on August 9,

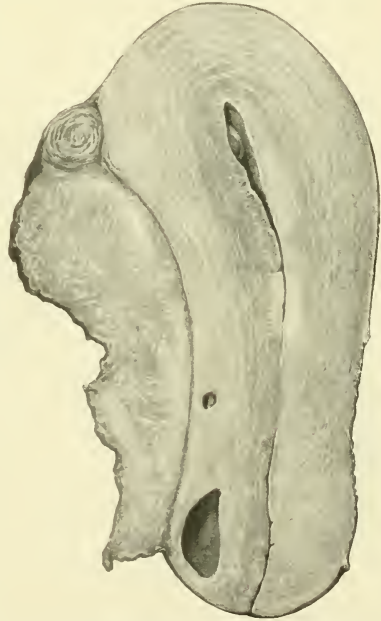
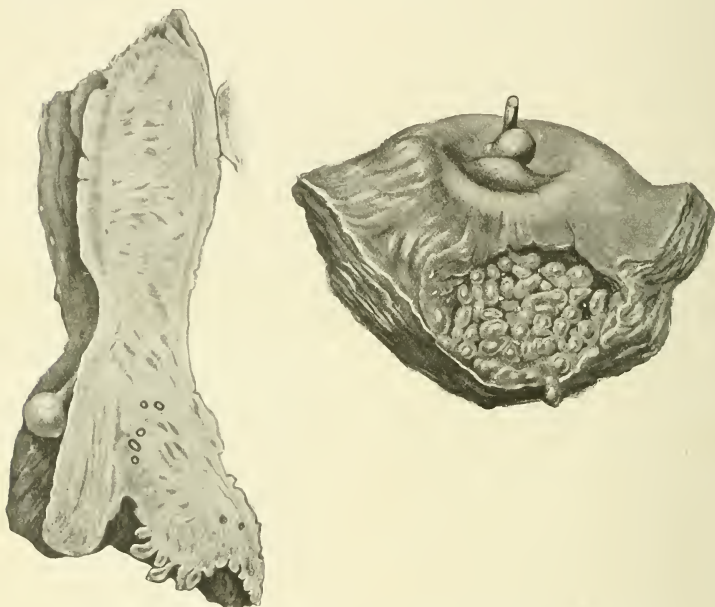


FIG. 200.—Adenomyoma of recto-vaginal septum. (After Füh, *Zentr. für Gynäk.*, 1903, vol. i. S. 628.)

1902. The rectum was not resected (see Fig. 200), and, when the patient left hospital, a hard, thick mass was felt, fixed to the rectum and side of the pelvis. A year and a half later the patient was in good health.

The growth had no continuity with the uterine mucosa, but Füh considered that it was Müllerian in origin for symptomatic reasons (cp. Cullen, page 320).

Case 7. Kleinhans in 1904¹ recorded the case of a patient 44 years of age, who had had one child. There had been a *brownish vaginal discharge* for nine months. The periods were regular, and lasted four to ten days; they were profuse but *painless*. In the posterior fornix was a *papilliferous growth* emitting a brown discharge (see Figs. 201 and 202);



FIGS. 201 and 202.—Kleinhans' case of adenomyoma of the recto-genital space.
(Taf. 4², Taf. 5⁵, *Zeitschr. f. Geb. u. Gyn.* Bd. lii.)

the neighbouring vaginal wall was thickened. The uterus was normal in shape but enlarged. Douglas's pouch was pushed up by a thick mass, which was very clearly felt *per rectum*.

Wertheim's hysterectomy was performed on March 10, 1903. The rectum and cervix were fused together by an

¹ "Beitrag zu Lehre von den Adenomyomen des weiblichen Genitaltraktes," *Zeit. f. Geb.*, 1904, Bd. lii. S. 266.

intervening mass, which also elevated the peritoneum. This paracervical induration did not prevent the separation from the rectum being carried out by 'blunt dissection.' When the patient left hospital, examination revealed a thickening at the point of separation of the growth. The drawing (Fig. 203) gives a clear indication of how the papilliferous vaginal surface was produced. Kleinhans regarded this infiltrating growth as arising from the 'vaginal glands,' *i.e.* parts of Müller's ducts.

Case 8. Kleinhans (*l.s.c.*) recorded a second case as illustrative of the "excessive activity of the gland-constituents of these tumours."

The patient was a single nulliparous woman, aged 40 years. The periods lasted three days, were profuse and always painful. A growth the size of a fist was felt lying to the left of the symphysis pubis. It was ovoid, movable, insensitive. The supravaginal cervix was thickened, and a nodular growth the size of a pigeon's egg lay between it and the rectum. At the operation (von Franqué) it proved to be a pedunculated, subserous fibroid. The uterus was retroverted and its posterior surface was fixed to the rectum, and here was the node found previously on examination. Panhysterectomy was performed, and the mass was left adherent to the bowel. It appeared as a malignant rectal tumour which had spread to the cervix. Ten centimetres



FIG. 203.—Section through the papilliferous processes in the vaginal wall. Note that the glands appear to be arising from the basal layer of the squamous epithelium at the apices of the two papillae. (Kleinhans, *l.s.c.*)

of the rectum were removed, and the bowel-ends were united by two rows of continuous silk.

The cervix was thickened by chronic metritis, and contained a cyst filled with brownish fluid.

The peripheral layers of the cervical muscle were invaded by glandular tissue, and the central part showed excess of fibrous tissue, whilst internally the cervical mucosa was normal. The glands in the outer segment of the cervix were like those of the *corpus uteri*. The rectal tumour looked like a carcinoma. The mucosa showed normal

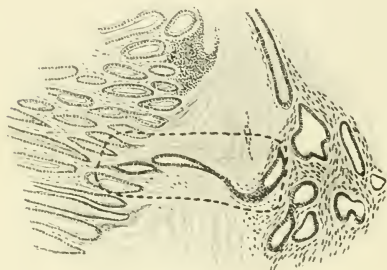


FIG. 204.—Section through the rectal wall in Kleinhan's second case. The dotted line embraces a 'single-file' process extending from the main growth through the submucosa towards the mucous membrane of the bowel. (Kleinhan, *l.s.c.*)

Lieberkuhn's crypts; the *muscularis mucosae* was thickened and displaced the submucosa in parts. In fact, the greater part of the swelling was due to the thickened circular muscle-layer, which was three times the normal thickness, whilst the longitudinal layer was double the usual breadth.

The tumours were invaded by gland-spaces right up to the base of Lieberkuhn's crypts (see Fig. 204). Kleinhan compares this case to the rare condition of *adenoma malignum cervicis*, which is relatively innocent, *i.e.* he thinks it demonstrated a form of malignancy of low type. Such a view is now known to be erroneous.

Cases 9-13. In 1909 R. Meyer reported on five cases of 'tumours' in the recto-genital space; the specimens were sent to him by Gerstenberg, Glöckner, Mackendrodt, and Rumpf (two cases). Two of the growths were removed during operation for carcinoma of the *portio cervicis*. Cases 3, 4, and 5

were nodules removed because they were painful, the pain being chiefly felt during coitus. The masses were diffuse, non-circumscribed, and therefore thought to be inflammatory.

They were associated with perimetritic adhesions, and in one case with adherent omentum. Partial resection of the rectum was performed in one instance. Meyer regarded all the cases as examples of *parametritis nodosa posterior*, and stated that those described by von Herff, Pfannenstiel, von Franqué, Pick,⁷ and others, are of this parametritic class. More diffuse examples of the same condition were illustrated by the cases of Füth, von Franqué, Kleinhans, and Moraller. The distinction between *parametritis nodosa* and *diffusa* was quantitative only, the genesis was the same in each. The diffuse form spreads downwards over the upper third of the vagina, and involves the vaginal and rectal walls; the epithelial heterotopy was more marked, and extended deeply into cervix, vagina, and rectum.

Cases 14-17. A. Sitzenfrey (Giessen) mentions four cases of 'Uterine Adenomyoma,' all involving the rectum.¹ The first case was similar to Kleinhans' Case No. 2 (No. 8 in this series), that is to say, there was a diffuse adenomyositic cervical condition which extended to the rectum, and there presented as a tumour in the rectal wall, the size of a walnut (see also Cullen's Case 3, page 358. Whilst the rectal growth in Kleinhans' case caused no symptoms, in that of Sitzenfrey there was evidence of stenosis of the bowel. In this, the first case of Sitzenfrey, the patient was aged 54 years, IV-para; the periods were somewhat profuse but *painless*. The symptoms were loss of appetite, wasting, dyschesia, and meteorism.

Examination.—A firm insensitive growth was felt, extending for three fingers' breadth above the symphysis pubis. It could be moved slightly from side to side.

Per vaginam the cervix was enlarged; a myoma was

¹ *Zeitschr. f. Geb. und Gyn.*, 1909, Bd. lxiv. S. 538.

felt in the anterior wall of the uterus ; on the posterior wall of the cervix a swelling was felt, which was the size of a pigeon's egg and adherent to the rectum.

Per rectum the upper part of the growth could not be reached. The left adnexa were fixed to the growth. *Operation* (by Sitzenfrey under lumbar anaesthesia, September 24, 1908). The uterus, and a portion of the vagina, together with the growth, were first removed, and then 9 cm. of the rectum resected, followed by an end-to-end anastomosis of the bowel. Drainage was carried out above and below, with gauze. Colotomy of the ascending colon was performed, and a Paul's tube introduced. The rectal anastomosis and the abdominal wound healed *per primam*. The colotomy wound had to be closed two months later. The epithelial inclusions are said to have arisen from the *serosa*, and probably from the endothelium of lymph-vessels.

(Sitzenfrey mentions that in 100 cases of laparotomy and resection for diseased rectum the mortality was about 35-40 per cent.)

Case 15, Sitzenfrey's second case,¹ was that of a *diffuse infiltration* between rectum and uterus (between this diffuse type and a distinct tumour-formation every gradation is to be found). The patient was aged 42 years. The periods were profuse but *painless*. A sense of pressure in the rectum and occasional dysuria constituted the symptoms in this case.

Examination.—The patient was a nullipara. There was a slender, smooth, mobile tumour, rising out of the pelvis to three fingers' breadth from the navel. The cervix was continuous with the tumour ; posteriorly there was an uneven, knotty growth uniting it to the rectum. *Operation* under spinal anaesthesia was performed on November 11, 1908, by von Franqué. It consisted of total extirpation of the uterus and the dissection of the posterior vaginal wall from the rectum. The latter procedure was carried

¹ *Loc. supra cit.*

out cautiously, from below upwards. The patient left hospital in seventeen days.

The large abdominal tumour was a degenerated fibromyoma. The recto-vaginal infiltration showed the gland-inclusions extending into cervix and rectum (see Fig. 205).

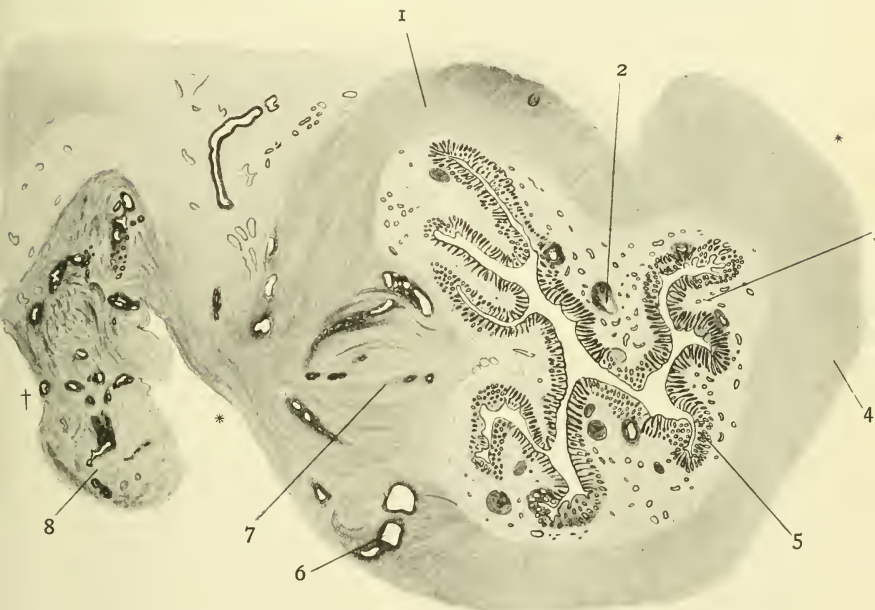


FIG. 205.—Section through an adenomyoma of the recto-vaginal septum. (After Sitzenfrey, *Zeitschr. für Geb. u. Gyn.* Bd. lxiv. Fig. 6, page 554.)

1=circular muscle of rectal wall; 2=follicle of adenomyoma; 3=submucosa; 4=longitudinal layer of muscle; 5=rectal mucosa; 6=penetrating glands; 7=follicle of adenomyoma in anterior wall of rectum; 8=posterior wall of cervix; *=position of mesorectum; †=growth in posterior wall of cervix.

The left ovarian ligament was also the seat of an adenomyomatous growth (see page 324). *Although the rectum was not resected, there was no trace of growth in the bowel-wall when the patient was discharged from hospital.*

Sitzenfrey regarded this case as an example of *adenomyositis recti*.

Case 16, *i.e.* the third case of Sitzenfrey,¹ was that of a primipara, aged 46 years, who had suffered for six months from irregular haemorrhage. On examination, the uterus was found to be large and irregular; there was a knotty thickening in the recto-vaginal space, which was forthwith diagnosed as an adenomyoma. Total vaginal hysterectomy was performed, but *portions of the growth were left on the rectal wall.* The operation was carried out under morphia and lumbar anaesthesia. The uterus contained several myomas, so that it was removed piecemeal through an anterior colpotomy wound. The large myoma contained no epithelial structures. The recto-vaginal growth showed 'cytogenous' tissue (as did the other cases, 1 and 2), which Sitzenfrey regarded as being fresh inflammatory granulation-tissue. The lumina of the glands contained quantities of thrombotic 'pigment-masses' derived (1) from the rupture of neighbouring blood-vessels (capillaries and pre-capillaries); (2) from haemorrhagic inflammation set up by the invading glands; and (3) from degeneration of the epithelium and connective tissue, which allowed thrombi, which had already formed, to penetrate into the gland-lumina. It will be noticed that Sitzenfrey does not regard the extravasation of blood as being due to menstrual excitation. On this point the opinion of Sitzenfrey is fundamentally different from that expressed by Cullen,² who favours the view that the presence of blood is due to *menstrual excitation.*

Case 17, *i.e.* Sitzenfrey's fourth case, was that of a nullipara, aged 30 years, on whom von Franqué operated for double pyosalpinx and ovarian abscess. The rectum was adherent to the posterior cervical wall, but the separation caused no injury to the bowel. A small cyst was removed from the posterior vaginal wall at the same time.

In the outer wall of the cervix, gland-spaces were found which arose from the serosal endothelium. Underneath

¹ *Loc. supra cit.*

² See page 320.

membranous adhesions on the back of the cervix the serosal endothelium had taken on the character of simple cylindrical epithelium, and in places this altered endothelium had sunk deeply into the muscle of the cervix. Moreover, the *squamous epithelium of the adherent vaginal wall dipped into the growth and changed its form into a cylindrical epithelium*, which could in no way be distinguished from that of the serosal inclusions. The cylindrical epithelium sprang from the basal cell-layer of the squamous epithelium of the vagina. Meyer had previously observed the same epithelial metaplasia in foetuses, both premature and at term. In the case of adults, Meyer had come to the conclusion (from observations made on a case of *vaginitis adenofibrosa*) that the vaginal mucosa, under certain pathological conditions, is capable of producing mucous glands, just as other mucous membranes, which have no glands in the phylogenetic sense, are able to do. Sitzenfrey concludes with the remark that these cases, as a rule, are *not true adenomyomas* but only *adenomyositis*; according to him, it is possible that on the top of an *adenomyositis recti* a true *adenomyoma recti* may develop, but in such a case the musculature is not an importation, it is only the myomatous constituent of the bowel-wall.

The author makes a *practical* distinction here: In the infiltrative type, experience has taught that the infiltration in the rectal wall disappears after operation, so that where there is no stenosis *the bowel may be left alone*. In the case of a true tumour resection of the bowel is indicated—as in his first case.

Cases 18-20. In July 1912 Amann showed three cases of retrouterine adenomyositis. In two of these the exhibitor advanced arguments to show that the epithelial inclusions sprang from the peritoneum.¹

Case 21. Hermann Renisch published an important case

¹ *Bacterisch. Gesell. f. Gynäk.*, München.

(strikingly similar to one of my own, see page 352, Case 32) of very extensive *Adenomyositis Uteri et Recti*.¹

Renisch mentioned that in most of the cases hitherto published the tumours were small, although some had involved the rectum; they had generally been regarded as Wolffian in origin, and Pick had spoken of the recto-genital space as the *site of election* for these mesonephric growths, adding that they certainly arose from the par-öphoral section of the Wolffian system.

Renisch's case was that of a woman aged 31 years; she had been married two years, and had never conceived. Menstruation started at sixteen years; at first it was regular every four weeks, lasting for three to four days, and was *painless*. For six months the periods had been profuse, lasting for eight days and accompanied with *acute sacralgia*. Then followed frequent straining at stool. The patient was a slender middle-sized woman, but well nourished; the cervix was forward, the body of the uterus was ante-flexed and not enlarged. *In the posterior fornix was a hard tender lump the size of an apple*. It was fixed to the intact vaginal wall and to the rectum. The parametrium on both sides was infiltrated. The adnexa were not palpable. The diagnosis of a malignant neoplasm was made. Total abdominal hysterectomy was performed by Amann on October 8, 1909. The whole of the back of the normal-sized uterus was adherent to the rectum. The separation of adhesions was easy until the cervix was reached, but this was immovably fixed to the rectum and 'blunt dissection' was impossible. As the rectal wall was thick and infiltrated, a portion the size of a crown-piece was resected from the anterior rectal wall and the wound closed. Drainage from above and from below was employed. Healing was perfect and no fistula formed. The width of the resected portion of bowel measured 5 × 4 × 2 cm.

¹ *Zeitschr. f. Geb. und Gynäk.*, 1912, Bd. lxx. S. 585.

The growth was not absolutely median but slightly to the left side (as in my second case). There were no myomas in the uterus. The tumour itself measured $2 \times 2 \times 3$ cm.; the fibrous ground-substance of the tumour radiated towards vagina, rectum, and cervix. Between the fibres of the stroma irregular brownish-red pigmented spots were seen, especially towards the vagina. In the hyperplastic uterine wall (which was 1.5 cm. thick) were cysts filled with numerous dark reddish-brown crumbling masses.

Microscopically.—The cystic spaces ran irregularly and only slightly followed the blood- and lymph-vessels. They fused to form a network of gland-spaces. Towards the serosa and cervix the gland-spaces were mostly single; towards the vagina and rectum the glands were more branched and larger. For the most part the glands were invested by a cellular connective-tissue mantle. The single-file arrangement was well marked above the vaginal surface (compare my second case, page 352). The double-comb form is never found in these chronic inflammatory cases. The epithelial inclusions were said to have come from the peritoneum (see Figs. 206 and 207).

Case 22. Raspini¹ published the case of a patient aged 36 years. She had once aborted, but the genitalia appeared nulliparous. The only symptom was severe pain in the lower abdomen, otherwise the patient had no complaint to make about her health. There was a fixed tumour between the uterus and the rectum. The adnexa were not diseased. A diagnosis of a malignant growth in the recto-vaginal space was made. The uterus was removed together with the growth. The latter contained numerous gland-spaces lined by cylindrical epithelium. The author regarded the

¹ M. Raspini, "Sull' adenomyositis dell' utero e del retto," *Ginecologia*, 1913, ix, page 577.

condition as a *pelvic peritonitis*. An origin from Müller's



FIG. 256.—Adenomyoma of the recto-genital space, showing the growth adherent to the entire posterior wall of the cervix and to a portion of the rectum. (After Hermann Renisch, *Zeitschr. für Geb. u. Gyn.*, 1912, Bd. lxx. S. 585.)

ducts could not be excluded. Raspini remarked, "These cases are not so rare as is thought."

Case 23. Louis Bazy's¹ case was that of a patient aged 50 years. The clinical signs were those of a myoma with adherent left appendages. The uterus was firmly bound down to the rectum, and on being separated, it bled like a placental site. The tumour in the posterior wall had no connection with the uterine mucosa. It contained glands and cystic spaces lined by low cubical epithelium. The origin was attributed to the *Wolffian system*. This case may, or may not, belong

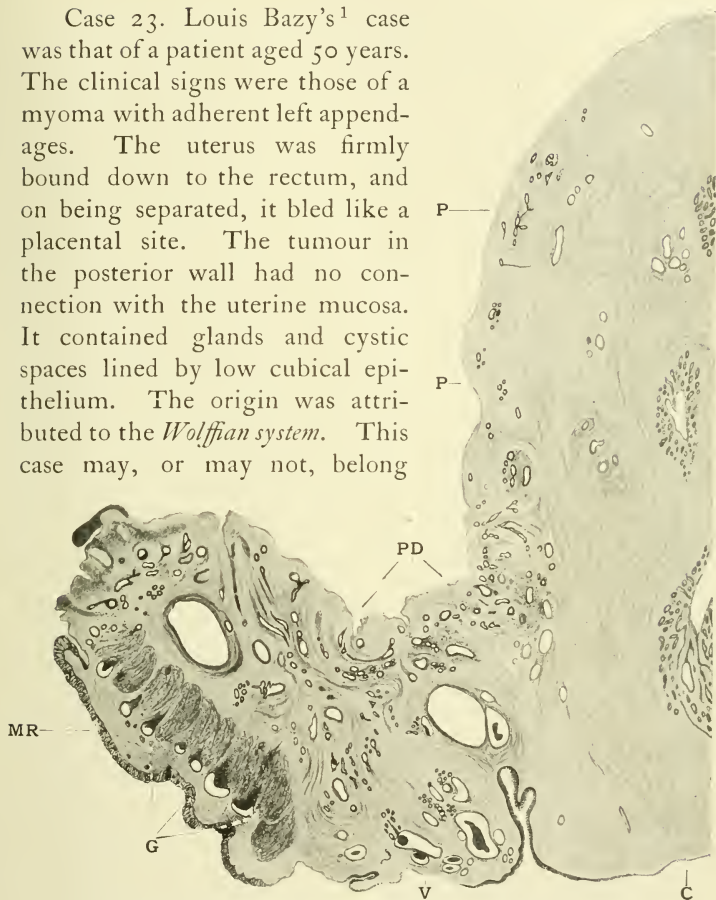


FIG. 207.—Adenomyoma of the recto-genital space. An enlargement of Fig. 206.

(After Renisch, *l.s.c.*)

C=cervix; *V*=posterior vaginal wall; *G*=growth in muscle and submucosa of rectum; *MR*=mucous membrane of rectum; *PD*=peritoneum of Douglas's pouch; *P*=peritoneum of posterior uterine wall, underneath which are multiple glands; the latter were considered by Renisch to represent inclusions of the peritoneum.

to the above class. The state of the rectum is not mentioned in the reference at my disposal.

¹ "Adénomyome de l'uterus," *Bull. et Mém. de la Soc. Anat. de Paris*, vol. lxxxviii. page 99, 1913.

Case 24. A. Bortkiewitsch of Petrograd described ten examples of adenomyoma.¹ The tenth case was one of *Adenomyoma vaginae fornicis posterioris*. The specimen was removed by Béna of Metz and was described by Bortkiewitsch as "questionable fistula-tissue from the posterior vaginal vault." *Macroscopically* it consisted of two pieces of tissue about 2.2 cm. in size. One piece was covered on one side with thick tissue like pale leather and presented a cystic prominence. The rest of the tissue was grey in colour. The cystic space contained yellowish-green fluid. The other specimen presented a grey, rough, warty surface.

Microscopically, the first piece of tissue showed the thickened vaginal wall, and the thickened recto-vaginal connective tissue, also both muscular layers of the rectum. The vaginal epithelium was intact, and underneath it there was small-celled infiltration. The cyst was lined by many layers of flattened epithelium. The tumour, like the thick vaginal wall, showed bundles of smooth muscle which extended into the pararectal connective tissue as far as the bowel. In the whole thickness of this tissue ran gland-tubules, clothed with low cylindrical epithelium. These were surrounded by a round-celled infiltration. No connection between the glands and the vaginal mucosa could be found. In the interstitial tissue were haemorrhages and iron-containing pigment-bodies, also signs of chronic inflammation (enlarged vessels and areas of round-celled infiltration). The author attributes the origin of the gland-tissue to the epithelium of embryonic Müllerian relics, but in no sense was this a true growth but only an *adenomyositis* of the posterior vaginal wall.

Cases 25-26. Funk-Tilp published two cases of adenomyoma of the vaginal fornix in the *Strassburger Med. Zeitung*, Bd. vii. S. 166, 1910, but as I have been unable to obtain this volume, the details cannot be given.

¹ *Archiv für Gynäkologie*, 1914, Bd. ci. H. 3, S. 620.

Case 27. Moraller at the Twelfth Congress of the German Gynaecological Society, Dresden, 1908, showed an adenomyoma of the recto-vaginal septum.

The patient was 44 years of age, and had suffered for five years from menorrhagia, severe pain in the abdomen, and attacks of fainting and sickness. Two years previously, the diagnosis had elsewhere been made of *myoma uteri*, but no operation could be performed on account of anaemia and weakness. The haemoglobin had fallen to 30 per cent.

Examination revealed an intraligamentary myoma the size of a man's head. In the upper part of the posterior vaginal wall the following condition was found :—

The entire wall was occupied by an invading growth composed of closely-opposed processes ; there was a general *papilliferous excrescence* on the vaginal wall (cp. Fig. 202, page 336) ; the processes of the growth were sessile and partly polypoid. The neighbouring mucous membrane was thickened. The growth extended to the anterior wall of the rectum and to the base of the broad ligament. No exact clinical diagnosis could be made.

Microscopically, one of the nodules showed vaginal epithelium sending down-growths into the subepithelial tissues and causing a glandular tumour, the tubules of which were lined by a single layer of cylindrical epithelium. This was diagnosed by von Hausemann as a malignant adenomyoma *im Sinne von Recklinghausen*.

Operation was performed in consequence of severe haemorrhage and pain. The uterus was removed by Wertheim's hysterectomy with morcellement of the growth ; a portion of the latter was left behind on the rectal wall. The patient stood the operation badly. Moraller intended to extirpate the rectum by Kraske's method later on, but this was found to be unnecessary as the *growth disappeared from the rectum and vaginal wall*. The patient increased 37 lbs. in weight, and the percentage of haemo-

globin nearly reached the normal. The author regarded the case as one of *Adenomyometritis* arising from the vaginal epithelium. It was not a true blastoma, not an autonomous new growth, "but a mass of tissue resembling a tumour" which had infiltrated both cervix and rectum. The adjacent myoma was degenerate, *i.e.* necrobiotic and calcareous.

Thomas Wilson of Birmingham has kindly sent me the following notes (*vide infra*) of three cases of adenomyoma of the recto-genital space. They all occurred in Wilson's practice.

Cases 28-30. (*Case 28*).—Mrs. P., aged 42; *twelve children*; one miscarriage; last labour in February 1896; three months' miscarriage in February 1899. The patient complained of pains and menorrhagia. On July 1, 1899, anterior vaginal coeliotomy; igni-puncture of small cystic ovaries. Menorrhagia persisted. In June 1904 menorrhagia still persisted with clots; pains in groins and over sacrum; anaemic. On July 12, under anaesthesia examination showed a deep laceration on either side of the cervix. From the supravaginal surface posteriorly, a nodule with ill-defined margins, and broadly attached to the cervix, extended backwards for $1\frac{1}{2}$ inches. The nodule was movable with the uterus, firm in consistence, and had a granular surface. As seen through the speculum the surface was of about the same colour as the rest of the vagina, but showed several small papillae, as well as a few small cysts, shining through the surface; two of these cysts on puncture gave exit to altered blood. A wedge-shaped piece of the nodule was excised for further examination. Rectal examination showed that the mucous membrane of the gut was freely movable over the tumour. On July 19, supravaginal amputation of the cervix together with the adherent nodule was carried out. The rectum was found to be closely adherent to the nodule, and in separating the gut its wall was perforated¹; this

¹ Compare Stevens' 4th Case (page 366).

opening was closed by interrupted sutures. The part removed showed at one place an old silk ligature, partly separated into strands, but otherwise well preserved.

On December 3, menorrhagia having persisted, the rest of the uterus was removed. Afterwards the patient did well. When examined nine years after operation she was quite well.

Microscopy of the tissue removed proved it to be an adenomyoma.

Case 29.—Wilson's second case was that of a single woman aged 36, who complained of left iliac pain of five months' duration, also of occasional *watery vaginal discharge*. There were hard inelastic fixed nodules felt in the left utero-sacral fold on rectal examination. The uterine body was somewhat large and uneven. There was an erosion of the cervix of the size of a florin, and small mucous polypi were noted. The diagnosis of posterior parametritis was made. Operation on February 13, 1912; the ovaries and tubes were normal. A firm uneven elongated nodule was found to occupy the left utero-sacral fold; this was partly dissected out for examination. The rectum was somewhat drawn towards the utero-sacral fold. The ureter was defined in its usual position.

Microscopically the nodule was found to consist of adenomyomatous tissue.

The patient was seen on March 27, 1913, when the cervix was noted to be very long and there was no sign of recurrence of the adenomyoma.

Case 30.—Wilson's third case relates to a woman aged 43 years, who had been married for eight years and was sterile; no miscarriages. The catamenia began at thirteen years of age. She suffered from pain before and after the periods. There was a clear interval of twenty-one days and the flow continued for five to ten days; loss was excessive. Operation on September 14, 1911. The presence of a large

submucous fibroid necessitated abdominal hysterectomy. The descending colon and part of the rectum were closely adherent to the posterior uterine wall. About a cubic inch of tissue was removed from the recto-vaginal septum. In this tissue there were two prominences, the size of French beans, projecting into the vaginal wall. Each of the nodules was studded with clear cysts of the size of a pin's head. Histologically the tissue was adenomyomatous. The ovaries and tubes were normal.

Thomas Wilson adds that "these cases were diagnosed correctly before operation by the characteristic appearance and feel in [the] posterior vaginal fornix."

Case 31. In January 1913 I reported a case of adenomyoma of the recto-uterine and recto-vaginal septa at the Royal Society of Medicine,¹ and I then stated that it was the second case I had seen in fifteen years. The first case was that of a curious teat-like projection in the right vaginal fornix; the vaginal skin covered it. There was no ulceration: the growth lay close to the cervix on the right side and was long enough to be palpable before the examining finger reached the vaginal cervix. There was no involvement of the rectum. No operation was performed. I subsequently heard from the patient's doctor that she died, but the cause of death I was unable to ascertain.

Case 32. My second case was that of a woman aged 35; married eighteen years; sterile. Her complaint was of vaginal haemorrhage and pain. The periods had always been regular, but for twelve months the loss had been excessive, and particularly so for the last three months. There was great pain in the rectum and defaecation had become very difficult. The pain was always worse at night. For several weeks the patient had been laid up in bed. The haemorrhage for the past few weeks had been continuous, but there had never been any bleeding from the bowel.

¹ *Proc. Roy. Soc. Med. Lond. (Obst. and Gyn. Sect.)*, 1913.

On examination a *curious hard mass was felt in the posterior vaginal fornix ; it was definitely fixed to the supravaginal cervix and adhered to the pelvic floor.* The vaginal cervix was normal. *Per rectum,* the mass was found to project anteriorly into the lumen of the bowel, but the *mucous membrane was intact* over it. No definite diagnosis was made. The posterior vaginal wall, for the space of $1\frac{1}{2}$ square inches, was *puckered and presented blue points like varicosities.* The skin-surface, however, was quite intact and did not bleed on contact.

At the operation it was found that the appendages were normal and the uterus small. There was no infiltration in the fornices. The rectum and uterus were fused together below the peritoneal reflection, so that the two structures could only be moved *en masse* from side to side. I dissected out the ureters ; the left one was intimately adherent to the side of the rectum, to the growth, and to the vagina. The vagina was opened in front, and the uterus, together with a large segment of bowel, was removed. A vaginal drain was inserted. The proximal end of the bowel was brought out through a wound in the left iliac region and the central abdominal wound closed, except that two drainage tubes were inserted down to the closed peritoneal level. This was the second time I had removed a portion of the rectum for adenomyoma, having thought in both instances that I was dealing with malignant disease. There were no peritoneal adhesions in this case, but whether there had been a nodular parametritis I could not say. The adherence of the left ureter was a point favouring the idea of an inflammatory process. The duct was injured, and a ureteric fistula developed. The following figures convey a good idea of the naked-eye and microscopical characters of the growth (Figs. 208, 209, 210, 211). A section of the rectal portion of the growth stained by van Gieson's method is seen on page 357, Fig. 212. This patient

recovered from the operation and put on two stones in weight, but she developed a ureteric fistula for which subsequent treatment by nephrectomy was necessary, ligation of the ureter having been tried without success (see page 551). The patient is now in good health.

In a case of adenomyoma of the body of the uterus in which I also removed a segment of rectum it was afterwards

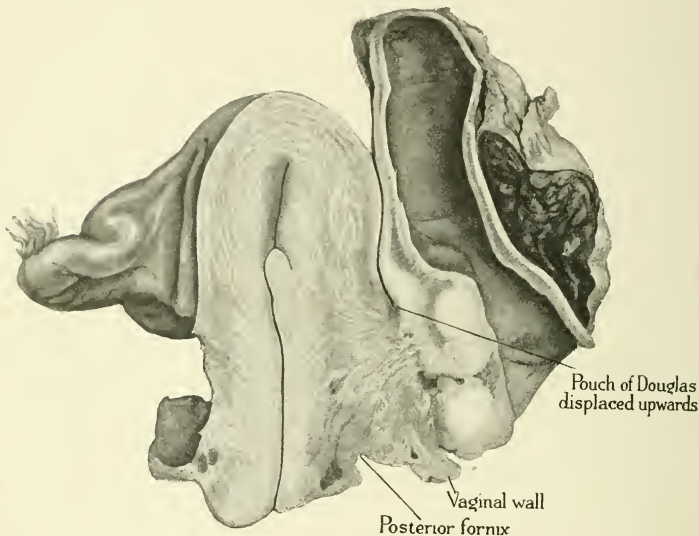


FIG. 208.—The Author's second case of adenomyoma of the recto-genital space. Macroscopic view of sagittal section.

found that the induration in the bowel-wall contained *no* adenomyomatous glands. The case is recorded on page 434.

Cases 33-34. At the same meeting (July 1914) of the Obstetric and Gynaecological Section of the Royal Society of Medicine, Clifford White mentioned two cases which had occurred in the practice of Herbert Spencer and Blacker respectively. White had examined both cases under anaesthesia and had removed portions of the growths

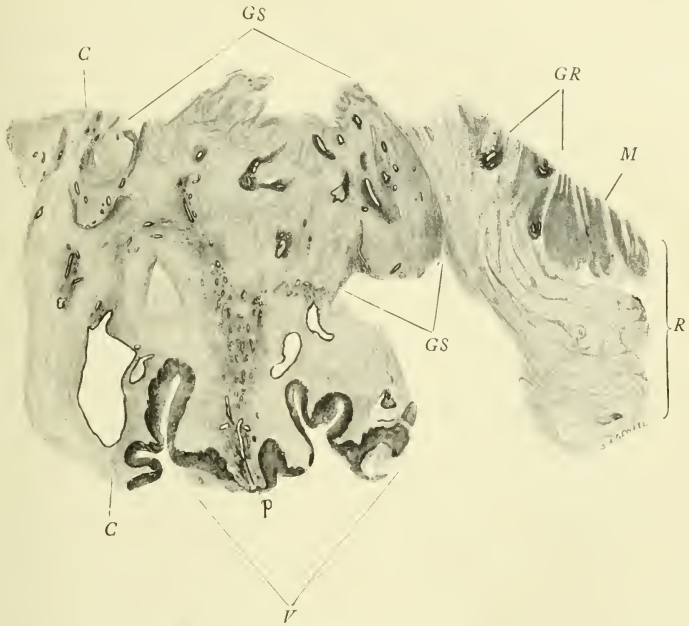


FIG. 209.—Section through adenomyomatous 'growth' seen in Fig. 208 ($\times 6$).
 C=portion of cervix; V=posterior vaginal wall; GS='growth' in septum between cervix and rectum; M=muscle-tissue of rectum; GR='growth' in muscle-wall of rectum; R=rectum; p=confluence of gland-tubules and vaginal mucous membrane. The latter is a possible source of origin of the adenomyoma.



FIG. 210.—Section through the rectal portion of 'growth' seen in Fig. 208 ($\times 6$).
 M=mucosa; SM=submucosa; M'=muscle-layers; g=gland-tubules of 'growth.'

for microscopic purposes and found them to be adenomyomas. Spencer's case was that of a woman aged 36,



FIG. 211.—Section through the rectal portion of 'growth' seen in Fig. 208, showing the cystic character of the tubules and the freedom of the rectal mucosa from invasion.

whose only pregnancy had ended in a ten weeks' miscarriage four years before. She complained that for four months she had had pain in the lower abdomen and

back, with slight menorrhagia. Brownish discharge had also been noticed. A hard nodular fixed mass $1\frac{1}{2}$ inches in diameter was found in the recto-vaginal septum. To the right of this was a slightly larger mass, which felt like enlarged glands. The right utero-sacral fold was thickened and nodular up to the pelvic brim. *The rectal mucosa was not ulcerated, and was freely movable over the tumour. The vaginal mucosa was thickened and fixed to the growth but was not ulcerated.* The growth and the thickened part of the vaginal mucosa were situated 1 inch from the *portio vaginalis*, which, with the intervening tissue, was apparently healthy. The uterus and appendages were normal. No operation was attempted.

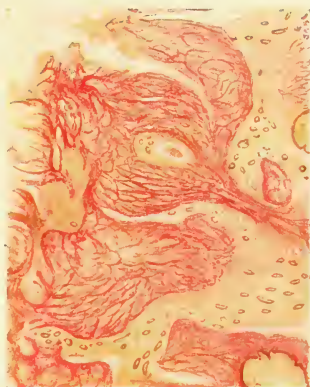


FIG. 212.—Section of rectal portion of adenomyoma of the recto-genital space, stained by van Gieson's method. The growth is coloured yellow, and is seen invading the circular muscular layer, the fibrous tissue of which is stained pink.

Blacker's case was that of a patient who for two years had had pain in the back which increased during and after menstruation. There was constipation and painful defaecation. Menstruation was regular and profuse. No obstetric history. Under anaesthesia, the uterus and appendages were healthy. At the top of the vagina, behind and on the left side, was a *firm tumour which had grown into the recto-vaginal septum. The vaginal mucosa was thickened and adherent to it, but was not ulcerated.* The cervix was healthy. *Per rectum*, the growth was as large as a hen's egg. *The rectal mucosa was movable and not ulcerated.* The patient was lost sight of for three months, when it was found that the growth had invaded the mucous membrane of the bowel, which was now thickened, warty, and adherent.

There was, however, no ulceration, and the growth was not friable. No signs of metastases could be found; otherwise the tumour resembled an ordinary malignant growth. White thought the close relation of the growth to the vaginal mucosa in the early stages, and the mobility of the rectal mucosa at that time, "might be of importance in elucidating the origin of these growths." White's suggestion therefore favours Sitzentrey's view that some of these curious adenomyomatous masses derive their gland-elements from the vaginal epithelium.

Cases 35-38. Cullen, in the *Journal of the American Medical Association*, vol. lxii. No. 11, page 835, reports on four cases of adenomyoma of the recto-vaginal septum. Two of these occurred in the practice of Jessup of New York. In each the tumour was attached to the cervix and to the rectum, and in each a portion of the bowel was resected. Cullen, on microscopical examination, found that these growths were identical in structure with *adenomyoma uteri*. Cases 3 and 4 occurred in Cullen's own practice. In Case 3 the uterus was retroposed. Several small polypi had previously been removed from the rectum. In performing laparotomy Cullen found the rectum adherent to the posterior surface of the uterus low down. Total hysterectomy was performed and a "myoma" 1 cm. in diameter was shelled out from the left side of the pelvic floor, and another 4 cm. in diameter, with a secondary nodule 1 cm. in diameter, lying on its surface. The situation of the "combined nodule" is seen in Figure 213. Microscopically it was shown that this "myoma" was a typical adenomyoma. Subsequently Cullen removed a stone from the pelvis of each kidney. There were small "fibroids" in the wall of the uterus, and the mucosa showed definite endometritis.

Cullen's Case 4 was an "Adenomyoma in the left broad ligament, intimately blended with the rectum." The patient was aged 37 years. Two years previously a myoma-

tous uterus and enlarged ovary had been removed. At that time a small portion of the rectum was also removed on account of adhesions. There was a protracted convalescence, and post-operative intestinal obstruction supervened. For months afterwards there were pelvic pain and continuous bleeding from the cervix. On admission into the Johns

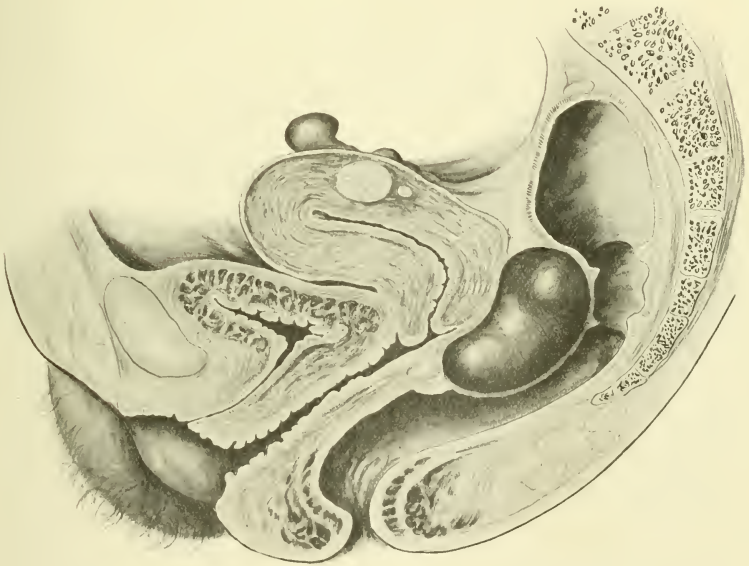


FIG. 213.—Situation of adenomyoma in Cullen's case shown diagrammatically. (After Cullen, by permission, *Journ. Amer. Med. Assoc.*, March 14, 1914, Fig. 3, page 837.)

Hopkins Hospital, Cullen found a thickening behind the cervix and induration in both broad ligaments. Haemorrhage continued whilst in hospital. When the abdomen was opened it was found that the folds of the left broad ligament were separated by a cystic mass 6 cm. in diameter (see Fig. 214). This was shelled out from its attachment to the pelvic wall, but a portion was left adherent to the rectum, as the patient's condition was serious. The right

broad ligament was not explored. The cyst contained chocolate-coloured fluid. The more solid parts were made up of smooth muscle-fibres and "quantities of uterine glands embedded in their characteristic stroma."

Cullen says: "In my group of adenomyomas of the uterus there were several of cervical origin. If these grow

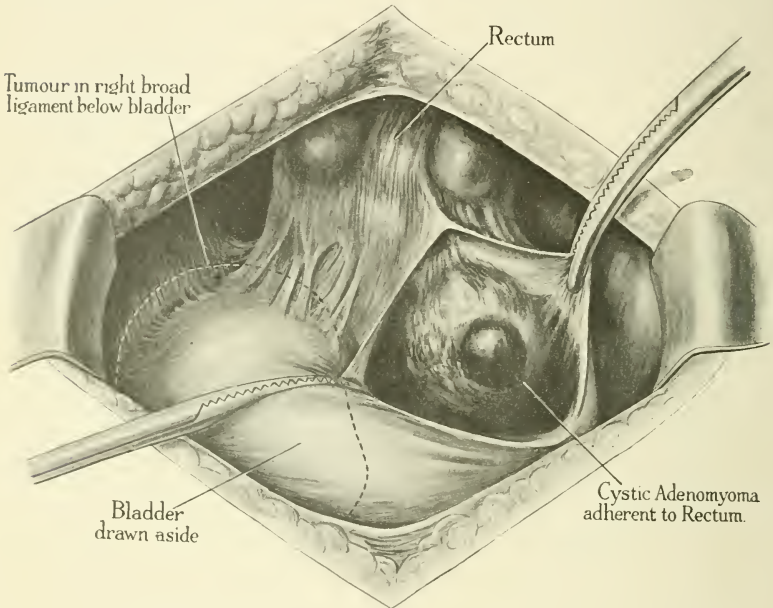


FIG. 214.—Cullen's cystic adenomyoma adherent to the rectum. The uterus had been previously removed. (After Cullen, by permission, *Journ. Amer. Med. Assoc.*, March 14, 1914, Fig. 5, page 838.)

posteriorly, owing to their inherent tendency to become attached, they will spread out into the recto-vaginal septum and become adherent to the rectum, or the *peritoneal surface of the cervix (sic)* may grow fast to the peritoneal surface of the rectum. In either case the rectum becomes fixed to the cervix." This author's practical observations were as follows: "When the growth has invaded the rectum to a

limited extent, it is *necessary* to remove only a small portion of the anterior wall of the rectum."

On the aetiology of adenomyoma of the recto-genital space Cullen is dogmatic; he states that "the glands in these growths undoubtedly arise from the uterine mucosa, or from remnants of Müller's duct."

"When the rectal involvement is extensive, as in Lockyer's Case 2, resection of that portion of the bowel will, as a rule, be necessary." As regards diagnosis Cullen states that: "The differentiation between carcinoma of the bowel and adenomyomas of the recto-vaginal septum is important. If the uterus contains myomas the probability that the pelvic growth is an adenomyoma is strengthened. Further, if the growth appears to be muscular in origin, this diagnosis is still more probable; if the growth is cystic, the diagnosis of adenomyoma is almost certain.

"The only rectal symptom is painful defaecation or obstructive symptoms."

Cullen's views on prognosis are summed up in the statement that: "If portions be left *these will continue to grow*, and will lead to more pelvic adhesions, and finally produce complications that may result in death or permanent invalidism."

Case 39. At the July (1914) meeting of the Obstetrical and Gynaecological Section of the Royal Society of Medicine, W. S. A. Griffith demonstrated microscopic slides of sections taken from a growth in the recto-genital space in the case of a woman who was pregnant. The patient was a unipara, aged 37 years. She was admitted into hospital in February 1914, with a history of having had an offensive blood-stained vaginal discharge for five years. There had been neither pain nor loss of flesh. On admission to hospital it was found that the patient was pregnant for the second time. The fundus of the gravid uterus reached to $9\frac{1}{2}$ inches above the symphysis pubis. A mass attached to the left of the uterus was diagnosed as a sessile fibro-

myoma. The cervix lay near the symphysis ; it was fixed by an ill-defined mass which lay between it and the rectum. The vaginal wall of the posterior fornix was invaded by growth ; this was soft and spongy, and when it was probed through a speculum, very free arterial haemorrhage resulted. A fragment of the growth was removed through the posterior fornix for examination. Abderhalden's dialytic test for pregnancy was faintly positive. Whilst under observation in hospital the uterus increased in size, hydramnios became marked, and the foetus took up the first vertex position, with the head above the brim.

The cervico-rectal growth increased in size considerably, compressing the rectum, and extending on the right side as far as the sacro-iliac synchondrosis. Radium was introduced into the growth (3 tubes, 100 mg. and 50 mg. of radium bromide and 37 mg. of radium carbonate), and these were removed after twenty hours' exposure. Three months after the treatment by radium the excess of liquor amnii was less marked. The vaginal discharge had ceased entirely, and the cervico-rectal mass was much diminished and was softer. Subsequent delivery was spontaneous and easy.

Sections stained by van Gieson's method showed large masses of typical decidual cells in a stroma of muscle and connective tissue. Within each mass was a cleft, simple or branching, lined by a thin lamina composed of flattened epithelial cells. In one part was seen a dilated gland-tubule lined by low cubical epithelium and completely surrounded by large decidual cells in three or four layers only. It was concluded that the clefts seen in the large masses of decidual cells were similar tubules, the epithelium of which had been compressed into the thin lamina by the pressure of the surrounding mass of decidual cells. The histological features were those of an adenomyoma, but the stromacells surrounding the gland-tubules had undergone decidual reaction (see Figs. 215 and 216). The speaker stated that

this decidual change supported the view that extra- as well as intrauterine adenomyomas were of Müllerian origin, and he remarked that the notable diminution of the hydramnios might be only a coincidence ; it certainly followed the application of radium.

Cases 40-41. Archibald Leitch¹ commented upon two cases of septal adenomyoma in an able paper written to give expression to the view that extrauterine adenomyomas

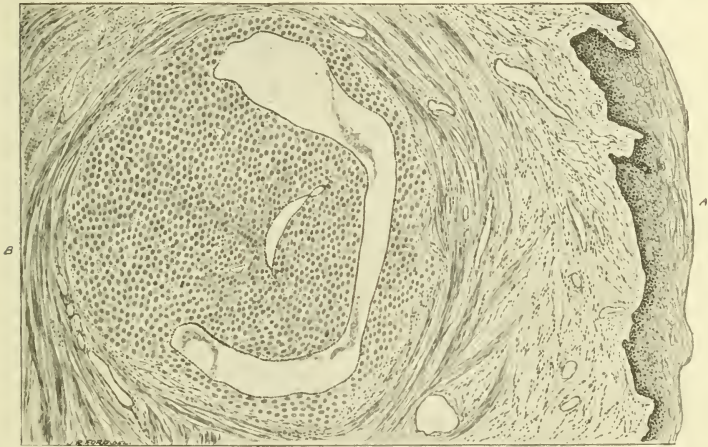


FIG. 215.—Adenomyoma of the recto-genital space adherent to the pregnant uterus. Section showing the structure of a portion of the ‘growth’ which was removed from the posterior vaginal fornix. (Reproduced from *Proc. Roy. Soc. Med. (Obstet. and Gyn. Sect.)* July 1914, page 390. By permission of W. S. A. Griffith.)

A=vaginal wall ; B=cytotogenous tissue which has undergone decidual change. This surrounds and distorts a cystic space which is lined by flattened epithelial cells and is obviously a dilated gland-tubule.

are instances of *migration* by a process of *extrusion*. The author’s words are : “Contraction of the connective tissue and perhaps also the endeavours of the uterine muscle to expel the growth would account for the separation of the tumour from its endometrial connection.” “Finally they [adenomyomas] may make their way into the broad ligaments or even into the recto-vaginal septum.”

¹ *Proc. Roy. Soc. Med. (Obst. and Gyn. Sect.)*, July 1914, page 389.

Leitch therefore agrees with Cullen with regard to the origin of extrauterine adenomyomata, but he is more emphatic than Cullen as to the mucosal origin of the septal growths. Cullen admits the possibility of an embryonic as well as a mucosal origin for these growths.



FIG. 216.—Adenomyoma of recto-genital space adherent to the cervix of a pregnant uterus, showing that the cytotogenous tissue has undergone decidual change. The decidual cells under high magnification are seen arrayed around a gland-tubule, the epithelium of which has not suffered so much from pressure as has the tubule shown in the preceding figure. (After W. S. A. Griffith, *l.s.c.* By permission.)

Leitch does not. In the two cases above referred to, Leitch stated that the septal tumours became *excessively painful during menstruation*.

In one, the lower part of the uterus was very hard and thickened, and there was a continuation of the hardness along the tissue of the left utero-sacral ligament, but it

stopped short of the rectal wall. The uterus and the backward prolongation were removed under the belief that the condition was a carcinoma of the endocervix infiltrating the sacro-uterine ligament. It proved to be an adenomyoma. The cervical endometrium had invaded the musculature of the cervix very deeply. The continuation of the adenomyoma into the utero-sacral prolongation was not traced, but a transverse section through the utero-sacral process showed the typical appearance of adenomyoma.

In the second case the bulk of the tumour in the recto-genital space was composed of dense fibrous tissue; the tubules were not numerous, but they penetrated the rectal wall as far as the submucous layer.

“In an attempt to trace the origin of the tubules it was found that they had wandered by a very devious route from the endometrium to the recto-vaginal septum, and a single large section would probably have failed to show the connection between them.”

Cases 42-47. T. G. Stevens reported on six cases of adenomyoma of the recto-genital space in 1915.¹ The first case of this series was previously reported in 1910² as an “Adenomyoma of the Vaginal Wall.” In addition to two tiny adenomyomatous nodules in the posterior fornix, a small cyst was found in the anterior fornix. Stevens (in 1909) concluded that the posterior nodules and the anterior cyst were all of Wolffian origin; but in 1915 he says that such a view for septal adenomyoma is “untenable,” and he now favours the Müllerian (congenital) hypothesis. In the first three cases of the above series the growths were small nodules; Cases 4 and 5 showed involvement of the rectal muscle, and in Case 6 the growth had spread upwards beyond the cervix into the posterior wall of the uterine body to about half the distance seen in the case

¹ “Adenomyoma of the Recto-Vaginal Septum,” *Proc. Roy. Soc. Med. (Obst. and Gyn. Sect.)*, 1916, vol. ix. No. 5, pages 1-17.

² *Ibid.* vol. iii. part ii. (*Obst. and Gyn. Sect.*), pages 57-58.

I have illustrated on page 335. Stevens' Case 4 is of practical interest in showing that a growth of the recto-genital space may be drawn up and duplicate the anterior rectal wall, thus leading to the bowel being accidentally opened up during a panhysterectomy (see Fig. 216A).

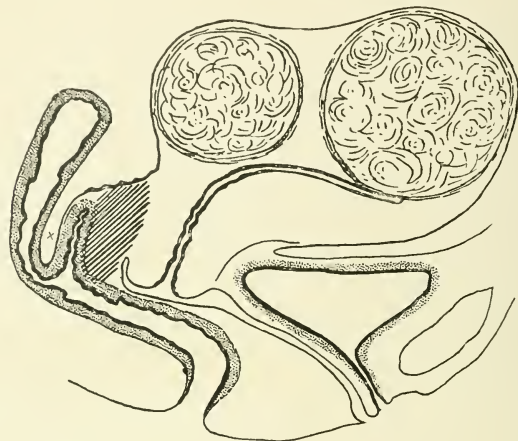


FIG. 216A.—Adenomyoma of the recto-genital septum. (After T. G. Stevens, *Proc. Roy. Soc. Med. (Obst. and Gyn. Sect.)*, 1916, vol. ix. No. 5, page 7).

The anterior wall of the rectum has been drawn up in the form of a fold. The space marked x is liable to be regarded as the pouch of Douglas during operation, thus leading to amputation of the rectal diverticulum.

SUMMARY

From a study of the foregoing cases and a few others I have come to the conclusion that:—

1. So-called 'adenomyoma' of the recto-genital space occurs more frequently than is commonly believed.

2. Except in the early stages (see page 368) clinical diagnosis can be made with greater certainty than in the case of adenomyoma confined to the uterus, because the symptomatology, and above all the clinical manifestations, are far more definite and distinctive.

(a) **The Symptomatology.**—The predominant com-

plaint is *pain*—*pain on coitus, pain on defaecation*. To these are added, in a later stage, blood-stained *vaginal discharge* and *obstinate constipation*, leading in some cases to actual *obstruction*.

Menstrual symptoms, such as menorrhagia and dysmenorrhoea, vary to such a degree as to afford no help in diagnosis.

Sterility is of no diagnostic value. Some patients have had large families, others have been absolutely or relatively sterile. Rectal haemorrhage is *not a symptom* of adenomyoma involving the bowel-wall.

(b) **Clinical Signs.**—Broadly speaking, the physical picture is that of a spreading inflammatory induration felt in the posterior fornix of the vagina.

The posterior vaginal wall in all marked cases is most intimately adherent to, and is penetrated by, the growth. Puckerings, petechiae, actual haemorrhagic points, ulceration, polypoidal fringes, and teat-like projections are to be found on the free surface of the posterior vaginal fornix.

The posterior wall of the cervix *beneath the peritoneal reflection* is fixed by the invading adenomyomatous process. The mobility of the cervix as a whole is lost. The anterior wall of the rectum *beneath the peritoneum* is fixed to the indurated mass which intervenes between the bowel and the cervix uteri.

The indurated recto-uterine or recto-vaginal mass may be central or lateral; it is often more prominent to the left of the mid-line. It may extend out into the base of one or other of the broad ligaments.

It tends to become nodular, irregular, and even cystic.¹ A clearly defined outline is usually wanting.

The body of the uterus may be retroflexed and adherent to the floor of Douglas's pouch. This complicates the diagnosis. The body of the uterus may be anteverted, in which case, if anaesthesia be employed, some estimate

¹ I have twice aspirated blood-stained fluid from the cystic portions of adenomyomas which projected through the posterior vaginal wall.—AUTHOR.

may be formed of the vertical dimensions of the mass which lies in the paracervical and pararectal cellular tissues.

If the mass is extensive, the peritoneum of the pouch of Douglas is elevated, and the depth of the pouch will naturally be lessened (see Fig. 200, page 335, and Fig. 208, page 354).

The Fallopian tubes and ovaries may be quite devoid of adhesions. Old adnexal inflammation may be present to confuse the issue and hamper correct diagnosis.

Per Rectum.—The lumen of the bowel is encroached upon by a hard fixed mass in its anterior wall. The mucous membrane is movable over this mass; it does not bleed, and it is not ulcerated. Only in one recorded case was the bowel completely stenosed. Only in one case was there late polypoidal ulceration of the rectum. Ulceration and stenosis are therefore very late signs, occurring much later than ulceration of the vagina.

Earlier Manifestations.—Many small nodules have been removed by posterior colpotomy and also during laparotomy for myoma and carcinoma of the uterus, and finally whilst removing diseased adnexa. Many of these nodules were therefore discovered by accident; in other words, they caused no symptoms but such as were masked by the prevailing condition for which operation was required. Such small nodes, when discovered, have been found to lead to dyspareunia, and it is for this reason only that they were detected.

The situation for such nodules is various. In some instances they appear to have been situated in one of the sacro-uterine folds, in other cases they are simply adherent to the top of the posterior vaginal vault, or attached solely to the cervix. In one case the uterus had been previously removed, and the node was adherent to the left side of the rectal wall. An instance of a remote location was that in which the node was dissected from off the right ischial spine.

It is clear that beyond the fact that such nodules may

give rise to pain, especially upon coitus, there are no distinct clinical features attaching to these tiny 'growths.'

(c) **Microscopy.**—Histological investigation proves that the growth itself and the tissues infiltrated by it (cervix, vagina, and rectum) all show the structure of adenomyomatous tissue, such as is seen in a typical diffuse adenomyoma occupying the centre of the uterus. The component parts will, therefore, be (a) gland-tubules lined by cubical epithelium and surrounded by (b) cytogenous tissue; (c) areas of smooth muscle-bundles suffering invasion by *a* and *b*. The cytogenous tissue is found by Weigert's elastin stain to contain fragments of elastic fibres. Plasma-cells in large numbers have been found in the adenomyomatous tissues. The rectal wall is invaded so far as the submucosa by the infiltrating gland-tubules. The invasion has never been proved histologically to go beyond the submucous into the mucous coat of the bowel. In the cervix the glands of the growth have never been traced as far as the cervical mucosa. In the vaginal wall the gland-tubules have been shown to have burst through the mucous membrane, and in some instances they appear to have arisen from the deepest layer of the vaginal epithelium (see Fig. 203, page 337). During pregnancy the cytogenous tissue may undergo decidual metaplasia.

(d) **Aetiology.**—Cullen holds these 'growths' to be Müllerian because of the histological similarity of the glands and stroma to the uterine mucous membrane. He will not say whether the epithelium is dystopic (congenital) or orthotopic (mature mucosa) in origin, but that it is one or the other is "doubtless."

Many observers cling to the opinion that the lower pole of the Wolffian system provides the gland-tubules (Gartnerian theory). Others favour the view of Robert Meyer, who holds that the condition is not a true neoplasm or blastoma, but merely an inflammatory product—

an example, in fact, of the normal triple sequence of *inflammation, induration, epithelial heterotopy*.

Meyer considers the term *parametritis nodosa posterior* to be the correct designation for the small nodal adenomyoma, and *parametritis diffusa posterior* that for the advanced infiltrative condition. Meyer further states (1) that the source of the epithelium is the overlying peritoneum, (2) that the cytogenous mantle around is nothing more than the original connective tissue rendered cellular and hyperplastic by chronic inflammation. The finding of fragments of elastic fibres in the centre of the mass (as well as around the large blood-vessels), and the presence of 'plasma-cell masses,' prove this point to Meyer's satisfaction. Even decidual metaplasia of the cellular stroma does not disconcert this redoubtable pathologist. He logically points out that such a phenomenon is not peculiar to Müllerian tissues. The connective-tissue cell will show decidual reaction in peritoneal adhesions, on the appendix, in the omentum, on the ovary, and elsewhere. The term *adenomyositis uteri et recti* is in my opinion the correct description for the diffuse variety of these cases of so-called 'adenomyomas,' but it does not meet the case of an 'encapsuled' growth which can be 'shelled out.' The evidence adduced by some authors that some of these growths derive their epithelium from the vagina is, to my mind, convincing. Fig. 203, page 337, clearly indicates that this may happen. I cannot bring myself to admit that the mature uterine mucosa has ever been *proved* to have provided the gland-tissue in any extrauterine growth, wherever situated. It is much more likely that the peritoneum or vagina is the source of the epithelium in the majority of cases. That Müllerian relics may play a part in the formation of some recto-vaginal 'tumours' is quite probable.

Prognosis.—This condition is *not malignant*.¹ When

¹ Since writing the above I have seen a case which leads me to believe that these 'growths' ultimately *may become malignant* (see page 432).—AUTHOR.

portions of 'growth' have been left in the rectal wall, they have disappeared after the removal of the bulk of the new formation, but, if left to itself, *adenomyositis recti* has been known to cause mechanical obstruction.

Diagnosis.—As the exclusion of malignant disease of the rectum and vagina is important, a portion of the growth should be removed in doubtful cases to enable a microscopic examination to be carried out. Small circumscribed nodes must be differentiated from tiny myomata and from cysts.

In the presence of adnexal tumours and uterine myomas the diagnosis of adenomyoma of the recto-vaginal space will be rendered very difficult. Generally speaking, the condition will be overlooked and only discovered during operation.

The freedom of movement of the rectal mucosa is a most valuable aid in excluding *carcinoma recti*.

Treatment.—Small painful nodes should be removed *per vaginam*. Diffuse adherent masses call for abdominal hysterectomy and the removal of the mass. As the latter is not malignant, the portion adherent to the rectal wall should where possible be removed by 'blunt dissection.' When this is not feasible, owing to deep infiltration of the bowel-wall, it seems unnecessary to sacrifice the bowel by excision, since small areas of 'growth' have been known to disappear. It seems that infiltrated bowel-wall may safely be left, if the bulk of the adenomyomatous tissue be removed.

(F) '**Adenomyoma**' of the Alimentary Tract.—The same discussion has taken place over the origin of 'adenomyoma' of the alimentary, as over that in the genital tract, *i.e.* as to whether the condition is the outcome of a growth starting from the foetal relics or whether it is a purely inflammatory process accompanied by the phenomenon of epithelial heterotopy. The literature on the subject is already extensive, but this is not the place to dwell upon it in detail, despite its commanding interest. The information obtained by a study of alimentary

'growths' cannot, however, be ignored by the gynaecologist, for they serve to throw light upon the subject of 'adenomyoma' in general. This is the more necessary as the term 'migratory adenomyoma' has been introduced of late, which is liable to convey a wrong impression if it is taken to mean that the uterine mucosa is the *fons et origo* of all 'adenomyomas,' and that when these 'growths' are found at a distance from the uterus, they have 'migrated' from thence to the particular spot at which they happen to be discovered.

'Adenomyoma' is *not* confined to the uterus, nor is it always dependent upon changes in the *adult* mucosa. It is a pseudo-neoplasm, the result of an inflammatory lesion in the neighbourhood of an epithelial tract. The tract may belong to foetal tubules which should have become obliterated, or it may form a part of the generative or digestive apparatus. (So far as I know the *urinary* tract has not provided an example, although I have found an adenomatous growth in the peri-urethral tissues invading the floor of the urethra, presumably derived from the epithelium of the rudimentary prostate and not from the urethral mucous membrane.) There seems to be no reason for excluding any epithelial surface from the faculty or function of demonstrating what Meyer calls 'heterotopy.' Friedländer demonstrated the process in various epithelial lesions. In fact, there is often an epithelial line of demarcation between the healed and unhealed parts deep down in the tissues.

Orth showed the same behaviour of epithelium in connection with suppurating follicles in the muscularis and submucosa of the dysenteric bowel. Ziegler demonstrated similar regenerative epithelial growth in 'bowel abscesses' where new crypts and gland-spaces had formed in the submucosa. Richter proved the same in a tuberculous ileo-caecal ulcer. I have myself seen the same formation of innocent gland-spaces in the scar-tissue at the base of a gastric ulcer. Lubarsch has shown epithelial

heterotopy or infiltration in the stomach, gall-bladder, appendix, and bowel-wall. Robert Meyer says with regard to epithelial heterotopy in general that it is only found in deep destructive processes, *e.g.* dysenteric, tuberculous, and typhoidal enteritis. Lubarsch is of opinion that many adenomas of the kidney and liver are examples of epithelial heterotopy similar to that seen in the genital tract.

As already mentioned in "Adenomyoma of the Fallopian Tube" (page 307), this process has been fully worked out by von Franqué, Hoehne, Maresch, Meyer, and others.

How do 'growths' arise around areas invaded by epithelium? Do they always contain muscle? In a muscular structure like the bowel or Fallopian tube the muscularis of the part becomes invaded by the epithelium and gland-spaces are formed. Around the latter the muscle-fibres of the part show marked hyperplasia. In some instances, but not in all, there is a 'cytogenous' mantle intervening between the glands and the muscle. This is regarded by Meyer as due to connective-tissue hyperplasia, and to prove that it is not a transportation or migration of uterine tissue, he has demonstrated plasma-cells in sufficient numbers to convince himself that there was a pre-existing inflammation of the tissues in question. Meyer has also shown that this cytogenous tissue contains the fragmentary remains of former elastic fibres—fragmentary because torn by the injury of the preceding inflammatory process. It might be said that the elastic fibres belonged to adjacent blood-vessels. Meyer admits that at the periphery of the 'cytogenous' areas the elastic fibres are most abundant in the region of the larger vessels, but he finds the fragments of elastic fibres in the *centre* of the areas, and it is upon this fact that he takes his stand. According to Meyer this is no example of *migration*. The 'cytogenous' tissue is the outcome of a localised connective-tissue hyperplasia following on an acute or subacute inflammatory process.

The uterine mucous membrane contains no elastin, no elastic tissue (except in the case of elderly women, and then only in the basal layers, where it is probably derived from the fibro-muscular substratum which has fused with the atrophic mucosa). The stroma of the growth is therefore made up of hyperplastic connective tissue and hyperplastic muscle. Can 'adenomyoma' form in tissues where there is no muscle? Klages advances Opitz's theory to show that it can do so. Opitz in discussing the aetiology of uterine myoma reasoned thus: The parenchyma (muscle) of the uterus arises from the mesoblast. The Müllerian epithelial threads grow into this richly cellular *connective tissue*. From the latter the muscle-fibres are gradually differentiated, whilst the inner layer of the same keeps its original characters and remains as the endometrial stroma.

Subsequent to the differentiation into muscle, connective-tissue 'rests' are left behind as fibrillary non-nucleated tissue in between the muscle-bundles. The stroma of the mucosa, the musculature, and its intervening connective tissue have one common origin from the richly cellular embryonic connective tissue surrounding the Müllerian ducts.

The non-nucleated connective-tissue 'rests' between the muscle-bundles under irritation become nucleated again, and assume the faculty of making muscle-cells just as they did during the embryonic epoch. Such an irritation as raised blood-pressure, or venous hyperaemia, will lead to chronic 'over-nutrition.' To the embryonic connective-tissue 'rests' thus overfed by increased blood-supply Opitz gives the name of "inflamed germ-tissue."

Klages argues that in cases of 'adenomyoma,' arising in the scars after ventri-fixation, such muscle as is found in the growths is due to the above "inflamed germ-tissue," whilst the gland-inclusions are derived from the peritoneum.

It is clear that such arguments do not apply to all alimentary 'growths' *per se*, but only to such as are found

adherent to the uterus. In alimentary 'growths' in general the muscle-tissue of the area involved becomes thickened, but when the epithelial heterotopy trespasses beyond the muscle-wall, say into the mesocolon or mesentery of the small bowel, the muscle does not follow, so that the gland-tubules come to lie in scar-tissue only. This scar-tissue is capable of assuming the features of the cytogenous mantle which is so characteristic of uterine growths. It seems most improbable that mature connective tissue and inflammatory connective tissue (new formation) can produce muscle-fibres.

The basis of an adenomyoma is the epithelial heterotopy or invasion. The myomatous constituent is there because the epithelial infiltration has taken place in a structure containing muscle. Muscular tissue is not essential to the process. Epithelium will infiltrate any soft tissue during the process of repair. Under certain conditions this "process of repair" runs riot, and a branching glandular growth is produced; *if muscle is the matrix in which this takes place, the result is an adenomyoma.* If the invaded tissue be solely fibrous, the resultant is a fibro-adenoma, but the underlying genetic factor is one and the same in each case, *i.e.* epithelial repair (following an inflammatory injury) carried to an excess which becomes pathological.

As an example of 'adenomyoma' of the alimentary tract may be mentioned a case published by Robert Meyer.¹

Mackendrodt resected the sigmoid colon on account of stenosis in a single woman, 45 years of age. The middle part of the resected portion was much altered for the space of 2-3 cm. by a stricture of the lumen, which was $1\frac{1}{2}$ cm. long. Here the walls were closely apposed with only a narrow chink intervening. At the point of narrowing the wall and the mesocolon were thickened. Between the mesocolic fat and the muscle-wall ran out thick strands of

¹ "Über eine bis in die Wurzel des Mesocolon ausgedehnte benigne Wucherung des Darmepitheliels," *Virchow's Archiv*, Bd. cxcv. S. 487, 1909.

fibrous tissue containing small lumina. This had no definite boundaries and invaded the thickened bowel-wall, but here there were no lumina to be seen, nor were there any lumina in the mucosa. The stenosis appeared to be due to an inflammatory stricture rather than to a thickening of the muscle. The submucosa was thickened and showed a fold like a



FIG. 217.—Microscopic section of Meyer's benign growth of the sigmoid colon and sigmoid mesocolon. (After R. Meyer, *Virchow's Archiv für Path. Anat.* Bd. cxcv. Fig. 1, page 489.)

a=heterotopic glands within fibrous tissue in mesocolon; *b*=thickened muscle-layer of bowel-wall; *c*=heterotopic glands in submucosa; *d*=rest of gland-tissue in mesocolon; *e*=polypus in lumen of bowel denuded of columnar surface-epithelium and containing gland-tubules in its stroma. Meyer's view was that the mucosa of the bowel provided the gland-elements of the 'tumour.'

polypus with a small base, projecting into the lumen of the bowel for a distance of a centimetre.

Microscopically numerous epithelial spaces were seen near the stenosis in the bowel-wall; these assumed the form of single cysts. They lay mostly in the muscularis near the mesocolon; less frequently they were seen in the submucosa,

near the stalk of the polypus. There were many such in the 'head' of the polypus itself.

All these spaces were in connection with the bowel-epithelium; plasma-cells and a few mast-cells were present. Elastic fibres were seen at the periphery of the epithelial inclusions; they were swollen, matted, and compressed. The growth had at many points burst through the elastic bundles, so that the latter appeared mixed up with it, but on the periphery the elastic tissue increased. In the submucosa there was the same relation between the growth and the elastic fibres. Brown and black and, more rarely, straw-coloured pigment-bodies were seen in the epithelial spaces and also outside them, especially in the form of *Herzfehlerzellen*. Some of the cells still had a small nucleus; they arose either from connective-tissue cells or from lymphocytes. In many points there was a similarity to von Recklinghausen's paroöphoral adenomyoma of the uterus as regards the epithelial spaces and their branching, e.g. ampullae, close order, collecting and secreting tubules, end-bulbs, pseudo-glomeruli, opening of tubules into ampullae, heaping of canals as islands, rich connective tissue, the relation of epithelial spaces to the cytogenous tissue, *Pigmentkörper*, etc.

The epithelial cells were cylindrical—sometimes tall with rod-shaped nuclei, or palisade with round nuclei, or often cubical and quite low. The trespassing epithelium never invaded the endothelium of the lymph-spaces, nor was transition of endothelial into epithelial cells seen. The penetrative faculty and chromatin division of an adenocarcinoma were absent. Inside the dilated spaces were colloid droplets and large colloid masses—the mucin-reaction could not be shown in the preserved specimen. The lesion was *ulceration* with the formation of granulation-tissue and heterotopy of epithelium. The result was *the formation of a pseudo-neoplasm in the base of the mesosigmoid*. Meyer, Maresch, von Franqué,

and others had shown the same in the mesosalpinx following on chronic salpingitis (see Fig. 181, page 309).

If it were argued that the 'growth' arose from Wolffian remains lying in the posterior abdominal wall, then it should be pointed out that there was a failure in the myomatous elements, on the presence of which von Recklinghausen laid so much stress. The muscular wall was thickened, but not in organic connection with the growth. The latter lay within "passive intermuscular interstices"; the muscle-bundles being dragged apart by the new growth. In the mesocolon the growth lay in a *fibrous stroma* resembling scar-tissue.

Many mesenteric cases have been described as Wolffian. Koblenz was the first to describe a retroperitoneal malignant growth as of Wolffian origin. Lexer considered that cysts in the mesentery were caused by a folding of the latter over the remains of the Wolffian body. Verocay described an adenosarcoma in the root of the mesentery as an embryonic malignant growth of the Wolffian body. Nioci¹ described a mesenteric cystoma as Wolffian because of the resemblance between the gland-arrangement and that of the Wolffian body. But would a blastomatous growth lying on the posterior abdominal wall be likely to send processes which penetrated into the bowel-wall, through the muscularis, into the submucosa, produce a polypus in the lumen, and establish secondary fusion with the epithelium of the alimentary tract? Meyer thinks not! I have quoted this case at some length to show how closely an inflammatory 'histoid' condition can simulate an 'organoid' neoplasm, and also to point out that epithelial heterotopy is not confined to the genital tract: in other words, that extrauterine adenomyomas are not necessarily uterine in origin.

(G) **Adenomyoma of the Umbilicus.**—For Cullen's views on this condition see Appendix V. (pages 573-578).

¹ For references, see R. Meyer's article, *l.c.*

CHAPTER III

ADENOMYOMA AND PREGNANCY

THIS is a subject of considerable clinical importance, because, whatever view is taken as regards the aetiology of adenomyomatous growths, there is abundant evidence to show that the gland-spaces of these 'tumours' communicate with the lumen of the Fallopian tubes and with the cavity of the uterus. Micholitsch of Vienna has drawn attention to the association between ectopic pregnancy and adenomyoma.

A fertilised ovum is liable, at the tubal angle, to stray into one of the communicating channels between the lumen and the interstices of the 'growth,' and so develop in the muscularis of the tube. The same may occur in connection with uterine adenomyomas which have become intraligamentary and cystic. These have been known to preserve their connection with the uterus by means of an open channel, large enough to allow a fertilised ovum to pass.

J. B. Hellier drew attention to this point when he wrote: "It seems possible, in view of the endometrial diverticula found in these cases, that an ovum might become embedded in the uterine wall and so give rise to an ectopic interstitial pregnancy at a point distant from the interstitial part of the oviduct."¹

An interesting histological feature seen in adenomyoma during pregnancy is the fact that in some instances,

¹ *The Lancet*, January 25, 1913, page 230.

but not in all, the 'cytogenous tissue' around the gland-follicles takes on decidual reaction. Cullen mentions two instances in which this occurred, and he sees in the decidual change a "further proof that these *islands of mucosa* are identical with the normal uterine mucosa."

Whitridge Williams in examining the uterus of a patient entering hospital in a desperate condition, and dying

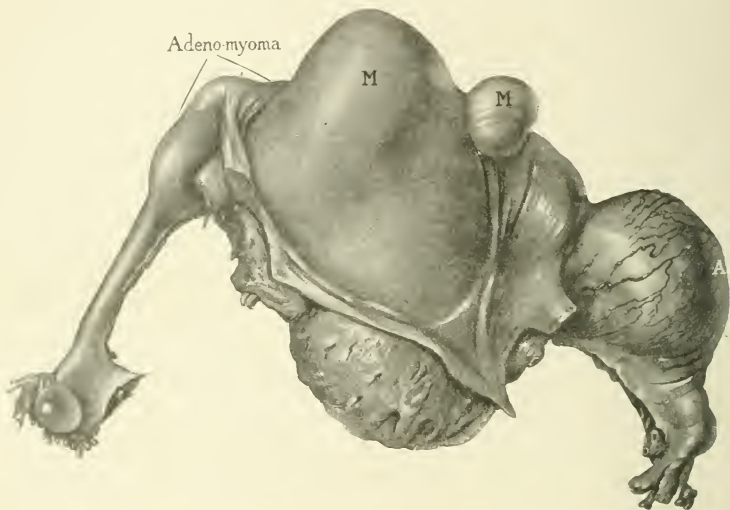


FIG. 218.—A case of 'adenomyoma' of the cornu uteri with unruptured tubal gestation. (After Cullen's Fig. 66, page 247. By permission.)

A=unruptured tubal gestation sac; M=myoma. The adenomyoma is on the opposite side to the tubal pregnancy.

two hours after labour, found that it was the seat of a diffuse adenomyoma, and that the stroma of these islands had been converted into typical decidua. This was a proof of the mucosal origin, Cullen says, which would certainly "tend to convince the most sceptical."

Cullen reported a case of his own, in which on the left side there existed an unruptured tubal pregnancy (see Fig. 218). There was a myoma in the fundus, and an

adenomyoma of the right uterine cornu. The stroma of the latter growth had in part undergone decidual change, "although the adenomyoma was at least 9 cm. away from the tubal pregnancy."

Boxer¹ recorded a case in which bilateral interstitial ectopic pregnancy was associated with cornual adenomyomas, and he drew attention to the connection between



FIG. 219.—Cystic adenomyoma lying in the left broad ligament. It displaced the tube and ovary upwards and to the right side. (After Döderlein and Herzog, *Surgery, Gynaecology and Obstetrics*, Fig. 1, page 18, January 1913.)

the "duct-system of von Recklinghausen's tumours" and the lumen of the tube. He accepted Micholitsch's view as to the aetiology of tubal gestation in these cases.

Theodore Döderlein and Max Herzog described "a new type of ectopic pregnancy: pregnancy in an adenomyomatous uterus"² (see Figs. 219 and 220). The patient

¹ "Beiderseitige interstitielle Gravidität," *Zentr. f. Gynäk.*, 1908, p. 466.

² *Surgery, Gynaecology and Obstetrics*, N. xvi. p. 14, 1913.

was aged 37 years. One year before observation she had undergone a complicated abortion without medical aid ; eight months later she was pregnant, and at the fourth month pain was felt in the lower abdomen. Three months later, the patient was examined by a doctor for haemorrhage, and a tumour was discovered. There was a tumour to the



FIG. 22c.—Same specimen as shown in Fig. 219. The cystic adenomyoma is seen to communicate with the uterine cavity. It contained placental tissue. (After Döderlein and Herzog, Fig. 2, page 18, *L.s.c.*)

left of the uterus which pushed the organ upwards and to the right ; the tumour felt harder than a gestation sac. The cervical canal was patulous. At the operation the uterus was found to be enlarged, and pushed over to the right, by a tumour within the left broad ligament. The growth arose below the level of the tube. Both tubes were intact and opened into the uterus. The growth in the broad ligament communicated with the uterus by a channel which

admitted the tips of two fingers. On slitting the canal open a large cavity was found inside the tumour, and within it was a placenta in a good state of preservation. A fairly typical, though quite irregular decidua was formed. There was histological proof that the growth was an adenomyoma, the gland-tissue of which communicated with the uterine mucosa. The authors repeat the oft-made statement that adenomyomas beneath the tubal angle cannot be Wolffian. Their explanation of events was, that the ovum had created a cavity for itself, and that the embryo had died and had been expelled in fragments. In the removal of the fragments and subsequent manipulation the mucosa of the connecting canal and of the cervix had been more or less destroyed and the opening made larger.

Zacharias showed, at the Hamburg Gynaecological Society, April 5, 1910, a specimen consisting of an adenomyoma, the size of a hen's egg, which he tried to enucleate during early gestation. The patient was aged 22 years; married three years. In 1909 a child was born, and two months later conception occurred again. There was great pain. In the attempt to enucleate the tumour it was found to be fused with the decidua, and the ovum had prolapsed into the bed of the tumour and was removed with it. There was no capsule. The growth contained a cyst the size of a walnut which did *not* communicate with the uterine cavity.

Amos¹ described a case of decidual formation in an adenomyoma and in a tumour of the abdominal wall. The uterus was removed on account of a myoma. Supravaginal amputation had been performed by Olshausen during the fifth month of pregnancy. The uterine wall was diffusely thickened and lumpy. There were a large adenomyoma and many round myomas present. The stroma of the adenomyoma *showed decidual change*. The patient had

¹ *Zeitschr. f. Geb. und Gyn.*, 1905, Bd. liv. S. 171.

noticed a small warty growth on the anterior abdominal wall for some time; this had not increased in size until the pregnancy intervened, when it got larger. It was a connective-tissue tumour, and its stroma had undergone *decidual transformation*.

R. Meyer¹ had collected three cases of adenomyometritis during gestation from Döderlein's Clinic at Tübingen.

In each case the uterus was three months gravid. In the first specimen the mucosa of the uterine cavity penetrated the muscle over the whole circumference of the tumour. The glands were single and not branched; they had the usual 'cytogenous' investment, but this showed *no* decidual reaction. In the second case the adenomatous growth lay deep in the muscle; there was a cytogenous stroma, but *no* decidual change had occurred in it. In the third case the mucosa was normal. The growth arose from the *peritoneum* covering the uterus. This for the space of one centimetre was puckered, and microscopically the serosa could be seen running into the muscle for the space of two centimetres. The stroma was *decidual* in parts. There were papillae in the cysts large enough to be seen macroscopically. Some of these papillae reached to, and formed a projection on, the serous surface. *Here was a case of a serosal growth showing decidual reaction.* Alfieri (quoted by Meyer) had lately described the serosal changes which occurred during pregnancy. He had rightly said that during gestation the peritoneum possessed a high cubical or cylindrical epithelium, but this is often not the case. The peritoneum usually remains unaltered, but in peritoneum underneath adhesions this metaplasia frequently occurs in the newly born and in the foetus. It is also known to happen in the non-gravid uterus.

In tubal pregnancy, Meyer had seen decidual change in the *ligamentum latum*. Penkert had noted it in the

¹ *Zeitschr. f. Geb. und Gyn.*, 1905, Bd. liv. S. 191.

omentum (see Fig. 221).¹ Hirschberg described decidual change on the vermiform appendix.²

I have myself seen the same change producing round maculae of reddish-pink colour on both ovaries and on the peritoneum, at the seventh month of gestation, in a case which was operated upon for a myoma complicating pregnancy, and I have demonstrated decidual reaction in



FIG. 221.—Showing decidual cells in omentum in a case of tubal pregnancy.
(After M. Penkert, *Zeitschr. f. Geb. u. Gyn.* Bd. liv. Fig. 1, page 84.)

the medulla and cortex of the ovary in a case of ovarian pregnancy.³

W. S. A. Griffith's case of septal adenomyoma showing decidual change has already been mentioned (see page 361).

For the significance of adenomyoma on the questions of sterility and fertility, the reader is referred to "Diagnosis and Prognosis," page 439.

¹ "Über deciduale Veränderung im Netz bei tuboabdominaler Schwangerschaft," *Zeitschr. f. Geb. und Gyn.*, 1905, Bd. liv. S. 80.

² *Arch. f. Gyn.* lxxiv. S. 620.

³ Giles and Lockyer, "Ovarian Pregnancy," *Proc. Roy. Soc. Med. Lond. (Obst. and Gyn. Sect.)*, November 1914.

CHAPTER IV

ADENOMYOMA AND UTERINE MALFORMATION

FRÄNKL'S view¹ that adenomyoma bears a relationship to malformations of the uterus, caused me to try and find records of this interesting association. My search has resulted in the discovery of seven cases; to these I add a case of my own, which has already been recorded in the *Transactions of the Obstetrical Society of London*, 1904, as an adenomyoma of a uterus septus.

(1) The first recorded case was operated upon by Säger on January 29, 1900, and published by Lichtenstern in 1903² (see Figs. 222 and 223).

The patient was aged 22 years; single. Menstruation began at 17 years, was always irregular, six to seven weeks' interval; duration two days, scanty; often many months of amenorrhoea intervened. Since the onset there was intense dysmenorrhoea on the right side; the pain was cramp-like, and confined the patient to her bed. Morphia was administered. Latterly she had suffered from colicky pains during menstruation, which caused her sleepless nights; otherwise she was healthy: she was not chlorotic; there was no leucorrhoea, no dysuria. Four years previously to operation the patient miscarried at the sixth month. There were two or three days of fever during the puerperium. On examination the patient was strongly built. The uterus was enlarged and lying to the left; attached to it

¹ See pages 318-320.

² *Monatsschr. für Geb.*, 1901, Bd. xiv. S. 308.

on the right side was a firm swelling the size of an apple, which was smooth, insensitive, and freely mobile.

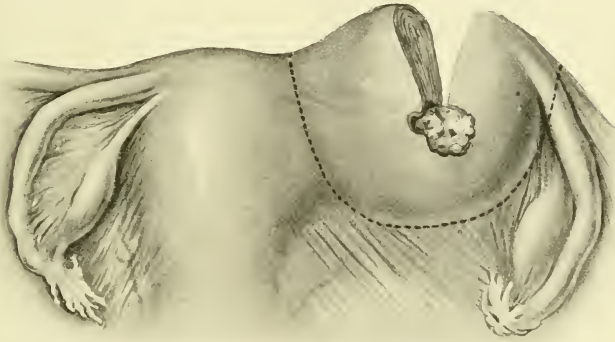


FIG. 222.—Adenomyoma of the blind horn of a *uterus bicornis*. The dotted line shows the parts removed, which are seen below in Fig. 223.

Diagnosis.—Genital atresia, right haematometra ; alternative diagnosis, subserous myoma.

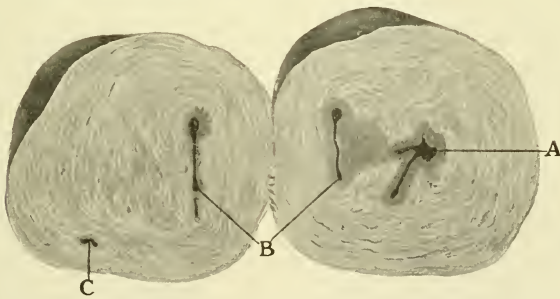


FIG. 223.—Showing in transverse section the horn of uterus removed as seen in Fig. 222. (After Lichtenstern, *Monatschr. für Geb. u. Gyn.* Bd. xiv. Taf. ii. S. 320.)

A=adenomyomatous area containing a small cyst ; B=cavity of horn ; C=small adenomyomatous area. The muscle-wall of the uterine horn contains numerous tuberculous foci.

At the operation the omentum was found to be adherent to uterus at the pelvic brim. The left appendages were normal. The right part of the uterus was enlarged by what

was regarded as a myoma. Its enucleation was attempted. A vertical incision was made into the summit of this mass; it proved to be the right horn of a malformed uterus. The wound revealed a diffuse thickening of the myometrium, and when the centre was reached dark blood poured out. A sound which was introduced would not pass either into the cervix or into the *cavum uteri*. The horn was removed and the uterus left *in situ*.

The menses were subsequently regular and painless, but more abundant than formerly. There was no sign in this case of infantilism such as W. A. Freund had suggested in these cases of adenomyoma, as the vagina and vulva were normal. There was no communicating canal between the cornu and the *cervix uteri*. The author regarded the growth as arising from the *mucosa* of the uterine horn.

The mucous membrane of the amputated horn showed menstrual infiltration in the *stratum compactum*, and in Figure 223 the continuation between the mucosa and the growth is indicated. The muscularis of the horn showed infiltrating tubercle.

(2) The second case is that of L. Landau of Berlin.¹ The patient was aged 40 years, she had never menstruated, but severe pain had recurred each month since she was twelve years of age. For three years the patient was unable to work, and spent most of the time in bed. The cervix was voluminous: there was a thick mass in the posterior fornix, and also a pelvic tumour reaching above the brim.

The case proved to be one of haematometra, double haematosalpinx, and right-sided oöphoritis. There was a haemorrhagic ovarian cyst on the left side and pelvic peritonitis with *haemorrhagic cysts in the connective tissue*.

In the cervix lay a diffuse solid tumour, the size of an apple, which extended into the body of the uterus. This cervical growth was regarded as a mesonephric adeno-

¹ *Berliner klinische Wochenschrift*, 1901, No. 8, 206.

myoma. The cervical canal (? mucosa) revealed nothing abnormal.

The genital atresia was not attributed to the cervical tumour but to a "fusion of Müller's ducts and a congenital hyperplasia of the relics of the Wolffian body, *i.e.* *vitium primae formationis*" (Landau and Pick).

Pick's view, which is borne out by the clinical history, was that a faulty development of the Müllerian ducts had resulted in atresia of the cervix and *portio vaginalis*.

Secondary in point of time came the hyperplasia of the mesonephros with the formation of an adenomyoma. The latter part of his conclusion appertaining to the genesis of the tumour is of course open to doubt. Why with a faulty development of Müller's ducts Pick dragged the Wolffian system into the question is hard to say, but the date (1901) at which the opinion was expressed will perhaps account for it. The Wolffian theory was then predominant.

(3) The third case is that of an adenomyoma in one horn of a bicornute uterus published by Cullen.¹ The patient, a negress, was operated upon on June 4, 1903. She was aged 24 years, married three years, sterile; menses started at 21 years—"there was just one stain once and none since." There had been severe pain in the left side and back every month for the past nine years. No opening could be found between the vagina and the internal pelvic organs. The cervix, which projected to the left, was separated from the vagina by a distance of 1-2 centimetres. Through an abdominal incision it was found that on the left side there was a small rudimentary uterus which was connected to the cervix by an impervious band of tissue. This left horn was removed, its lower end was blind, but in the upper third there was a cavity lined by mucous membrane. "Scattered everywhere throughout the uterine wall were found islands of uterine mucosa."

¹ *Adenomyoma of the Uterus*, 1908.

Cullen says "it is particularly interesting to find an adenomyoma in one half of a bicornute uterus. The histological picture in this case would lead one to infer that the glands first existed and that the myomatous change was a secondary phenomenon. This is the first case that has suggested this origin to us."

(4) Cullen also mentions a case (*l.s.c.* page 161) of double vagina and double cervix, large submucous adenomyoma with the glands originating from the uterine mucosa and containing a large number of "miniature uterine cavities."

The patient was a married woman aged 50 years. She was admitted for uterine haemorrhage. The menses were normal until ten years ago, since when the loss was irregular, profuse, and accompanied with pain. The patient had been married for twenty-one years, but had never been pregnant. Haemoglobin = 55 per cent. Adventitious sounds in right lung. On examination, a double vagina with the septum extending the entire length of the vault, also a double cervix and a double cervical canal, were discovered. There was a submucous myoma within the uterus, apparently the size of a goose's egg.

Operation.—The septum was first removed and the myoma brought away in fragments. The specimen measured $11 \times 7 \times 7$ cm. On section it presented a myomatous appearance, diffuse in character. Scattered everywhere throughout the myomatous tissue were collapsed and dilated "miniature uterine cavities" lined by typical mucous membrane.

Cullen was able to trace the origin of the growth to the lining membrane of the uterine cavity.

(5) The fifth case is that of Fränkl, who demonstrated a double uterus with an adenomyoma of the round ligament.¹

(6) The sixth example is by E. Alfieri, *Uteri bicorni*

¹ For reference see page 320.

*con adenomyomi Mülleriani multipli uterini e tubarici.*¹ The adenomyomatous growth was in relation to the epithelium of the uterus and the tube. The author referred both the disease and the malformation to developmental (Müllerian) disturbances. There was no evidence in this case of any inflammatory cause.

(7) My own case was the first of three which were recorded in the *Transactions of the Obstetrical Society of London* in 1906. The patient was aged 45 years. The uterus was removed by Amand Routh, under whose care she had been for five years. Curettage was performed in 1898 for continuous haemorrhage which had lasted for four months. The diagnosis then was a "hard fibroid with fungous endometritis." Subsequent to the curettage there was relief from the haemorrhage for one month, after which the patient was as bad as before. On August 2, 1901, as the haemorrhage had been almost continuous for four years, Routh removed the uterus by vaginal hysterectomy. The specimen consisted of two portions, the uterus having been divided at the internal os. Taking the two pieces together the uterus measured $5\frac{1}{2}$ inches in the vertical direction, and 3 inches from side to side, at its widest part.

The drawing (Fig. 224) represents the posterior half of the uterus seen in coronal section. The wall was 2 inches in thickness and was occupied by a diffuse honeycombed growth, with cysts measuring $\frac{1}{2}$ inch in diameter.

At the internal os the canal divided and ran upwards towards the cornua on either side of the growth, as seen in a *uterus septus*. The anterior half of the uterine body showed the same honeycombed structure in the centre with the two limbs of the bifid cavity on either side, so that the growth obviously occupied the *median septum of a uterus subseptus*. The increased height of the fundus above

¹ *Folia Gynaecol.* Bd. viii. N. 2. S. 165.

the tubal angle was caused by the growth itself, and the point for discussion was whether this was a submucous and subserous sessile growth, *i.e.* whether a septum existed at all. A further point of interest was that Frank Taylor



FIG. 224.—Cystic adenomyoma in the septum of a uterus septus removed by Amand Routh.

considered one spot malignant, and this opinion was confirmed by the Pathology Committee.¹

(8) E. Kehrer described a malformed uterus with tuberculous salpingitis and a cornual adenomyoma, for further details of which see page 284.

As these eight cases are the only examples of adenomyoma associated with uterine malformation which I can

¹ *Trans. Obst. Soc. Lond.*, 1906, vol. xlviii, page 128.

find in the literature, it would appear that Fränkl's opinion that there is an inter-relationship between these two conditions has little or nothing to support it. The number of recorded cases of uterine adenomyoma now total many hundreds, so that the frequency of uterine malformations as an association with this disease will only amount to a small decimal percentage.

CHAPTER V

CYSTIC ADENOMYOMA

UNDER this heading I have grouped a number of interesting cases, the genesis of which is various and in many cases highly debatable, but which have one common feature, viz. the presence of a predominating cyst or cysts of considerable dimensions.

Bauereisen of Erlangen¹ described the case of a pedunculated cyst of mucosal origin (see Fig. 225).

The patient was a nullipara aged 49 years. There was a history of apical phthisis. There had been nearly continuous uterine haemorrhage for six months, and also severe pains like labour. The patient was in an exhausted condition. A uterine tumour the size of a three months' gestation was discovered. *Per vaginam*, the anterior wall of the cervix was felt to be more prominent and of a softer consistence than the posterior. The cervical canal admitted one finger. Differential diagnosis—*carcinoma corporis* or *myoma uteri*. A tent was introduced, and on its removal half a litre of chocolate-coloured fluid poured out. The cervix was then split open, and immediately *inside the internal os* two narrow apertures were found, the posterior leading to the uterine cavity, and the anterior into a hollow space in the tumour. The latter cavity still contained a lot of chocolate-coloured fluid. The uterus was removed *per*

¹ *Beiträge zur Geb. und Gyn.*, 1905, Bd. ix. S. 313.

vaginam by Veit. The tumour was *subperitoneal* (not *extraperitoneal*). The pedicle was $1\frac{1}{2}$ cm. long and 1 cm. wide; its lumen was $\frac{1}{2}$ cm. wide. *Its inner surface resembled that of the cervical canal* and gave the impression that it had existed from a very early period of life. The 'tumour' measured $12 \times 8 \times 9$ cm. At its attachment to the uterus the wall of the latter contained "cysts and

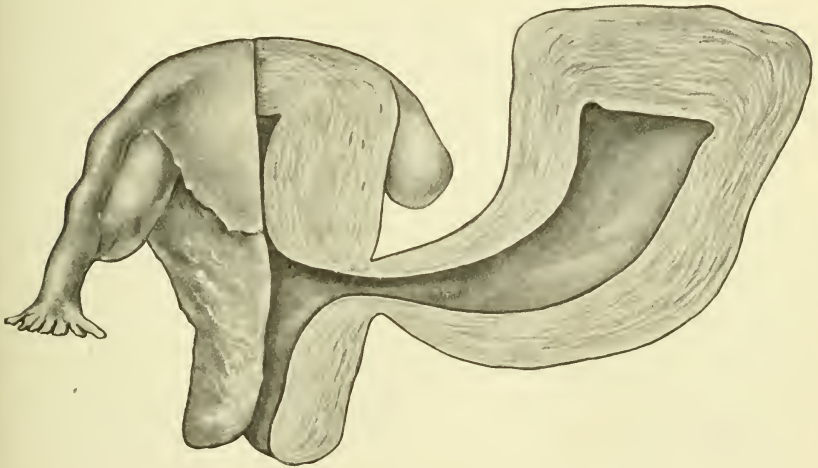


FIG. 225.—A cystic subperitoneal adenomyoma arising from the anterior wall of the uterus and communicating with the uterine cavity. (After A. Bauereisen, *Beitr. zur Geb. und Gyn.* Bd. ix., 1905.) To be compared with von Recklinghausen's case (Fig. 226), and with Döderlein and Herzog's case (Fig. 220, page 382).

ducts" which opened into the adjacent cystic tumour. The tumour-wall for the most part was free of glands. The contents of the glands consisted of mucus. The uterine mucosa was thick and granular. According to R. Meyer, there were two possible explanations to account for the origin of this cystic growth: (1) Development from the epithelium of Müller's canals before the formation of the glands of the uterine mucosa. (2) Development from the mature mucous membrane.

In Bauereisen's opinion the growth arose in *an accessory Müllerian duct* embedded in the uterus.

In 1905 the same author (Bauereisen) also recorded a remarkable case of *adenomyoma uteri sarcomatosa*.¹

In this case there was a cyst behind the uterus filled with blood and continuous with a papilliferous growth proceeding from the fundus and back of the uterus. The

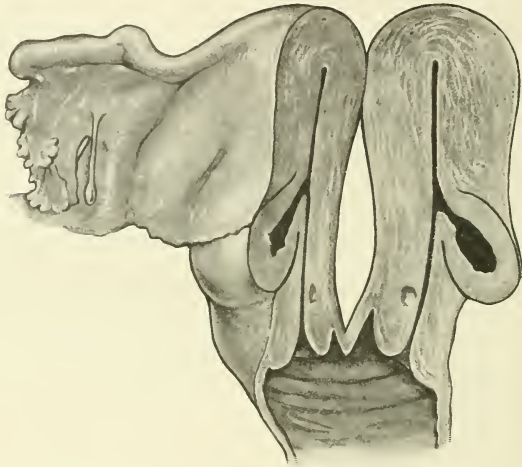


FIG. 226.—A cystic subperitoneal adenomyoma arising from the anterior wall of the uterus and communicating with the uterine cavity (cp. Fig. 225). (After v. Recklinghausen, *Die Adenomyome und Cystadenome*, Taf. xi.)

growth was sarcomatous in its peripheral, and adenomyomatous in its proximal, portions. The case will be more fully described in the section dealing with adenomyoma and malignancy (page 430). The cystic portion seemed to belong to the sarcomatous part of the growth and not to the adenomyomatous portion.

In 1906 von Recklinghausen published his monograph on *Die Adenomyome*. One of the cases figured in this

¹ *Beiträge zur Geb. und Gyn.*, 1905, Bd. ix. S. 313. (See also pages 430-432 of this volume.—C. L.)

volume resembles an early stage of Bauereisen's first case (see Fig. 226).

The patient was 42 years of age. She died of amyloid disease, following tuberculosis of the lungs, larynx, spleen, kidney, and liver. There were multiple "adeno-cysts" on the dorsal aspect of the uterus. There were gland-spaces in the myometrium at the right cornu of the uterus.

The case was described as a cystic myo-fibroma of the

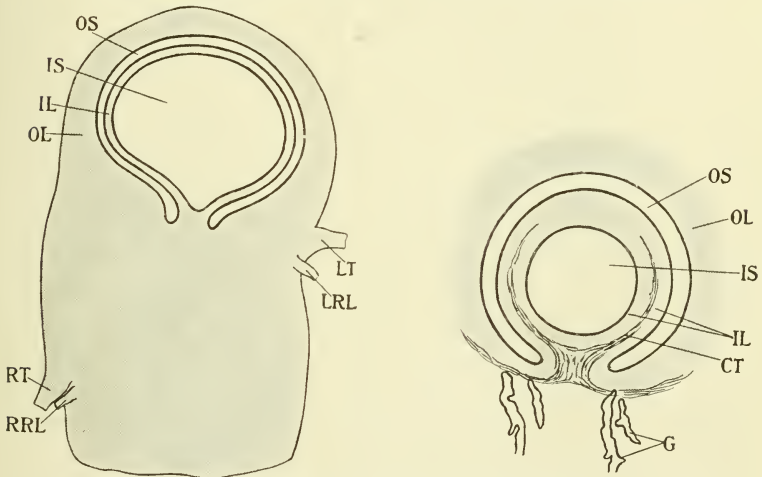


FIG. 227.—Showing diagrammatically the situation of a cystic adenomyoma in the sagittal plane of the fundus uteri as described in the text. (After Oskar Fränkl, *Archiv für Gynäk.* Bd. xciii. Tafel xii.)

OS=outer cavity; IS=inner space; IL=inner lamina; OL=outer lamina; LT, RT=Fallopian tubes; RRL, LRL=round ligaments; CT=connective-tissue septum; G=glands in uterine muscle.

anterior wall of the *corpus uteri*. The cyst was lined by mucosa. There were only a few discrete gland-spaces in the muscle-wall of the cyst.

As an example of an 'adenomyoma' arising in portions of embryonic tissue is the case of O. Fränkl, which shows a cyst situated in the centre of the fundus uteri (see Fig. 227). The cyst lay ensheathed in an outer space in telescopic manner, excepting that the outer ensheathing

cyst was attached at one point by connective tissue to the wall of the internal cyst. Between these cysts and the top of the fundus lay gland-spaces (see Figs. 228 and 229). There is no room to doubt Fränkl's explanation that this

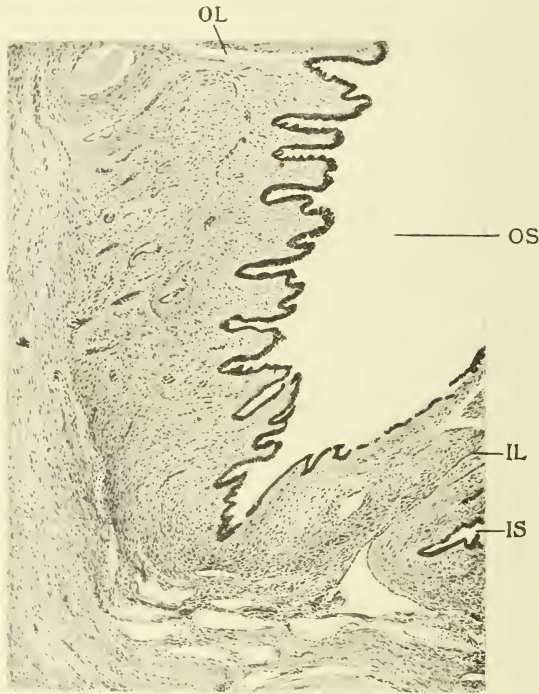


FIG. 228.—Microscopic section corresponding to Fig. 227. The section was taken through the laminae of the cyst. (After Fränkl.)

OL and *IL*=outer and inner layers; *OS* and *IS*=outer and inner spaces.

structure had to do with some defect during fusion of the Müllerian ducts. The central sagittal plane of the uterine body is the situation where R. Meyer has found epithelial rests in foetal uteri and in uteri up to the age of puberty.

Theodore Döderlein and Max Herzog described a cyst of the left broad ligament which communicated with the

uterus by a channel admitting the tips of two fingers. The communication was situated just above the internal os, in the same situation—judging from the drawings and descriptions—as in the cases of Bauereisen and von Recklinghausen. This cyst contained a placenta. Its muscular walls showed



FIG. 229.—Microscopic section showing the glands ramifying in the uterine muscle at the point marked *G* in Fig. 227. (After Fränkl.)

some gland-spaces, especially in the region of the communicating channel. The case is recorded more fully in the section dealing with pregnancy and adenomyoma (page 381).

The case of Semmelink and de Joselin de Jong has been mentioned several times before in the various sections. The patient was a virgin aged 48 years. She had been

treated for one year for menorrhagia, dysmenorrhoea, and pressure on the bladder and rectum. She was very anaemic and weak. An abdominal tumour had been known to exist for a year, during which time it had not increased in size. A large hard mass was felt to the left of the symphysis pubis, reaching nearly to the umbilicus, and continuous with the cervix. It was diagnosed as a myomatous uterus. Under anaesthesia, a large tumour was felt to the left of the middle line; still farther to the left was a smaller mass; in the middle line was a third, which appeared to be the body of the uterus with the largest mass lying above it; finally, a fourth tumour lay away to the right.

The above made up one large fixed mass, whilst the adnexa presented nothing noteworthy.

The abdominal total extirpation was very difficult because of the fixation of the tumour. The mass reaching out on the left side proved to be an adherent cyst. It was retroperitoneal and attached to the posterior wall of the bladder; during removal it was torn, and emitted a chocolate-coloured mucoid fluid.

The macroscopic description accompanies the drawing (see Fig. 187, page 316).

The lining membrane of the cyst consisted of a remarkably thick mucous membrane, composed of branching tubules which are shown in Fig. 186, page 315. The mucous membrane of the uterine cavity was thick, and there were small intrauterine polypi present. A striking characteristic in this case was the covering of the posterior surface of the uterus with a mucous membrane similar to that lining the left-sided cyst (see Fig. 230).

This glandular investment of the posterior uterine wall reached down to the cervix as far as is indicated by the letter D in Figure 187. It recalls two other cases—one of Robert Meyer's, in which he said: "The back of the uterus was

covered by a mucous membrane, I can call it nothing else." In this case Meyer could trace the dipping-in of epithelial invagination to the serosa, and he regarded the growth as arising from the peritoneum. The other case is that of Louis Bazy, who described the back of the uterus as resembling, and bleeding like, a placental site.

Polypi within Cystic Adenomyoma.—The term "miniature uterine cavities" for small cystic spaces in adenomyomas has often been employed by Thomas S. Cullen, and the following case from Routh's Clinic at Charing Cross Hospital, previously published by me,¹ bears

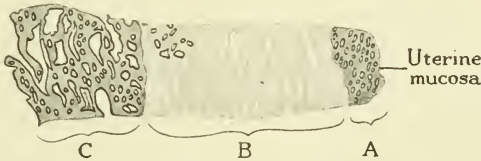


FIG. 230.—Showing a transverse section taken through the uterine wall in the remarkable case of Semmelink and de Joselin de Jong. (*Monatsschr. für Geb. u. Gyn.*, 1905, Bd. xxii. S. 238.)

A = mucous membrane of uterine cavity; B = muscle-wall of uterus (normal); C = "acquired mucous membrane" which covered the whole posterior surface of the uterus in the place of normal peritoneum.

out his analogy, in so far that one of the cystic spaces contained three small mucous polypi.

The patient was a sterile married woman aged 29 years. The operative difficulties need not be stated, but they were many. The uterus was amputated above the level of the internal os, and a dermoid cyst of the left ovary was removed. Fig. 231 shows the uterus; its wall measured $1\frac{1}{4}$ inches in thickness at its thickest part, which was near the right cornu. The endometrium presented a smooth surface, but opening on to it there were many cysts, which were especially numerous near the right cornu; here they could be traced into a large cyst, from which foul muco-

¹ Cuthbert Lockyer, "Three Cases of Adenomyoma Uteri," *Trans. Obstet. Soc. Lond.*, 1906, xlvi. pages 84-96.

sanious discharge escaped during operation and soiled the wound. The cysts everywhere surrounded the *interstitial part of the right tube and appeared to open into it*. Through the aperture of one of the cysts three tiny polypi projected into the cavity of the uterus. This pit, from the bottom of which these tiny growths sprang, admitted a probe for a distance of a quarter of an inch.

A glairy fluid, similar to that expressed from the right

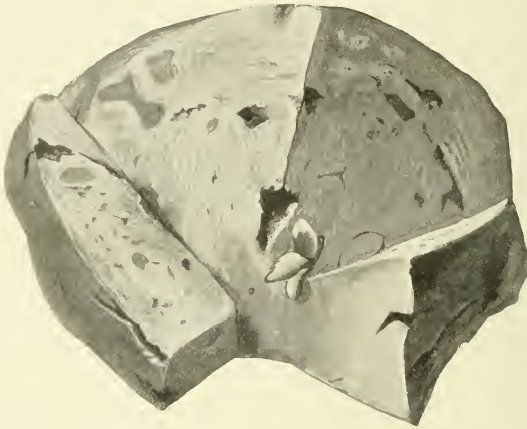


FIG. 231.—Showing three small polypi projecting through a single cyst in a case of adenomyoma uteri.

uterine cornu during the operation, could be squeezed from these cysts into the uterine cavity when the latter was first opened up.

The cysts showed a degenerating epithelial lining, and some contained fragments of epithelium lying free in the lumen. The muscle-tissue was invaded by aggregations of tubules lined by a single layer of non-ciliated epithelium, and was surrounded by the usual cytogenous tissue.

There was no evidence of tuberculosis in the walls of the tubes or in the uterine walls. There is no doubt that

this growth arose from the uterine mucosa and was of inflammatory, but non-tuberculous, origin.

This case and one of my other cases referred to under uterine malformation (page 392) are both examples of cystic disease occurring in diffuse uterine adenomyoma. In both, the cysts were multiple and not large, tending to produce a honeycombed condition in the myometrium. In subperitoneal adenomyomas the cysts are much larger, because, as Cullen says, they are not subjected to so much pressure. Figure 166, page 267, shows a cystic subperitoneal adenomyoma (after Ribbert) in its early stage. It is interesting to note that the growth was situated near the tubal angle, which von Recklinghausen said was the site of election for adenomyoma.

“An unknown form of Adenomyoma of the Uterus” containing cysts with intracystic growth was described by Robert Meyer.¹ The specimen was supplied by Mackendrodt, and was removed by subtotal hysterectomy from a nullipara aged 36 years. It consisted of a uterus, from the right cornu of which sprang a pedunculated bilobed tumour, each lobe being about the size of a man’s head. The right lobe had a pedicle, which lay between the ovarian and the round ligaments, in the position normal to the right tube. In fact, the right Fallopian tube, to reach the uterus, passed through the pedicle of the tumour (see Fig. 232). The pedicle was small, measuring only $1\frac{1}{2}$ cm. in its largest transverse diameter; it connected both the right and the left tumour with the uterus. The omentum was adherent to the right tumour, and to the anterior uterine wall. The right tube was thin and stretched. The right ovary was atrophic. The left adnexa were not removed. There was an intrauterine polypus the size of a plum. It was cystic, and its contents were brown in colour. The myometrium was densely fibrous

¹ *Zeitschr. für Geb. und Gyn.*, 1903, Bd. xlix.

and invaded by small cysts and portions of mucosa. On the right side of the posterior uterine wall was a subserous circumscribed myoma containing cysts. Both right and left tumours showed many adhesions.

The two tumours were presumably of the same character, since Meyer speaks of them as one. He says "the tumour" is beset with small cysts and with a tortuous duct

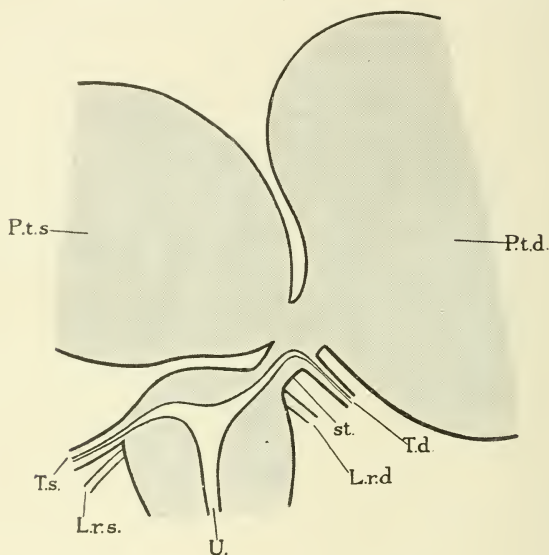


FIG. 232.—Scheme of a large bilobed adenomyoma growing from the right cornu of the uterus. (After Robert Meyer, *Zeitschr. für Geb. u. Gyn.*, 1903, Bd. xlix. Fig. 1, page 467.)

U=uterine cavity; L.r.s. and L.r.d.=left and right round ligaments; P.t.s. and P.t.d.=left and right portions of tumour; T.s. and T.d.=left and right Fallopian tubes; st.=pedicle of tumour. It is traversed by the Fallopian tube.

(see Fig. 233). The lumen of the duct was visible under a magnifying glass; its walls were very thick and sharply demarcated from the connective tissue of the tumour. The size of the cysts varied from that of a pin's head to that of a plum. The larger cysts presented polypoid and folded processes; these intracystic projections quite filled the smaller cysts. The larger cysts contained also smooth

coagulated material, rendered solid and glass-like by formalin solution. The cysts and their intracystic processes recalled the picture of a mammary adenoma with intracanalicular fibro-papillomata, but the cyst-walls were everywhere sharply differentiated from the neighbouring connective tissue.

Microscopically, the tumour consisted of a scanty

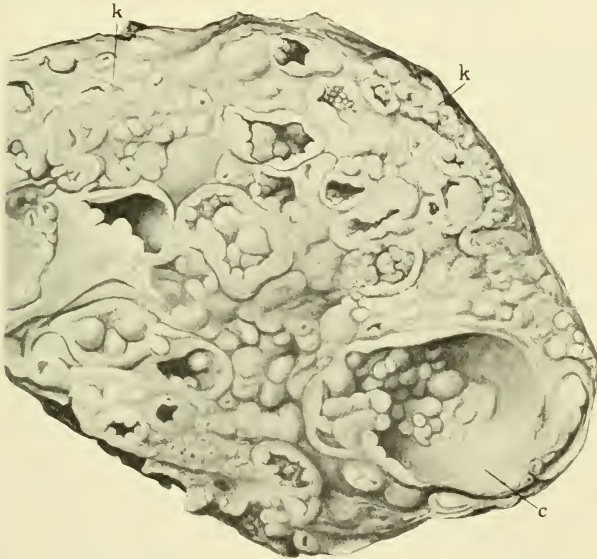


FIG. 233.—Macroscopic view of a portion of the bilobed tumour described by Robert Meyer (*l.s.c.*).

C=large cyst showing intracanalicular fibromas; *kk*=tortuous duct with here and there a definite lumen which could be seen by the naked eye.

amount of connective tissue uniting a system of canals and cysts. The two latter were lined by an epithelial tunic, composed of a single layer of cylindrical epithelium. The stained sections enabled the canals to be picked out by the naked eye; they lay close together, and were mostly seen in transverse section, with their lumina half-moon shaped (see Fig. 234); this configuration was due to the intra-

canalicular projections. In transverse section the tortuous canal was round, and its thick wall contrasted with its narrow lumen. The course of the canal gave the tumour the characteristic appearance of a section through the efferent canals of the epididymis, or similar to that which the epoöphoritic canals, and the Wolffian duct, present in the broad ligament.

The walls of the canal were composed of two laminae,

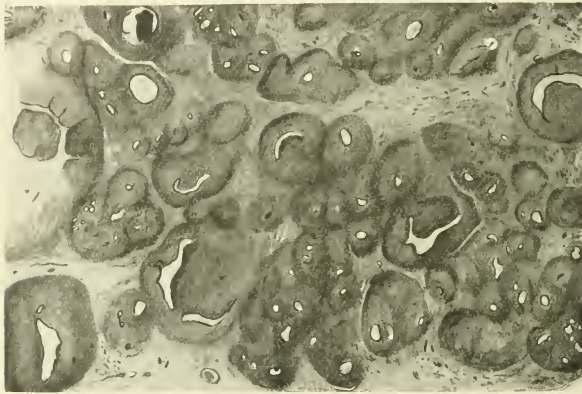


FIG. 234.—Section of Robert Meyer's tumour under a low power. The "tortuous duct" mentioned in the text is here seen in transverse section to possess a very thick wall. Its lumen is often sickle-shaped from the projection into it of "intracanalicular fibromas." (After Meyer, *l.s.c.*)

an inner longitudinal and an outer circular. Besides these two layers there was an innermost circular layer, in close connection with the epithelium lining the lumen. The outermost layer was vascular. These layers of the wall of the tortuous canal, and also those of the cysts, were composed of spindle-shaped connective-tissue cells, and muscular fibres; the former predominated in the inner and middle layers. The intracanalicular projections contained no muscle. The connective tissue uniting the convolutions of the duct contained muscle-bundles which appeared to come

from the walls of the canal. There was no elastic tissue in any of the component parts of the tumour. Hyaline degeneration and calcification were present, also liquefaction and non-epithelial cystic formation. The lining of the canal was formed of a single or double layer of cylindrical epithelium, which became flattened out on the intracanalicular projections. The epithelium had neither basement membrane nor cilia. The nuclei of the cells were central and stained deeply. The uterine mucosa invaded the myometrium as far as its outermost layers, but in the pedicle of the tumour the tubal epithelium was normal along the whole course taken by the intramural part of the Fallopian tube. *The uterine mucosa at the tubal angle, however, sent deep processes into the pedicle of the tumour* (cp. Cullen), but these had no connection with the canalicular part of the tumour. The pedicle therefore contained :—

- (1) The narrowed lumen of the right Fallopian tube.
- (2) Numerous tubules from the uterine mucosa.
- (3) Canals and cysts *not* derived from the uterine mucous membrane.

The upper or distal part of the pedicle resembled the tumour in its microscopic characters, except that it contained more connective tissue, and that the cysts were large and irregular in shape, and possessed no thick laminated tunic. *These cysts probably arose from the parametrium* and resembled dilatations of the epoöphoritic tubules.

The lower (proximal) part of the pedicle was mainly composed of uterine muscle, and contained the intramural part of the tube. The lateral angle of the pedicle was made up of the loose connective tissue of the broad ligament, containing small canals and cysts.

The muscular part of the pedicle contained a canal, which was elongated and tortuous, and devoid of a laminated tunic; it connected the large tumours, first, with the small adeno-fibroma in the right uterine wall,

and also with the uterine mucosa. This canal was morphologically a transition between the uterine mucosa and the thick-walled canal which composed the greater part of the large tumour.

Meyer describes the large pedunculated growth as a "*combination of organoid tumours*" (see Fig. 233), the principal constituents being a long thick-walled canal twisted upon itself in a very complex way, and presenting dilatations which contained intracystic fibrous growths (see Fig. 234). The term 'organoid' was justified because of the existence of circular and longitudinal coats of fibro-muscular tissue in the wall of the canal and cysts. This was no mere secondary arrangement of fibrous tissue, such as is well known to exist around glands in an adeno-fibroma. It was the distinct fully-formed wall of a sharply demarcated *duct*. It was in no sense a case of a fibroma invaded by epithelial canals, but was a tumour composed in its entirety of a tortuous duct and its thick fibro-muscular mantle.

Meyer said he knew of one organ only from which such a tumour could arise, and that was the *epöphoron* and the *Wolffian duct*. He could not allow that the undoubted adenomyomatous state of the uterus had any genetic relation to the tumour. So far as I know, Cullen has never pronounced judgment on this tumour, but we should expect him to regard it as an example of his variety of subperitoneal adenomyoma; and to support his argument by the fact that there were tubules of the uterine mucosa found in the pedicle, since these were definitely stated by Meyer to be in communication with the 'duct'-system of the tumour. I have myself seen a cyst which was produced in a myoma by liquefaction, and which was surrounded by muscle and fibrous tissue arranged in circular and longitudinal layers (see Fig. 50 on Plate IX., opposite page 48). Meyer explained the mucosal invasion of the pedicle of his tumour by the ingenious suggestion that

the tumour-mass exerted a pressure upon the uterus; the mucosa became, thereby, squeezed along the lines of least resistance, which, in this case, was the pedicle of the tumour; and he illustrates this process by citing, as an example, the pedicle of an adeno-fibromatous polypus of the uterus.

Meyer further pleads the localisation of his tumour as favouring a heterotopic (non-mucosal or extrauterine) origin. In this he falls back upon one of the main arguments of his teacher, von Recklinghausen. He finally admits that the morphological resemblance of an adenomyoma to the mesonephros is purely accidental, and that the various points of supposed resemblance are the result of accidental mechanical factors. Nevertheless, in this tumour which Meyer claims has no parallel (1903), the close resemblance between the thick-walled duct and the Wolffian duct induces him to accept the morphological argument for once in a way. The tumour was therefore diagnosed as Wolffian because of its morphology, and because of its location at the uterine cornu.

The following is a short account of some cystic adenomyomas described by T. S. Cullen:—

1. *Diffuse Adenomyoma with Cornual Cyst.*—The patient was aged 53 years. She complained of frequent uterine haemorrhage. On opening the abdomen the uterus was found to be the size of a four months' gestation; it was nodular, and the cervix was adherent. There was a right-sided hydrosalpinx, which is figured in Cullen's drawing as a tubo-ovarian cyst. The uterus was amputated through the cervix. Its posterior surface showed some delicate adhesions. The walls, both anterior and posterior, were 5 cm. thick. The uterine mucosa was thickened. At the left cornu was an irregular cystic space 6 × 4 cm. in size. Sections from the body of the uterus showed that the mucosa could be traced into the depths of the muscularis for a considerable distance. The cyst at

the left cornu was lined with a single layer of ciliated epithelium. It was evidently due to dilatation of portions of the adenomyomatous elements.¹

“The entire fundus is converted into diffuse myomatous tissue, and with a low power the uterine mucosa can be seen penetrating the myoma in all directions. The cystic space (A) (Fig. 235) in the left uterine horn is due to gland-dilatation, it being lined with a cylindrical ciliated

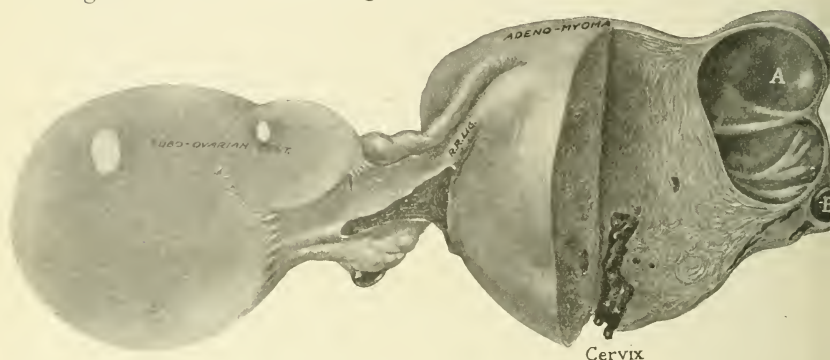


FIG. 235.—Diffuse adenomyoma of the uterus with cystic spaces in the left uterine cornu ($\times \frac{1}{2}$). (After Cullen's Fig. 36, page 120. By permission.)

A=cystic space lined by columnar ciliated epithelium; B=space filled with blood-clot. The mucous membrane of the cavum uteri invaded the muscularis for a considerable distance, but there is no mention of ciliated epithelium in the glands which communicated with the cavity of the uterus. Cullen's view is that cystic spaces occur in parts removed from the pressure of the uterine wall, hence the frequency with which they are found in a peripheral situation.

epithelium. The space (B) is filled with blood. On the right side is a tubo-ovarian cyst. The inner pole of the right ovary is normal.” Whether the cornual epithelial cyst had any connection with the central adenomyoma seemed to me to be open to doubt.

II. *Subperitoneal Cystic Adenomyoma*.—The patient was single and aged 40 years. The menses began at twelve years and were regular, lasting three days. An abdominal swelling about the size of an egg had existed for a long time; for the last year it had increased in size. It gave rise

¹ Cullen, *Adenomyoma of the Uterus*, pages 119-122.

to no discomfort whatever. On examination there was a movable lump reaching to within 2 cm. of the umbilicus; it was smooth and oblong in shape.

Operation.—The uterus was bisected and removed, together with the tubes. The ovaries were retained. The

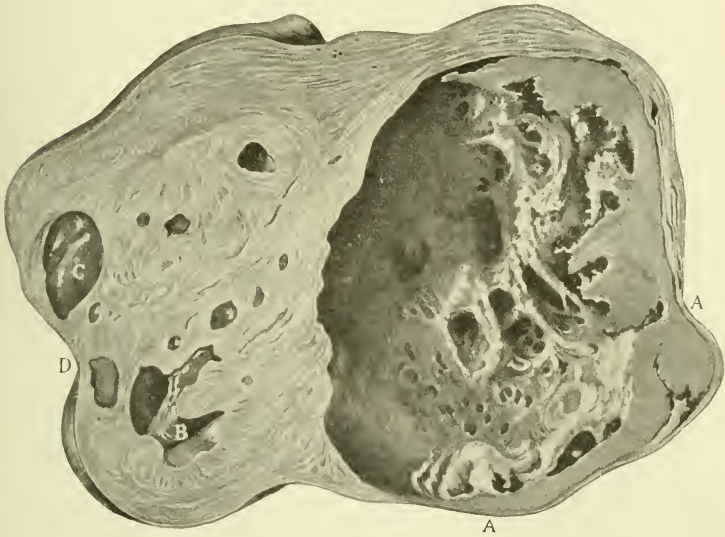


FIG. 236.—A subperitoneal adenomyoma which has become cystic.
(Reproduced from Cullen's Fig. 37, page 130. By permission.)

One-half of the tumour is shown. It was attached to the right cornu uteri by a short broad pedicle near *D*. At *A.A* the cyst-wall is thinned out. The ragged appearance is due to coagulated cyst-contents. Cullen stated that the interior was in reality smooth and velvety. The spaces are said by the author not to convey the idea of cysts, but it seemed as though the muscle was tunnelled in various directions by spaces of variable size. The epithelial lining of the spaces was apparently ciliated. The maximum depth to which the uterine glands penetrated the muscle-wall was 1.5 mm. *C* shows a small cyst filled with coagulated contents.

uterus was very irregular, due to the projection from its surface of numerous myomatous nodules. Springing from the right cornu, and attached by a pedicle 4 cm. in diameter, was the cystic subperitoneal adenomyoma seen in Figure 236.

The drawing represents one-half of the tumour, which was attached to the enlarged fundus by a very short broad-

based pedicle situated in the vicinity of D. The tumour was roughly divided into a semi-solid and a cystic portion. The cyst was irregular in outline, and it connected up with little bays, extending into the solid portion.

In some places the cyst-wall was very thin, as at A. The ragged appearance of the interior of the cyst was due to coagulated cyst-contents. The inner surface of the cyst was in reality smooth and velvety. The solid portion of the tumour was composed of a diffuse myoma. Scattered through it were large and small cyst-like spaces; B is such a cavity. In C the contents still remain. "These spaces, on careful examination, do not convey the idea of cysts, but it seems as though the muscle was being tunnelled in various directions by spaces of variable size." The large cyst was lined by ciliated epithelium which sometimes rested directly on muscle, but in many places was separated by stroma similar to that of mucosa.

III. *Multiple Cysts in a Subperitoneal Adenomyoma.*—Double perisalpingitis and perioöphoritis (see Fig. 237, page 413).

The patient was a negress, aged 40 years; single. She had had one child twenty years ago; no miscarriages. The menses appeared at fifteen years; they were regular but painful, and had been more profuse lately, lasting three days and accompanied by intense pain. The patient had a thin *bloody, offensive, leucorrhoeal discharge* containing shreds; this lasted for two weeks after each menstrual period, and then gave place to a white *offensive discharge* lasting until the next period. Ten years ago, the patient noticed a small lump in the abdomen, which became more prominent during menstruation. The tumour grew steadily, and at the time of operation it practically filled the abdomen. There was dull pain over the region of the growth; the pain became more severe at the menstrual periods.

Examination.—The abdomen was much distended by a

hard, sensitive, irregular mass; the cervix was pushed against the symphysis pubis. The whole vaginal vault was filled with a hard immovable mass.



FIG. 237.—Subperitoneal cystic adenomyomas occurring in the case of large myomatous uterus. (Reproduced by permission from Fig. 39, page 134, Cullen's *Adenomyoma of the Uterus*.)

A and *B*=myomas; *C* and *D*=cystic adenomyomas. *D* shows the area from which the microscopic section illustrated in Fig. 238 was taken.

Operation.—"Panhytero-myomectomy." General peritoneal adhesions were found, and three large subserous myomas; submucous myoma were present. The interest in

the specimen for our purpose, is the presence of numerous cysts in the peripheral adenomyomatous bosses. These subperitoneal cysts lay under a very thin strand of muscle (Fig. 238). They were lined with cylindrical epithelium, which Cullen regards as being embryonic and Müllerian.

The mucosa of the cavity of the uterus was atrophic and seemed to have shown no tendency to invade; therefore Cullen's favourite theory could not be applied to this case. There was yellow pigment in the cysts, so that Cullen



FIG. 238.—Showing microscopic features of spot *D* in the preceding figure ($\times 6$).

(Reproduced by permission. Cullen's Fig. 40, page 136.)

A is the solid myomatous tumour; *b*=the myomatous wall of cyst; *c* and *d*=spaces lined by cylindrical epithelium; *b'*=outer peritoneal covering; *ff*=cysts which Cullen considers resemble uterine glands and which he regards as arising from the remains of Müller's ducts; *e*=gland-like depressions of surface-epithelium; *g*=portion of neighbouring cyst.

says: "I am inclined to think that they have been derived from Müller's duct: (1) because the epithelium bears such a striking likeness to that of the uterine mucosa; and (2) because of the pigment in the cyst-wall."

Another very obvious explanation would be that of infiltration by *peritoneal epithelium* under the many adhesions which were present.

"The uterus is much enlarged, owing to the presence of myomatous tumour. Projecting through the cervix is a small portion of a submucous myoma, and situated anteriorly

and to the left (*sic*) are large myomata, A and B (Fig. 237), only dimly outlined. Scattered over the posterior surface of the uterus are several sessile nodules, and one of moderate size, with several cysts springing from its surface. C is a single cyst, and at D a group of seven are seen. All are thin-walled and semi-translucent." The walls of these cysts are composed of myomatous tissue, and their lining consists of a single layer of cylindrical epithelium.

Figure 238 shows the histological feature of one of the cysts marked D in Figure 237.

IV. *An Intraligamentary Cystic Adenomyoma of the Uterus.*—Cullen described the above as extending into the right broad ligament and also becoming submucous. There was hypertrophy of the glands of the uterine mucosa and slight pelvic adhesions. The patient was a married woman, aged 36 years. She complained of *continuous bleeding* from the uterus and pain in the right lower abdomen. She had been married sixteen years and had three children. The menses began at twelve years and were regular, lasting four days. There was no pain, and the flow was moderate.

Two years previously, a submucous adenomyoma had been removed. Two or three curettings had also been performed. For two years leucorrhoea had been profuse; there was also dysuria. On such occasions, the patient had to push the uterus up before voiding urine. The bowels were constipated. The uterus was the size of a four months' pregnancy. On opening the abdomen, its appearance suggested a sarcoma involving the right uterine walls, and extending into the right broad ligament. The right tube and ovary were adherent to the pelvic floor. There were slight adhesions on the left ovary. The macroscopic appearances are illustrated in Figures 175 and 239, pages 290 and 416.

(1) The uterus, which is much enlarged, has been opened anteriorly. The vaginal portion of the cervix is considerably

thickened. The external os is dilated and the cervical mucosa is more shaggy than usual. The anterior uterine wall is considerably thickened. Occupying the broad ligament is a globular tumour, A. This has extended through the uterine wall, and projects into, and completely fills the uterine cavity. The submucous portion projects from the posterior and right uterine wall. It is smooth and glistening but lobulated, owing to the presence of

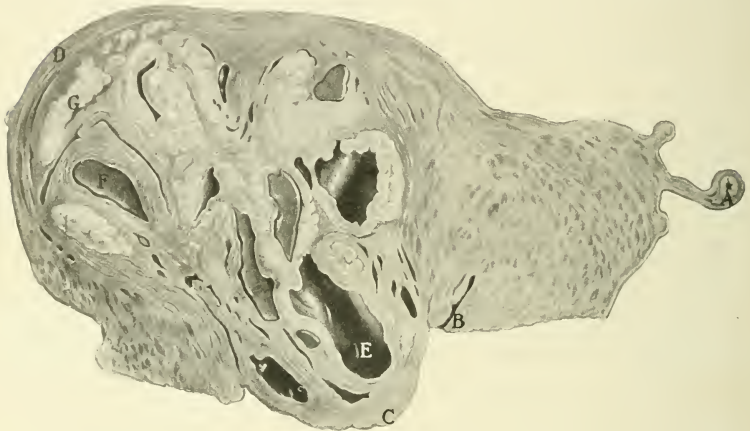


FIG. 239.—A cystic intraligamentary and partly submucous adenomyoma from section *bb1* in Fig. 175, page 290. (Reproduced from Cullen's Fig. 44, page 152. By permission.)

A= cross-section of left Fallopian tube; B= small portion of uterine cavity; C= submucous portion of growth; D= intraligamentary pole of growth; E= irregular cyst; F= cyst filled with coagulated contents; G= myomatous tissue.

cysts, varying from 1 mm. to 1.5 cm. or more in diameter, which project slightly from the surface. Over some of these the blood-vessels are slightly dilated. At one point the submucous myoma has been cut for a distance of 2 cm. and we see the smooth inner surface of two cysts. The appendages on the right are normal; those on the left are also normal, except for a band of adhesions between the outer end of the tube and the ovary. Figure 239 represents a transverse section through this uterus on a level

with a line between *b* and *b*¹. The histological structure is shown in Fig. 240.

“The drawing illustrates a section through Fig. 175, page 290, between *b* and *b*¹. *A* is a cross-section of the left tube. *B* is a small portion of the uterine cavity. *C* is the submucous portion of the cystic adenomyoma, and *D* its intraligamentary pole. *E* is one of the irregular cyst-like spaces with a smooth velvety inner lining resembling mucosa. Just above it is a similar but smaller one. The other spaces as indicated by *F*, also irregular in outline,



FIG. 240.—Section $\times 5$ of submucous portion of cystic adenomyoma seen in Fig. 239. (After Cullen, Fig. 45, page 154. By permission.)

a = uterine mucosa, its stroma is rarefied; *c* = mass of hypertrophic glands with cyst *A*.

are filled with glistening coagulated contents which have not been removed. The coagulation is due to the hardening fluid. *G* is the characteristic myomatous tissue. The outline of the myomatous growth is well defined, but notwithstanding this fact the tumour merges gradually into the normal muscle.”

The section seen above in Figure 240 is from the submucous myoma shown in Figures 175 and 239, pages 290 and 416.

“*a* represents the uterine mucosa which has an intact epithelium and perfectly normal uterine glands. The stroma of the mucosa is rarefied but normal. *A* is one of

the cyst-like spaces. At some points it is lined with a layer of cylindrical epithelium lying directly on the muscle. At other points this is separated from it by a small amount of stroma similar to that of the uterine mucosa. Whilst in some places, as at *b*, there are definite uterine glands beneath the epithelial lining, at *c* we have a uterine mucosa as thick as that covering the surface of the submucous myoma, and consisting of a typical gland-hypertrophy. *B*, *C*, *D*, and *E* are other cyst-like spaces lined with cylindrical epithelium.

“*A* and *B* are evidently one and the same cavity, communicating as they do with one another by the bar *d*, consisting of the characteristic stroma of the mucosa and containing two small glands.”

It is perfectly obvious that in the above case Cullen is right in concluding that the cysts are derived from epithelium of mucosal origin; but it is not so clear that his view regarding subperitoneal cysts, such as those seen in the preceding figures, is correct. In the case of his figures (237 and 238) I prefer to attribute the origin of the epithelial cysts to the peritoneum.

CHAPTER VI

ADENOMYOMA AND MALIGNANCY

WHEN in 1903 Robert Meyer wrote on 'adenomatous' growths of mucosal origin in the uterus and tubes, he was at great pains to show that what he subsequently called epithelial heterotopy, although infiltrating in its character, was not malignant. The infiltrative behaviour of the mucosa was allowed to display itself owing to a want of true submucosa in the tubal and uterine wall, but the invading processes were in no sense malignant. Primary carcinoma of the Fallopian tubes would be quite frequent, if this heterotopy was malignant or ultimately became so. Meyer had seen follicular salpingitis in adenocarcinoma and in sarcoma of the tube, but he asks, What right have we to say that the one condition is the result of the other?

Cullen¹ mentions some cases in which adenomyomas had been excised from the uterus, and the after-results were said to have "graphically illustrated the benign character of adenomyomas of the uterus."

Sitzenfrey² says, We have had half a dozen cases where the fusion between the uterus and rectum (by adenomyomas) could be separated more or less easily by blunt or sharp dissection. Although infiltrated bowel was left behind at the operations, and although the histological examinations proved the presence of adenomyoma in the bowel-wall, there was not a single recurrence "even after

¹ *Adenomyoma of the Uterus*, page 188.

² *Zeit. für Geb. und Gynäk.*, 1909, Bd. lxiv. S. 560.

ten years." Fütth's case and that of von Franqué reported by Kleinhans (Case 2), and also that of Moraller, showed the same benign character. All these patients recovered from operation with a lump in the anterior wall of the rectum, which subsequently *disappeared*. Rumpf's case of recto-uterine growth was well four years after operation, and that of Glöckner two years later. In one of Meyer's cases nearly the whole of the vagina was excised, the vaginal wall being riddled with glands. The upper part of the growth could not be removed because it was so densely adherent to the rectum; nevertheless "cure occurred contrary to expectation."

The cases of adenomyoma of the recto-genital space have, more than any other class, clearly demonstrated both the infiltrative propensity and the non-malignant character of these growths.

Grünbaum of Nuremberg, writing on *Das klinische Verhalten der Adenomyomen uterinen*,¹ considers the question of malignancy under three groups:—

1. Malignant disease of the adenomyoma itself (primary carcinoma of the epithelial inclusions).

2. *Carcinoma uteri* and *adenomyoma uteri*, with the latter becoming malignant.

3. *Carcinoma uteri* and *adenomyoma uteri*, both independent.

In Class I. Grünbaum puts the cases of Dillman, Kaufmann, Rolly, Babes, and erroneously he adds "perhaps that of Fütth"—a case which certainly was not malignant, the patient being "better than she had ever been in her life" eighteen months after an incomplete operation.

In Class II. are included by this author one of von Recklinghausen's cases where a pre-existing benign adenomyoma was invaded by a mucosal cancer, and also cases recorded by Cullen, Meyer, and Babes; the last was a

¹ *Archiv für Gynäkologie*, Bd. lxxxvi. H. 2, S. 387.

case where there was extensive cervical carcinoma with a fundal adenomyoma in which some of the glands suggested cancer.

In Class III. come a case of von Recklinghausen's, a case of Cullen's, and one of Grünbaum's (see Fig. 241).

The case of malignant adenomyoma recorded by

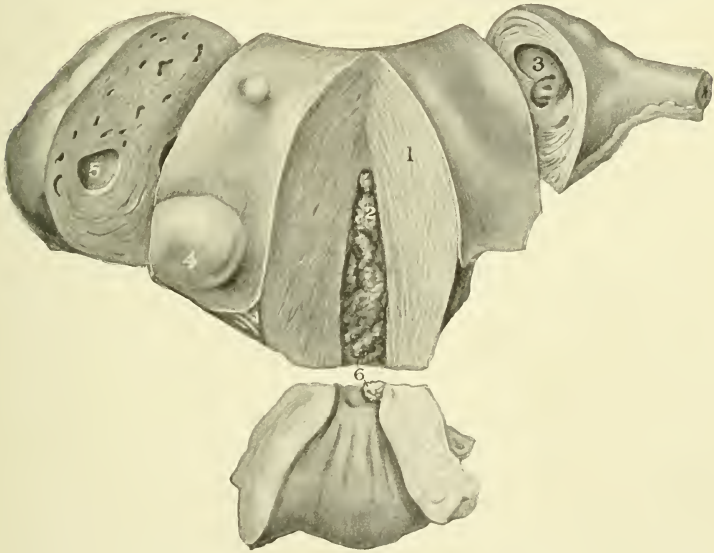


FIG. 241.—Cornual cystic adenomyoma associated with adenocarcinoma of the body of the uterus. (After Grünbaum, *Archiv f. Gynäk.* lxxxvi. H. 2, S. 400.)

1 = anterior uterine wall ; 2 = adenocarcinoma ; 3 = adenomyoma at the tubal angle ; 4 = subserous cystic adenomyoma ; 5 = cystic adenomyoma ; 6 = boundary of adenocarcinoma at cervical level.

Dillman ended fatally. It was a large cyst, and caused perforation of the duodenum and fatal peritonitis.¹ Grünbaum's case was Landau's adenomyoma, No. 15. The patient was sterile. There was a symptomless extensive carcinoma of the body of the uterus, and two cornual adenomyomas were present. The symptoms were referable to the bladder only. A tubo-ovarian abscess lay in the pouch of

¹ *Zeitschr. für Krebsforschung*, 1904, ii. 333. (See also page 427 of this volume. —C. L.)

Douglas. The carcinoma extended to the cervix, which was therefore removed after a supravaginal amputation of the uterus had been performed.

Meyer makes the statement that carcinoma is less common with adenomyoma than with myoma.

Sitzenfrey recorded a case of multiple squamous carcinomatous nodules arising from the corporeal endometrium in a case of adenomyometritis (adenomyoma).¹ The patient was 43 years of age. She suffered from pelvic pain and extreme prolapse, also from menorrhagia and leucorrhoea. The uterus was removed by vaginal hysterectomy.

Rolly of Heidelberg described a case of *adenomyoma uteri* with carcinomatous change and the formation of metastases.² The specimen consisted of a uterus showing an intramural calcareous myoma, left-sided cystic adenomyoma, and right-sided adenomyoma. The latter showed carcinomatous change. There were metastases in the bones, pleura, lymph-glands, and liver. The carcinoma was of the "large" alveolar type, but there were no mitotic figures in the nuclei of the cells. "Instead of cylindrical cells there were large polyhedral and round cells with oval irregular nuclei." Rolly said the epithelial tubules in his specimen came from the Wolffian system. Babes published a case in 1882³ in which there was a subserous fundal myoma the size of a man's fist. Absolutely in the middle of this growth lay a soft cylindrical-celled carcinoma. There was a "fresh" metastasis in the liver, and miliary cancerous nodules on the pleura. Babes favoured an origin from "rest-cells," but Schroeder thought that the glands were mucosal in origin and that the myoma whilst growing included the mucous membrane within itself—a most extraordinary suggestion, considering that a myoma grows as a circumscribed rounded mass, and is incapable of throwing

¹ *Gynäkol. Rundschau*, 1911.

² Chapter xxviii. *Virchow's Archiv*, Bd. cl. S. 555, 1897.

³ *Wiener med. Blätter*, p. 30.

out processes of muscle so as to embrace a segment of mucous membrane in the same way that an amoeba includes a foreign body. Von Recklinghausen published the following three malignant cases in his monograph, 1896.¹

Case A was that of Hermann Freund. The patient was a sterile woman of 44 years of age. The periods were profuse and painful. For four years the loss had been so severe as to cause very extreme anaemia. The uterus was about the size of a child's head and was firmly adherent to bladder, caecum, ileum and vermiform appendix. Freeing of the uterus was very difficult, and a cystic ovary and tube also gave great trouble. In spite of a normal temperature for six days, the patient died exhausted seventeen days after operation.

The specimen is described as "adenomyoma and cyst-adenoma (with epithelial tubercle) diffusely distributed throughout the whole *corpus uteri*, but most extensive on the dorsum and fundus." The microscopical findings were "infiltrating *myoplastic* cylindrical-celled cancer in the central layers of the right wall of the body of the uterus." There was also present a simple myoma and hypertrophy of the tubes.

Case B.—The patient was aged 55 years; sterile; menstruation began at the age of twelve years. In the twentieth year there was a doubtful abortion. From the twenty-eighth year onwards the periods were scanty, and menopause occurred in the thirtieth year. In the forty-fifth year there was a haemorrhage after straining, and this bleeding recurred at irregular intervals with exhaustion. The haemorrhagic discharge was offensive. The patient was extremely corpulent. There was a uterine tumour the size of a man's fist. Curettings were diagnosed as carcinoma. Abdominal hysterectomy was performed by W. A. Freund. This route was chosen because the vagina was narrowed

¹ *Loc. supra cit.*

by senile atrophy. There was no sign of recurrence fifteen months after operation. Von Recklinghausen described the case as an infiltrating *myoplastic* cylindrical carcinoma of the central layers of the corporeal walls; epithelioid tubercle; general hypertrophy of the uterus "without a myoma."

Case C.—The patient was 62 years of age. She had suffered for many years from pelvic pain. The uterus was nearly round in shape; its body was the size of a man's fist. There was a cystadenoma of one of the ovaries. Eugene Bockel removed the tumour by supravaginal amputation. The specimen is described as an infiltrating mucosal cylindrical-celled cancer of the central layers of the uterine wall with a subserous myoma undergoing myxomatous and cystic degeneration.

There are no illustrations in von Recklinghausen's monograph, either of the macro- or microscopic preparations appertaining to these three cases.

Von Recklinghausen thought the "rare" mucosal growths were more prone to cancerous change than his organoid tumours. Shütze, writing in 1907, said that adenomyomas were morphologically benign growths of the endometrium, but that they laid the foundation for adenocarcinoma.

Max Schwab recorded a case of "multiple adenomyomas of the uterus undergoing carcinomatous degeneration."¹

The patient, a II-para, was 37 years of age. She was admitted for severe pelvic and sacral pain. A diagnosis of inflamed appendages was made. Electrical treatment was employed, and high temperature with rapid pulse followed. At the operation the uterus was found to be adherent to the rectum by thin adhesions, which, when separated, showed the adnexa to be normal. In Douglas's pouch was a curious tumour, shaped like a hen's egg, and lying obliquely. It was thought at first to be an old

¹ *Beiträge zur Geb.*, 1908, Bd. xii. S. 102.

haematocele, and it was doubtful whether it was covered by peritoneum or not. The tumour was so adherent to the rectum and to the vagina that it could not be separated. The mass was then tapped for pus without result. Then a strong capsule was incised and soft medullary tissue "sprang out." It resembled a myoma with central softening. The central part was easily removed and the thick capsule left behind. Subsequently, four tiny nodules were

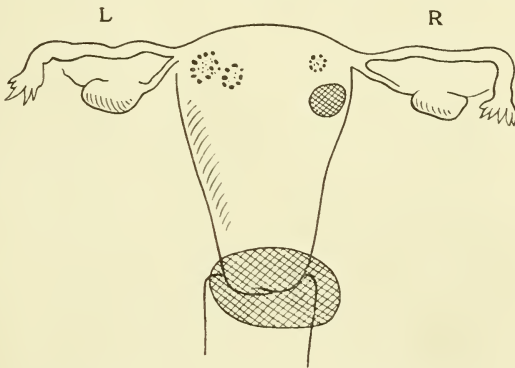


FIG. 242.—Scheme of uterus as seen from behind. Tumours in the anterior uterine wall are represented by points. Those in the posterior uterine wall are represented by cross-lines. (After Max Schwab, *Beiträge zur Geb. u. Gynäk.*, 1908, Bd. xii. S. 105.)

enucleated from the fundal part of the body of the uterus (see Fig. 242). One was an encapsuled myoma, the other three were not encapsuled, and proved to be the same in character as the recto-cervical growth. Fig. 243 shows the curious structure of these nodules. The radial arrangement of the 'carcinomatous' portion is the chief feature. The sections were submitted to Robert Meyer, who seems to have cautiously withheld his opinion, but asked Max Schwab to publish the case. Schwab could find only four other examples of 'malignant adenomyoma' in which the growth was covered by healthy uterine mucosa. These were, one by Babes, Rolly's case, and two cases of Dillman.

Rolly and Dillman regarded their specimens as Wolffian. Schwab favoured the view that in his case the growths were mucosal (Müllerian). The case of Max Schwab, from the description he gives, seems to differ from the cases already

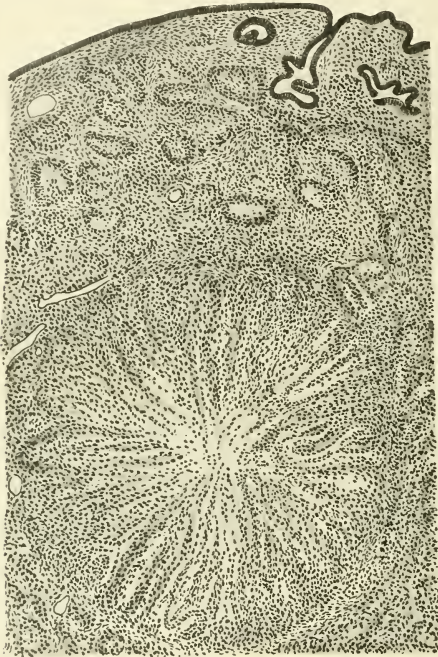


FIG. 243.—Adenomyoma of the recto-vaginal septum, showing microscopically what was considered to be carcinomatous change. (See also Fig. 242. After Max Schwab, *Beiträge zur Geb. u. Gynäk.*, 1908, Bd. xii. Fig. 2, page 107.)

recorded in the section dealing with the recto-genital space. In none of the former examples was there a 'capsule' with a soft growth inside.

Babes (Budapest) reported two cases¹ to substantiate his view that epithelial growths occurring deep in the uterus and independent of the mucosa, could form a site

¹ *Pest. med.-chir. Presse*, 1882, xviii. 24.

for carcinoma. I cannot obtain the original paper, but found a good abstract in the *Zentralblatt*, No. 24, 1882. I find that in the first case there was a metastasis in the liver, and the microscopical description of a large growth in the uterus mentions "spaces filled with large and small cells" as well as the ordinary gland-structure of an adenomyoma.

In the second case the wall of a cyst in the tumour showed connective-tissue spaces filled with rows of "low epithelial cells with vacuolated nuclei"; "epithelial rests" on the inner surface of the cyst-wall are also mentioned. No illustrations are given, so that it is difficult to express an opinion on the question of malignancy in these cases.

Heinrich Dillman¹ published two important cases of malignant adenomyoma of the uterus² under a notice "Nachdruck verboten"! In spite of the prohibition it may be admissible to mention that Case No. 1 is described as *Myoma adenomatosum malignum cum metastasibus hepatis, glandularum lymphaticarum: Carcinomatosis peritonei. Peritonitis ichorosa et purulenta*.

Case 2 was an *Adenomyoma cysticum malignum uteri cum metastasibus pulmonis dextri, hepatis, intestini, peritonei. Peritonitis fibrino-purulenta*" (this has already been mentioned on page 421).

Dillman did not accept von Recklinghausen's views on morphology, but thought the above cases were Wolffian on topographical grounds. The growths were dorsal and subserous. R. Meyer, who has repeatedly expressed his disbelief in the malignant possibilities of adenomyoma, states in regard to the above two specimens, "The remarkable feature in these cases is the malignant degeneration."³

Cullen,⁴ 1908, mentions six cases of epithelioma

¹ A pupil of von Hausemann's. ² *Zeitschr. für Krebsforschung*, 1904, ii. 333.

³ *Ergebnisse der allgem. Pathologie*, ix., 1903, 2. Abteil. S. 621.

⁴ *Loc. supra cit.* page 194.

of the cervix in association with diffuse adenomyoma of the body of the uterus; also two cases of diffuse adenomyoma in conjunction with adenocarcinoma of the body. "In both of these the uterine mucosa had been destroyed, and the carcinomatous growth so overshadowed the picture, that the origin of the glands in the myomatous growth was naturally totally obscured."

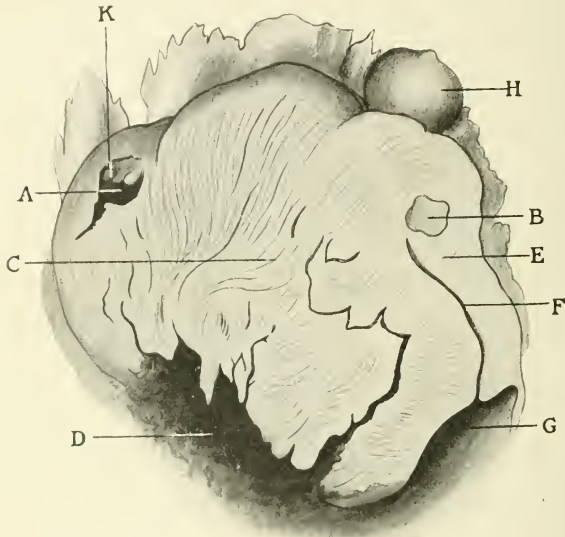


FIG. 244.—Right half of N. S. Iwanoff's uterine tumour.
(From *Monatsschr. für Geb. und Gyn.* Bd. vii. Fig. 1, Taf. iv., 1898.)

A = glandular area, and K = cyst in same; B = myoma of anterior wall of uterus; C = uterine growth; D = carcinomatous part of C; E = uterus; F = cavum uteri; G = vagina; H = ovary.

I have been able to find only two cases of sarcoma associated with adenomyoma—those of Iwanoff and Bauer-eisen. Grünbaum mentions a third, that described by Kaufmann in his *Lehrbuch der path. Anatomie*. This book I have been unable to obtain.

Iwanoff's case (see Figs. 244, 245, 246) was that of a

woman aged 38 years. The uterus was enlarged and retroflexed. There was a cauliflower-growth in the posterior fornix. This was removed in May 1891 and again in 1892. Several months later the vagina was filled with new growth and this was again cleared out, and all went well for two years.

In 1897 the vaginal tumour was insignificant in size but the pelvis was filled by a growth.

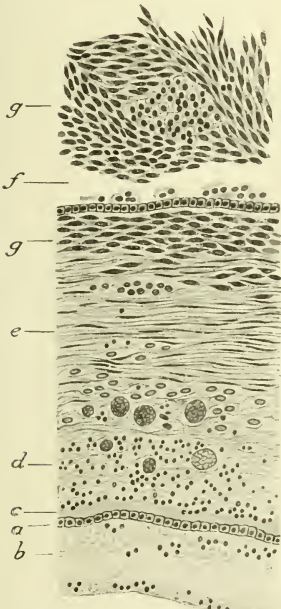


FIG. 245.—Microscopic characters of N. S. Iwanoff's uterine tumour (*l.s.c.*).
a = cubical epithelium of cyst-wall; *b* = inner lining of fibrin and leucocytes; *c* = membrana propria; *d* = connective tissue infiltrated with leucocytes; *e* = smooth muscle; *f* = glandular hollow space; *g* = sarcoma.

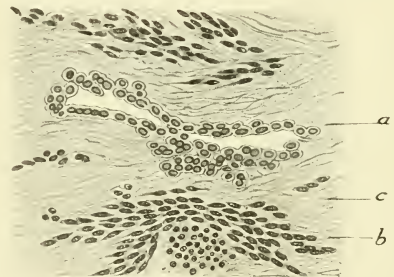


FIG. 246.—(Iwanoff, *l.s.c.*)
a = gland; *b* = sarcoma; *c* = connective tissue.

a tumour, the upper part of which was a sarcoma. The lower part of this growth, which ran to the vaginal vault, contained gland-spaces lined by epithelial cells which also ran in the intercellular substance, singly or in groups; such an arrangement bespoke an adenocarcinoma. At the upper, sarcomatous part of the growth, was a cyst and typical gland-tissue, so that the component parts were,

fibrous tissue, smooth muscle, gland-tissue, cysts with cylindrical or cubical epithelium, and, finally, sarcomatous tissue; therefore the author designated the case as *Adeno-fibromyoma cysticum sarcomatodes carcinomatosum*.

Bauereisen described *ein bemerkenswerter Fall von Adenomyoma uteri sarcomatosum*.¹

The patient was a spinster, aged 46 years. The family history was tuberculous; the periods were not profuse; pain in the abdomen and back had been complained of for one year.

On examination.—The woman was slender and ill-nourished. The posterior vaginal vault was filled as if by a haematocele. To the left of the uterus a tense, elastic, partly solid tumour was found. The diagnosis of inflamed adnexal tumour was made. Veit performed the operation. A papilliferous growth proceeded from the fundus and formed the summit of the mass felt *per vaginam*. A blood-cyst ruptured during removal; the source of this was the fundal tumour. Papilliferous masses were present on the adnexa, secondary to the large fundal growth. The latter measured $4 \times 5 \times 7$ cm. (see Fig. 247); its surface was nodular, and presented grape-like masses resembling the 'berries' of a vesicular mole or those of a cervical sarcoma. It appeared as if a papilliferous growth from the interior of the uterus had eroded through the uterine wall. On opening the uterus a well-encapsuled myoma was found in the fundal wall. The papilliferous tumour overlay the capsule of the myoma, but had no relation to the encapsuled part of the latter. The myoma had a streaked appearance and presented cystic spaces. In the cavity of the uterus was a polypus, and other myomas were seen in the lower part of the *corpus uteri*. Microscopically the muscular capsule of the myoma was seen to fuse with the richly-cellular elements of the papilliferous cystic growth. The rod-shaped nuclei of the muscle-

¹ *Beiträge zur Geb.*, 1905, Bd. ix. S. 313.

cells lost themselves in the large irregular-shaped nuclei of the tumour-cells.

The fundal myoma differed from the lower ones in



FIG. 247.—Bauereisen's adenomyoma uteri sarcomatosum : specimen seen from the front.
(After Bauereisen, *Beiträge zur Geb. u. Gyn.*, 1905, Bd. ix.)

being highly cellular, and in having a very irregular structure. It had a very similar structure to that of the papilliferous haemorrhagic growth. In fact, Bauereisen thought it was sarcomatous, but not to the same extent as

the latter. In the papillary tumour were strands of cells in a myxomatous vascular matrix ; the cells had nuclei of various shapes which stained deeply (the illustration of the microscopic section is unsatisfactory, and the author says nothing about the arrangement of nuclear figures).

In the proximal part of the papillary growth were glands, showing a scattered arrangement, and surrounded by a cytogenous mantle, which Bauereisen regarded as favouring a uterine origin, "but whether from Müller's duct or from the normal mucosa was a theoretical question to which only a speculative answer could be given."

I have already mentioned that one of my cases was regarded by Taylor and others as being malignant (see page 392).

My personal view is that adenomyomas *may* become malignant, but that they do so very rarely. The reasons for coming to this conclusion are based—

1. Mainly upon the investigation of a semi-solid semi-cystic growth in the recto-vaginal septum which was situated at a distance from the uterus and did not implicate the rectal mucous membrane and in which the vaginal mucous membrane was also intact. This tumour had the structure of an adenocarcinoma.

2. The causal relationship of chronic salpingitis with so-called *adenomyoma tubae* on the one hand, and with *papilloma* and *adenocarcinoma tubae* on the other, naturally leads one to the conclusion that a neoplastic process set up by chronic inflammation of a mucous membrane may result in malignancy.

3. That an adenomyomatous change may form a benign intermediate stage in the transition from an inflammatory to a malignant process is made probable by the occurrence of tubules lined by a single layer of cubical epithelium lying in the midst of cancerous areas in cases of *adenocarcinoma tubae*.

CHAPTER VII

ADENOMYOMA AND TUBERCLE

IN investigations on the Fallopian tubes in cases of *salpingitis isthmica nodosa*, tuberculous lesions were so frequently found that many authors have come to regard tubercle as an aetiological factor of adenomyoma. Meyer showed that tuberculous inflammation had no specific faculty of producing epithelial heterotopy, but that the latter was to be found in all inflammatory lesions however produced. In one of my own cases of adenomyoma of the posterior uterine wall there was bilateral tuberculous salpingitis, but there was no invasion of the uterine growth by tubercle bacilli. Grünbaum, writing in 1908, states that "tuberculous degeneration of adenomyoma" has been recorded in five instances: by von Recklinghausen, Lichtenstern (see Fig. 223, page 387), Hölsi, Archambault, and Pearce (Pozzi).

Landau's Case 13 is mentioned by Grünbaum. It was that of a woman aged 45 years. The tumour was adherent to the bladder and caused pain. It proved to be a diffuse adenomyoma riddled with caseating tubercles. The caseation was principally found in the adenomatous portions. Tubercle bacilli were demonstrated. This author regarded the growth as a *locus minoris resistentiae*. The patient had old lung-trouble which had secondarily infected the uterine growth.

In Pozzi's case, published by Archambault and Pearce in

Revue de Gynécologie, 1902, the patient was a virgin, aged 20 years. The uterus was infantile and retroverted. There was slight adnexal inflammation. The patient suffered from pulmonary tuberculosis. The diagnosis of fibromyoma or tuberculous salpingitis was made. At the operation many adhesions were found. The uterus was irregular; it was removed by supravaginal amputation. In the posterior wall was a rounded mass reaching down to the cervix. It had the typical structure of a myoma. Bacteriological examination for the gonococcus and for the tubercle bacillus was negative. Histologically there was extensive tuberculous infiltration in the uterine growth and on the peritoneum, also in the right Fallopian tube. The uterine tumour was an adenomyoma. It was a case of "implantation" of tubercle from the lungs. A case of von Recklinghausen has already been recorded (see page 396). In Lichtenstern's case the muscle-wall of the uterine horn contained numerous tuberculous foci. The tuberculosis was not regarded as the primary lesion; its source was unknown.

In my case (Fig. 248) there was tuberculosis of both Fallopian tubes running from the cornua, but no tubercle was seen in any of the sections of the growth in the posterior wall of the uterus. One sister had died of consumption at the age of 45 years. The patient complained of an offensive discharge, which she stated was passed *per vaginam* and *per rectum*. Her periods, which began at the age of eleven, had always been irregular and scanty, excepting on the last occasion before I saw her, when the flow lasted for fourteen days. *Dysmenorrhoea* had never been complained of; she had *never been anaemic*. There had been an attack of pelvic inflammation some months before operation, when "an abscess broke internally," followed by a discharge of pus from the rectum and from the vagina. These discharges continued more or less until admission

into hospital five months later. Ever since the acute illness, constipation had been very obstinate, amounting to obstruction for three weeks on end. Defaecation was always attended with great pain in the left loin. Micturition was very painful during the attack of pelvic inflammation, but dysuria subsided after convalescence.

On examination the abdomen was distended and the whole of the large bowel was filled by faecal masses. There was a hard fixed mass rising out of the pelvis to within a finger's breadth of the umbilicus. The mass extended out into the left broad ligament where it was fixed.

Per rectum a fish-bone $1\frac{1}{4}$ inches long was

found sticking into the mucous membrane, but no sinus was discovered anywhere. At the operation the omentum was adherent to the pelvic viscera. The sigmoid flexure ran over the top of a cystic mass lying in the left pelvis and over the fundus of the uterus; it then entered the true pelvis on the right side. This part of the bowel, which was enormously thickened, was separated from the pelvic structures with difficulty. The left-sided cyst was full of pus and burst during dissection; it was densely adherent to the rectum low down. The uterus had to be bisected in order to effect an entrance into the deeper



FIG. 248. — Author's case of adenomyoma of the posterior wall of the uterus associated with double tuberculous salpingitis.

parts of the pelvis. Finally, the uterus and abscess-sac were removed *en masse*. The uterus is shown in Figure 248.

The growth will be seen to occupy the outer two-thirds of the posterior wall and fundus; one angle of the tumour-mass lies near the internal os, otherwise the growth is peripheral in the bulk of its extent. There are one or two naked-eye cysts at the fundal extremity. The microscopic features are seen in Figure 249.

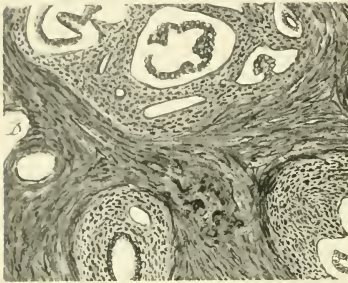


FIG. 249.—Microscopic character of growth shown in Fig. 248. The mucosa of the cavum uteri deeply invaded the muscularis. No tubercle was found in the growth, but both tubes were tuberculous.

The uterine mucosa is not thickened. Both Fallopian tubes were the seat of a chronic tuberculous process. That on the left had formed

a large tubo-ovarian abscess. Seven inches of rectum were removed. The walls of the bowel were $\frac{5}{8}$ of an inch in thickness and of stony hardness; this tissue proved to be free from growth.

A microscopic section of the uterine wall shows the endometrium dipping down here and there into the muscularis. This invasion is enough to justify the view being taken that the growth is of mucosal origin, although the naked-eye drawing would not convey this impression except at the lower angle which approximates the internal os.

CHAPTER VIII

DIAGNOSIS, PROGNOSIS, AND TREATMENT

Diagnosis of Adenomyoma Uteri.—In von Recklinghausen's monograph,¹ W. A. Freund appended a clinical note "on the voluminous adenomyomas of the uterus," in which he stated that these growths presented a definite clinical picture by which they could be diagnosed. There was a history of debilitated childhood. Menstruation appeared late; puberty was postponed. The periods were profuse and painful. Irregular haemorrhage was common; there was pelvic peritonitis and marked anaemia. Body-functions were impaired, and the growth led eventually to complete incapacity for work.

Objectively there were signs of general hypoplasia and infantilism. The tumour had its situation in the dorsal wall of the uterus. Pelvic peritonitis and fixation of the pelvic organs was a marked feature. The site of election was the *cornu uteri*, from whence the growth spread downwards towards the cervix.

Cullen² says: "Diffuse adenomyoma of the uterus has, thanks to the work of von Recklinghausen, become a definite pathological entity, but heretofore it has not impressed surgeons as having a very definite and peculiar train of symptoms. In the early years of our investigations we also failed to detect it clinically, but in the early and fairly advanced stages of the process, so definite are

¹ *Die Adenomyome und Cystadenome*, 1896.

² *Loc. supra cit.* page 177.

the symptoms that the hospital assistant now frequently comes and says that a given case has all the signs of an adenomyoma, and that he feels sure that this is the cause of the bleeding. We accordingly see that this disease has very characteristic symptoms, and must be given its proper place in our list of uterine diseases which may be clinically recognised."

Cullen gives a long list of morbid conditions which cause uterine haemorrhage and more or less pain, and which have to be differentiated from adenomyoma. It is, however, clear that in many cases, if not in most, the diagnosis is made at the operation or by the microscope. We are therefore obliged to accept the view that an opinion expressed before operation only amounts to a probability.

Freund's "clinical picture" was soon contested. Pick expressed his doubt as to the possibility of an exact diagnosis. L. Landau stated that as far as clinical symptoms went, these growths could not be differentiated from myomas.

Funk, on the evidence afforded him by two cases in which a correct diagnosis was made before operation, strongly supported Freund's views. The diagnosis was founded on the growth starting at the tubal angle and growing downwards, also on the semi-fixation of the uterus by adhesions.

Von Rosthorn published two cases of adenomyoma which agreed clinically with Freund's data: The diagnosis, however, was not correctly made in these cases, and von Rosthorn stated that there were many adenomyomas which presented no characteristic "clinical picture." Freund's diagnostic points were not substantiated by Polano's investigation into the symptomatology of 100 cases collected from the journals. Signs of infantilism were very few in comparison to the number of the cases. J. G. von Meyer stated that a clinical limitation

in the sense intended by Freund was impossible for the majority. All the features he gave may fail for adenomyoma and be present for myoma.

Jasche reported a case at the Vienna Obstetrical Society in 1909, in which there was no weakness, no infantilism, no peritonitis, no dysuria, no local pain, and no sterility: in fact the patient had had ten children and four abortions.

Grünbaum investigated twenty cases in Landau's Clinic from their clinical aspect. He concluded that as regards—

(1) *Age*.—The age in Landau's twenty cases varied between 32 and 51 years, *i.e.* average 41 years. I find that in Polano's series of 66 operation-cases, 55 patients varied in age between 30 and 50 years. Nine were under 30 years of age; two were over 50 years. Forty-five per cent of the cases were in the fifth decade. It is worth recording that Fritz Volk mentions a case of adenomyoma in a virgin, aged 25 years,¹ and that Trent² performed vaginal hysterectomy for *adenomyoma uteri* on two patients, aged 69 and 85 years respectively.

(2) *Sterility*.—Grünbaum states that the significance of adenomyoma was not great, nevertheless, in seventeen of the cases recorded by him ten were sterile.

Polano and Kudoli,³ writing on this question three years before (1905), found that out of 100 cases there were 68 married women, of whom 53 per cent were fertile and 47 per cent sterile.

This 47 per cent sterility in adenomyoma was contrasted with 20-25 per cent sterility in myoma.

This estimation, Grünbaum says, should be modified. Rustein had shown that in seven of Olshausen's cases, six who were married were remarkably fertile; there were eighteen full-term births and twelve abortions, an average

¹ *Gyn. Rundschau*, 1912, H. 9.

² *Niedl. Gynäk. Gesellsch.*, 1907.

³ *Zeitschr. f. Geb. u. Gyn.*, 1905, Bde. liv.-lv. S. 294-303.

of five pregnancies each. One of Wilson's cases bore twelve children.

In Jasche's case (*l.s.c.*) the patient had ten children and four abortions.

(3) *Menstruation: (a) Onset.*—There is nothing particular to note about the time of onset. Polano found that in 23 cases it varied between 12 and 19 years. The onset at 13 years occurred in 30 per cent, and at 17 years in 21 per cent.

(b) *Course and Amount.*—In sixteen of the Kudoli-Polano series, menstruation was regular in 63 per cent, irregular in 37 per cent; excessive in 62 per cent of the cases; normal in amount in 18 per cent, and scanty in 18 per cent of cases.

Grünbaum found that the usual complaint was menorrhagia and metrorrhagia; irregular haemorrhage uninfluenced by curettage and cauterisation.

(4) *Pain.*—Nine patients in Landau's series of twenty cases complained of severe pelvic pain and sacralgia, especially so *during menstruation*. In three cases the pain was localised to the bladder; there was dysuria, and the pain in two instances led to retention of urine and the frequent resort to catheterisation. Retention of urine was the main symptom in J. B. Hellier's case.¹ Polano says that the principal symptoms are *haemorrhage* and *pain*. Out of 100 cases, in 37 pain was the first symptom.

(5) *Status.*—Grünbaum found that Freund's statement as to infantilism was wrong. Ten of the twenty cases in Landau's Clinic were well developed, and in only one instance did menstruation appear late. Polano found that in 58 per cent the patients were anaemic; in 41 per cent normal as regards blood-supply.

Gross Anatomy: (a) Uterus.—Polano and Kudoli found that in twenty-five cases the uterus and tumour

¹ *Lancet*, 1913.

formed a mass the size of a child's head. In forty-seven cases the mass was smaller. The whole uterus was involved in 65 per cent of the cases. In 34 per cent the involvement was only partial. The outer surface of the mass was *smooth* in 77 per cent and irregular or lumpy in 23 per cent.

The tumour was *hard* in 85 per cent and soft in 10 per cent of the cases. As regards pathological peculiarities, ten tumours in the above series were large and cystic, one calcareous; four associated with cancer, but sloughing and necrosis never occurred.

Grünbaum found that in twenty cases of adenomyoma, four were associated with multiple myomas. In one case there was both tuberculosis and carcinoma of the endometrium. This was also present in Cases A and B of von Recklinghausen's series (page 423).

(b) *The Adnexa*.—In one-half of Grünbaum's (Landau's) series there were inflammatory changes in the adnexa (adhesions and inflammatory tumour-formation), sometimes with extensive adhesions to the bowel and omentum.

Adenomyoma is far more frequently found associated with pelvic peritonitis than is myoma. Grünbaum, however, states that a large intraligamentary adenomyoma may be present without any adhesive peritonitis; he does not consider that the frequent association of inflammatory adnexal tumours and adenomyoma is of much diagnostic value. And in this I agree with him, for in two of my cases the adnexal disease overmasked the comparatively small uterine condition altogether. The importance of the adnexal disease lies in the fact that it accounts for a good deal of the pain complained of in adenomyoma-cases, and also that it complicates the operative measures which have to be carried out.

Grünbaum's twenty cases provided examples of ovarian cysts, tubo-ovarian cysts, salpingitis, hydrosalpinx, ovarian abscess, and pyosalpinx. Polano found adhesions in 89.5 per cent of cases.

Both Polano and Grünbaum state that ante-operative diagnosis is problematical only. Adenomyoma is a pathological entity clearly enough, but clinically it is a vagrant devoid of definite pathognomonic symptoms peculiar to itself. Grünbaum quotes Landau as saying: "How is a clinician to decide what can only be found out by the knife and anatomy?"

Polano drew up a table of comparison between adenomyoma and myoma. He found the age-incidence the same for each. The ratio between spinsters and married women was the same. In adenomyoma there were 15 per cent spinsters to 84 per cent married; in myoma 20 per cent spinsters to 79 per cent married women. As regards sterility there was a divergence: 47 per cent for adenomyoma as compared with 20-25 per cent for myoma.

The usual error in diagnosis is to confuse adenomyoma with myoma, but adenomyoma may also be mistaken for an adnexal tumour. Large growths will easily lead to confusion in diagnosis. Adherent tumours in the recto-genital space have been mistaken for haematocoele, for cellulitic abscess, for cancer of the rectum, and for an adherent adnexal tumour in the pouch of Douglas. In no case that I have met with in literature, nor in any of my own, was the rectal mucous membrane involved; in all, it was freely movable over the induration in the muscular wall. In many, ulceration of the vaginal fornix had occurred, producing a red or brown vaginal discharge, and the diseased surface is always liable to bleed on contact. When advanced, the ulceration leaves tongues of vaginal mucous membrane hanging in fringes between deep sulci, giving a coarse papilliferous appearance. Each furrow represents the tract of a *Gänsemarsch* or a single file of gland-tubules. These ultimately open up on the surface of the vaginal wall, and produce deep straight furrows (see Fig. 203, page 337). In my case the process stopped just short of bursting

through the squamous epithelium ; in Griffith's case it had done so ; and in Kleinhans' case (Fig. 202, page 336) it showed the process carried to extreme limits. Before ulceration has occurred, diagnosis may be made by excision and microscopy ; and when papillae are present, one or more may be cut off for histological investigation.

Prognosis.—Freund said that the prognosis is worse than with myoma. Polano states the prognosis is “specially serious.” Fritz Volk pointed out the danger of curetting. There is no doubt that curetting and medical treatment make matters worse. The danger in neglected cases proceeds from haemorrhage, which, as in one case already recorded, led to a fatal issue.

As an adenomyoma is far better nourished than an encapsuled myoma, it is not liable to the same degenerative changes as is the latter. A sloughing or gangrenous adenomyoma is a thing unknown, but cystic formation occurs, sometimes to an extreme degree, as in the cases of Knauer, Amos, Breus, and Bauereisen.

Primary carcinoma has been recorded ; and despite the fact that no good reproductive illustrations are to be found, and although R. Meyer is sceptical, we must admit the possibility.¹ Like other uterine growths—myomata, for example—adenomyoma has in many instances been found in association with cancer of the body and of the cervix.

The intimate relationship with pelvic peritonitis is of great importance for the point of view of prognosis. Therefore, if we summarise the outlook, we must regard an ‘adenomyoma’ as a haemorrhagic and painful structure which is found in bad company, its intimate associates being adnexal tumours, pelvic peritonitis, parametritis, and infiltrations into bowel, whilst it can claim caseating tubercle, carcinoma, and sarcoma as casual acquaintances.

Treatment.—Small non-encapsuled nodules at the cornu

¹ See also page 432.—C. L.

of the uterus have been excised, with cessation of symptoms, but enucleation is quite impossible. The removal of a wedge-shaped portion of the uterine wall, wide enough to be quite free of the indurated area, should be carried out. For the diffuse variety nothing but total hysterectomy should be performed. Whether this is done *per vaginam* or after laparotomy will depend upon the presence or absence of complications, such as fixation of the uterus and adnexal tumours of inflammatory origin. Owing to the frequency of the latter, abdominal panhysterectomy is the more advisable procedure.

For extensive 'growths' in the recto-genital space, it has been shown that total removal or excision of the invaded bowel is, as a rule, unnecessary. These growths do not cause uterine haemorrhage. The indication for operation appertains to the bowel. When left, there is a danger of stenosis and chronic intestinal obstruction, as one of the cases I have recorded fully proved. Moreover, ulceration into the vagina is very liable to occur. Some check is therefore required by way of operation. When it is assured by microscopic proof that the case is one of innocent epithelial invasion and not carcinoma, the removal of the entire uterus together with as much of the growth as possible is the best procedure. There is usually no need to resect a portion of the rectum. For previous remarks on the treatment of these growths in the recto-genital space, see page 371.

All forms of radio-therapy (Radium, X-rays, Mesothorium) for adenomyoma are disappointing; only in one case, that of Griffith's (page 362), have I ever heard of radium doing good. It is my belief that such treatment is liable to excite the inflammatory process, which is the pathological basis of the disease.

PART III
OPERATIONS FOR MYOMA

CHAPTER I

OPERATIONS FOR MYOMA

THE indications for the operative treatment of myoma have been dealt with in Part I. (see pages 252-262). A short description of the different operations will here be given. The order in which the various procedures are described is that found on page 252.

I. Vaginal Operations

1. **The Removal of Pedunculated Submucous Myoma.**—If the growth lies in the vagina its removal is extremely easy. Such a tumour as that shown in Figure 162, page 216, is seized with a volsella, and its pedicle is cut off close to its base with a pair of stout scissors. Very little bleeding results. The uterus is then explored for further submucous growths, and if none are found the cavity is curetted and flushed out with weak iodine solution. No ligature is required for the pedicle of the tumour; such oozing as occurs can be stopped by packing the upper part of the vagina with gauze, which should be removed after twelve hours.

For pedunculated submucous myomas which have not been extruded into the vagina, it is necessary to obtain access to the growth by dilatation of the cervix, or, when the growth is large or if the cervix is unyielding, it is best to dissect the bladder from off the anterior cervical wall and

split the denuded cervix with scissors, making a central incision in the anterior wall from the external to the internal os, and even higher if necessary. It sometimes happens that the tumour has dilated the upper part of the cervix and only a thin ring of cervical tissue remains undilated. In such cases, where it may be said that partial 'delivery' of the growth has already taken place, dilatation of the remainder of the cervix by metal bougies will afford access to the tumour without the aid of an incision. The growth shown in Figure 161, page 215, illustrates the relations above referred to.

The Method of Splitting the Cervix.—An Auvard's speculum is inserted to depress the perineum and posterior vaginal wall. The vagina is dilated laterally by Jayle's self-retaining dilator (see Fig. 250). The anterior lip of the cervix is grasped with a volsella and is drawn down. A wide crescentic incision is now made through the vaginal mucosa in front of the reflection of the bladder. When necessary, two lateral incisions may also be made passing upwards and outwards from either angle of the transverse incision, thus mapping out a tongue-shaped flap of vaginal mucous membrane (Fig. 250). This flap-like incision facilitates the dissection of the bladder and enables the cervical incision to be carried up into the lower uterine segment. The limits of the bladder are indicated by the difference in appearance of the vaginal mucous surface in the anterior fornix, that covering the bladder being rugose, and that part covering the anterior cervical wall beyond the bladder being smooth.

The incision across the front of the cervix should therefore be made through the smooth and not through the rugose mucous membrane. (The rugae run much lower down on the cervix than shown in Figure 250, where strong traction on the cervix has caused their obliteration.) The central point of the upper margin of the incision is grasped

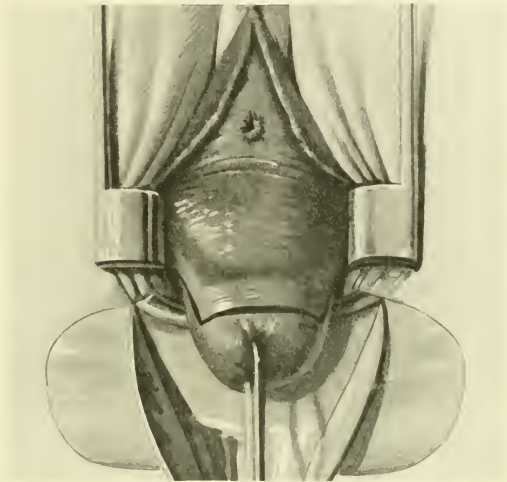


FIG. 250.—Flap-incision through vaginal mucous membrane.

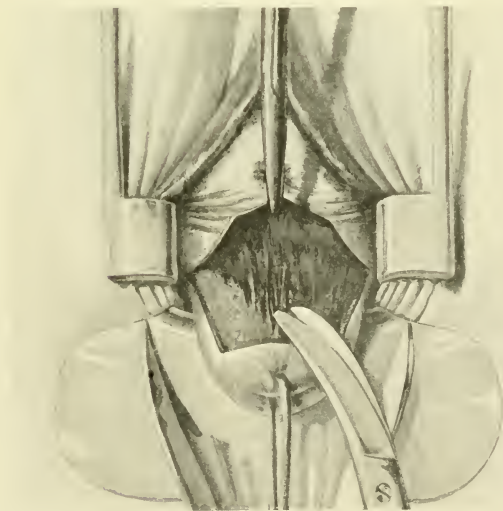


FIG. 251.—Dissection of bladder from cervix.

with toothed dissecting forceps and pulled vertically upwards, so as to put the connective tissue on the stretch. The vertical bands of tissue uniting bladder to cervix are then cut through with blunt-pointed scissors curved on the flat (see Fig. 251). The extremities of the scissors are kept applied to the cervix, and when a fold of the bladder has thus been dissected off the cervix, the total separation

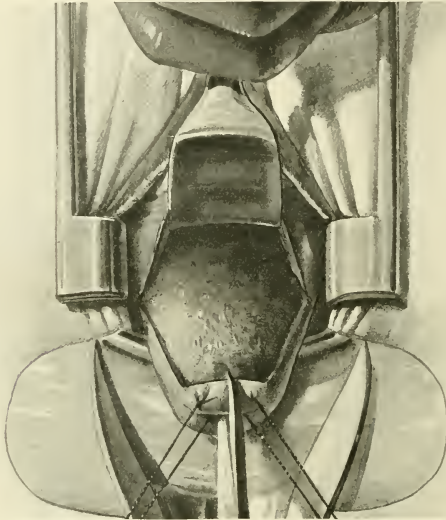


FIG. 252.—Bladder raised by retractor. Anterior wall of cervix exposed for incision in mid-line.

may be effected by blunt dissection, *i.e.* by pushing the bladder off the cervix with a finger wrapped round with gauze. When the bladder is free it is held up by a bayonet-shaped retractor (Fig. 261, page 460), or by a simple Kocher's copper spatula, and the anterior wall of the cervix thus displayed is ready for splitting (Fig. 252). Before the incision is made, a stout silk ligature is passed through the lip of the cervix on either side of the volsella, which has already been applied to the anterior lip for the purpose of

drawing it down. As soon as the ligatures are applied the volsella is removed. The cervix is now steadied by traction on the ligatures, and its anterior wall is divided in the central line. A second pair of ligatures may be applied to the flap of cervical tissue higher up, near the internal os, if required (see Fig. 253). With large submucous tumours arising from the fundus it is sometimes necessary to carry

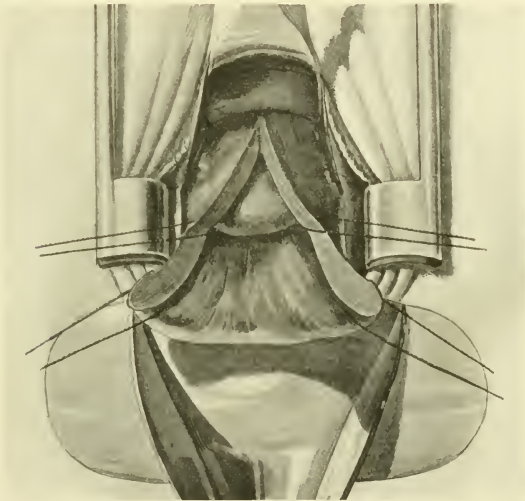


FIG. 253.—Cervix split anteriorly, exposing lower pole of a submucous myoma.

the central incision beyond the internal os into the lower uterine segment, in which case the utero-vesical pouch is opened up as well. It is in such cases that the flap-incision through the vaginal mucosa mentioned above is most useful. After removal of the growth the cervical flaps are brought together by interrupted sutures of chromicised catgut, which are passed through the entire thickness of each flap (Fig. 254). The uppermost stitch is placed just above the upper angle of the incision. The last suture should be so placed as to effect accurate apposition of the lips of the

external os. Before the interrupted sutures are tied, the silk sutures used as tractors are removed. The integrity of the cervix having been restored (Fig. 254), the bladder retractor is removed and the crescentic or flap incision in the vaginal mucous membrane is then closed by interrupted catgut stitches (Fig. 255). In the removal of an *intra-uterine* pedunculated growth, the first step, after free access

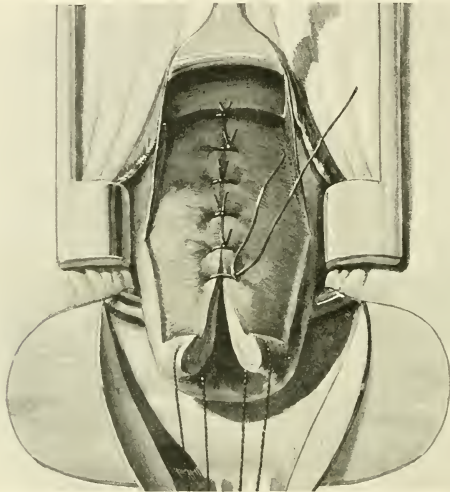


FIG. 254.—Closure of incision in anterior wall of cervix by interrupted catgut sutures.

has been made, is accurately to define the situation and width of the pedicle. When it is narrow and within easy reach, it may be deliberately cut off with curved scissors, but when it is broad and attached high up, it is better to incise the capsule of the growth near the attachment of the pedicle, insert the finger, and shell the growth out. Any tags of capsule, and the pedicle itself, may then be removed, or, in the case of a very broad attachment and a thin uterine wall, a portion of the base of the pedicle may be left; it will be extruded subsequently by uterine contractions.

2. **Morcellement and Enucleation.**—Large submucous myomas are encountered with a very wide connection with the uterine wall or walls. Such tumours are often widest at their attachment to the uterus, and may therefore be termed *sessile*. They may expand the uterine body to the size of a five months' gestation, and at the same time may dilate the cervix and present in the vagina (Fig. 19).

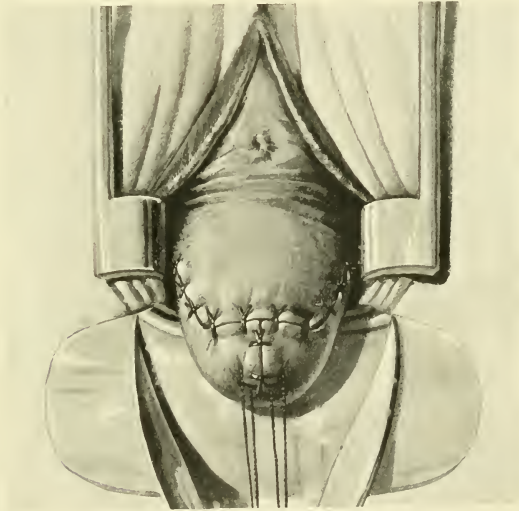


FIG. 255.—Closure of the flap-incision in the vaginal mucous membrane.

In process of time they become infected and slough. Abdominal hysterectomy under such conditions would be attended with grave risks, as would also the opening of the vesico-uterine pouch of peritoneum. Such cases are best treated by morcellement and enucleation *per vaginam*. For this operation special instruments are desirable, and those of Segond will serve the purpose. They consist of very strong volsellae, short-bladed knives on long stout handles, and stout curved scissors with long handles (see Fig. 256). The vagina is dilated as already described, the exposed pole

of the growth is seized with a volsella and portions are gouged out and cut away with the knife (Fig. 257). As the morcelllement proceeds, observance of the following points is essential :—

- (1) The growth must be kept well in view. (2) Before

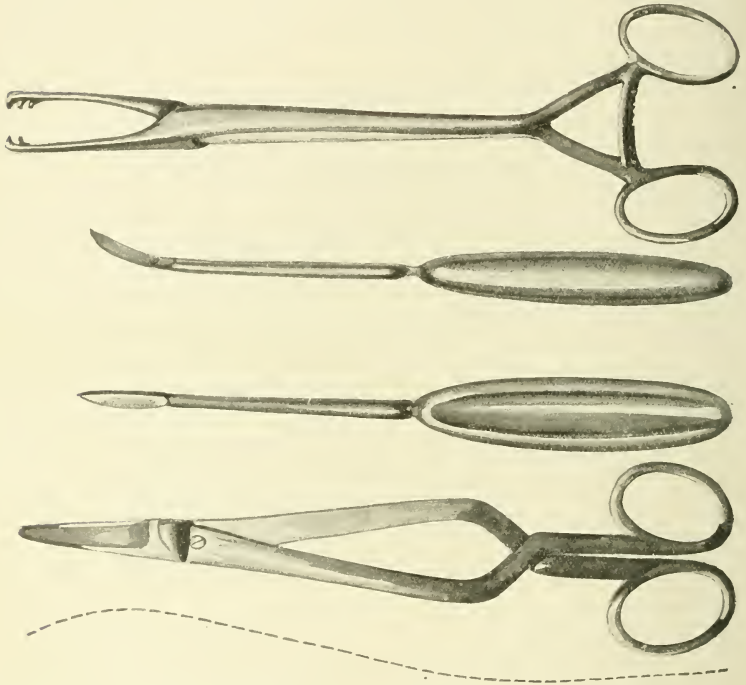


FIG. 256.—Segond's instruments for use in morcelllement. The curve of the scissors is shown in dotted outline.

a piece of tumour-substance is removed another hold must be made by a second volsella, applied elsewhere to the tumour. (3) The process of cutting-up must be carried on within the capsule. (4) The index finger of the right hand should frequently be inserted inside the capsule for the purpose of stripping it from off the successively accessible

portions of the tumour. (5) The fundus must be grasped by an assistant.

The capsule is often adherent to the wall of the uterus over wide areas outside the base of the growth. Such adhesions easily yield to a sweeping movement of the finger, and should be separated, as this enables the uterus to contract down more efficiently. By working inside the

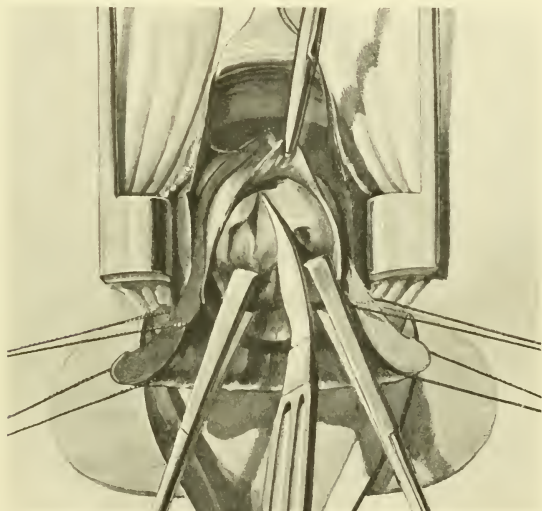


FIG. 257.—Morcellment of a submucous myoma within its capsule.

capsule, and by preserving its integrity, free haemorrhage is avoided. The uterus contracts *pari passu* with the morcellment and enucleation.

Owing to the frequency of hyaline liquefaction in large submucous myomas, it is often possible, after commencing by morcellment, to remove from within the capsule portions of growth as large as a man's fist, so that the final stage of the operation may be the enucleation of a large myomatous mass.

3. **Colpotomy and Myomectomy.**—The removal of interstitial and subserous myomas *per vaginam* is not much practised in this country, but in certain circumstances it is a very advantageous procedure, more especially in the case of pedunculated subserous growths which lie low in the pelvis, and are hence easily accessible through the posterior or

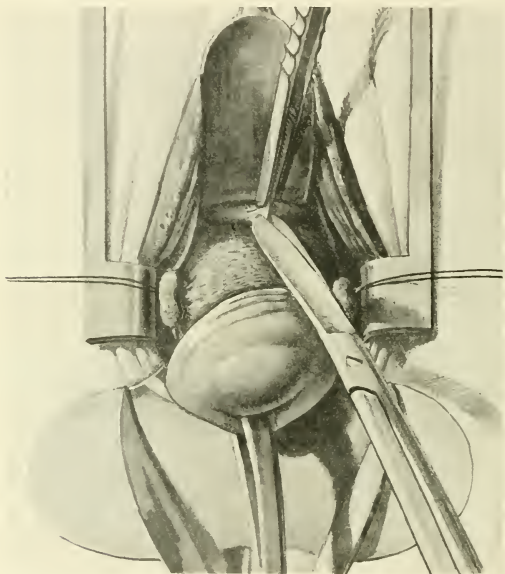


FIG. 258.—The utero-vesical pouch is seized with forceps and incised with scissors.

anterior fornix. Figure 147, page 185, shows the type of growth suitable for vaginal myomectomy.

Anterior Colpotomy.—After a crescentic or flap incision has been made as already described, the bladder is dissected off the cervix by the method given on page 448, excepting that as it is here intended to open the utero-vesical pouch, it is advisable to forgo blunt dissection altogether and continue the use of scissors until the peritoneum comes into view. If the finger is used for pushing back the

bladder, the peritoneum is apt to be rolled farther and farther away, which renders it less easy to reach. When the fold of the utero-vesical pouch (see Fig. 258) comes into view it is opened with the scissors, and the aperture is enlarged from side to side to the desired extent. The retractor, which has hitherto been used to keep up the bladder, is now withdrawn, and inserted through the colpotomy-wound into the peritoneal cavity. Then, by downward traction on the cervix, the tumour is brought into view. If it is pedunculated it must be so rotated that the pole opposite to its pedicle can be seized and drawn into the colpotomy-wound. The latter may have to be enlarged by extending the vaginal mucosal incision laterally upwards and forwards as in Figure 250. The tumour itself may have to be removed piecemeal, in which case the rules laid down for morcellement will have to be observed.

In dealing with the pedicle, care must be taken to avoid cutting too near the uterine wall. The incision should encircle the pedicle at a distance of one-half to three-quarters of an inch away from the uterus with the knife-edge inclined obliquely downwards. The peritoneum and the muscular capsule of the pedicle when incised are stripped back as a collar, and the central core cut across close to its origin from the uterine wall. It will now be found that the collar which at first appeared excessive has retracted, and forms just enough tissue to lie in easy apposition. In uniting the edges, interrupted sutures of catgut are used, and these should include a portion of the uterine wall in the bed of the wound. With a wide pedicle, the bed of the wound must be brought together with buried sutures before the superficial stitches are applied. The wound must be quite dry before the uterus is released and the colpotomy-aperture is closed.

Posterior Colpotomy affords easy access to a pedunculated subserous myoma lying in the pouch of Douglas (see

page 185). The approach to the posterior *cul-de-sac* may be made by a transverse or T-shaped incision. The usual method is to make a transverse incision about 1 inch below the external os. The posterior lip of the cervix is grasped with a volsella and drawn upwards and forwards. The loose vaginal mucosa is then picked up in the central line, 1 inch from the external os, and held firmly, so as to

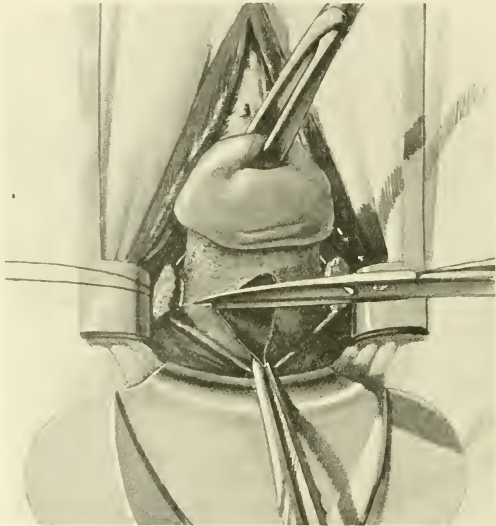


FIG. 259.—Opening of the pouch of Douglas.

produce a vertical fold. The latter is then cut across by scissors held horizontally (see Fig. 259). This initial cut is enlarged laterally in both directions. The first incision may divide mucous membrane and peritoneum at the same time; if not, the latter can be drawn up into the wound with forceps and incised (Fig. 259). The peritoneal aperture should correspond in length to that made in the vaginal mucosa. As soon as the opening is made of the size required, the peritoneum and mucosa should be brought

together by interrupted sutures which may be left long for traction. A bayonet-shaped retractor (Fig. 261) is now inserted into the vagina and passed through the colpotomy-wound into the peritoneal cavity.

The operation-table may be now tilted to prevent the falling of intestines into the wound. A forehead-light and a light on the blade of the speculum (see Figs. 260, 261) is

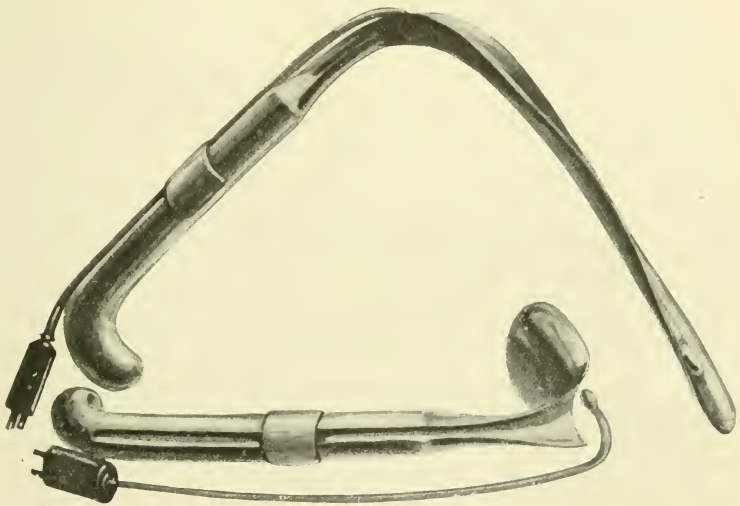


FIG. 260.—Professor de Ott's specula for ventroscopic illumination.

often useful at this stage, especially if the tumour has dropped back. The artificial light enables the tumour to be clearly seen, and its distal pole to be grasped by a volsella. When this is done the speculum is withdrawn and the growth is drawn through the colpotomy-wound. The tumour is then removed in the manner already described. The final stage of the operation consists in the closure of the colpotomy-wound, which is effected by uniting the edges with interrupted catgut sutures.

4. **Vaginal Hysterectomy.**—Vaginal hysterectomy is but little employed for myoma, but for cases of multiple small myomas associated with intractable haemorrhage which do not yield to treatment by curettage, it is a very valuable surgical procedure. The uteri shown in Figures 20, 27, 34, 69 were removed *per vaginam*.

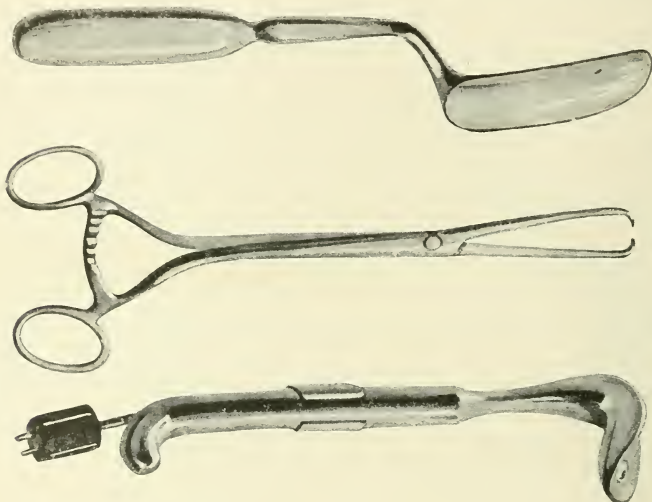


FIG. 261.—Bayonet-shaped retractor, volsella, de Ott's illuminated speculum.

In some cases where morcellation of the tumour has been carried out through the vagina, the uterus may appear unworthy of preservation, and the operation is concluded by performing hysterectomy.

Vaginal hysterectomy is carried out in two ways: (1) by extirpating the uterus from above downwards; (2) by effecting its removal from below upwards.

When it is possible to bring the myoma and fundus uteri well into view through the colpotomy-aperture,

removal from above downwards, with or without morcellation of the tumour, is to be preferred.

When the body of the uterus is too large to be thus dealt with, the better plan is to work from below upwards, and to bisect the uterus, and also to make a paravaginal incision when necessary.

It is to be borne in mind that in removing a myoma

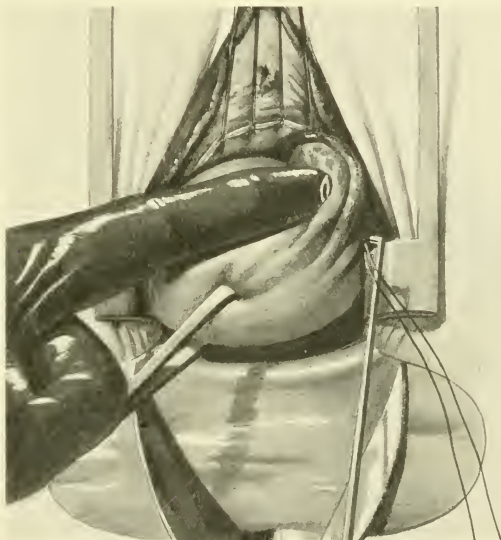


FIG. 262.—Vaginal hysterectomy from above downwards. Tying off the left adnexa.

piecemeal, the rules laid down for morcellation must be observed even when the uterus is going to be removed, *i.e.* the cutting must be confined to the tumour itself whilst keeping as far as possible from the uterus, especially at the sides where the large vessels lie. Such haemorrhage as does occur, if this precaution is observed, can be controlled by traction on the forceps attached to the uterus. Another practical point to observe where hysterectomy after morcellation is decided on, is that the adnexa should be

tied and divided if they become visible during the morcellation, as this will prevent these structures being torn, and will also serve the purpose of rendering the uterus and tumour more mobile.

Vaginal Hysterectomy from above downwards.— After opening the vesico-uterine pouch, the fundus is drawn down into the vagina by a volsella (it is often necessary to

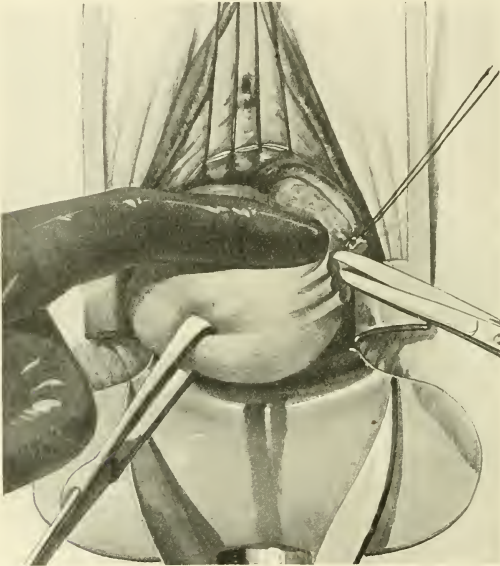


FIG. 263.—Section of adnexal structures at right angles to their long axis.

use two volsellae, applying them in succession to different points higher and higher up on the anterior uterine wall until the fundus is reached).

When the fundus is drawn well down into the vagina it is carried to the right side and the tying off of the left adnexa is begun from above. The left index finger is passed behind the left ovarian ligament (Fig. 262) and a threaded needle-holder is passed through the mesosalpinx

beneath the round ligament, Fallopian tube, and ligament of the ovary, being guided in its course by the tip of the left index finger. This ligature is then tied and the adnexa divided. The section through the adnexal structures should be made at right angles to their long axis and not too close to the ligature—two precautions necessary to

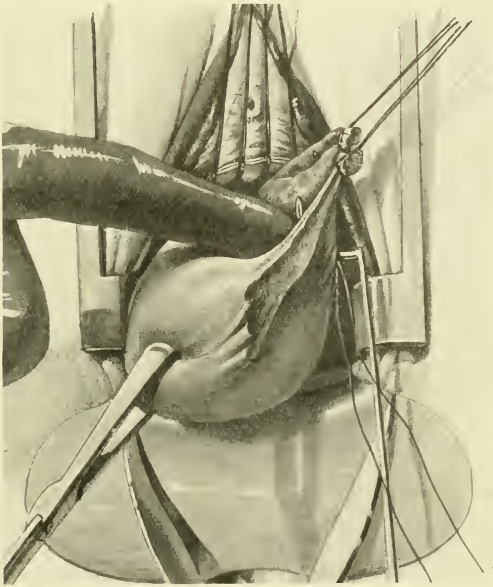


FIG. 264.—Ligation of broad ligament.

observe in order to prevent the ligature from slipping off during the further course of the operation (Fig. 263).

The ligature is left long, the two ends being clamped and held aside.

The succeeding parts of the broad ligament—under control of the left index finger and thumb—are tied and divided (Fig. 264). This is continued until the parametrium is reached, when the vaginal cervix is pressed

out of the posterior fornix by the finger. In this way the parametrium is clearly defined and made more accessible. Figure 265 shows the ligation of the upper part of the parametrium.

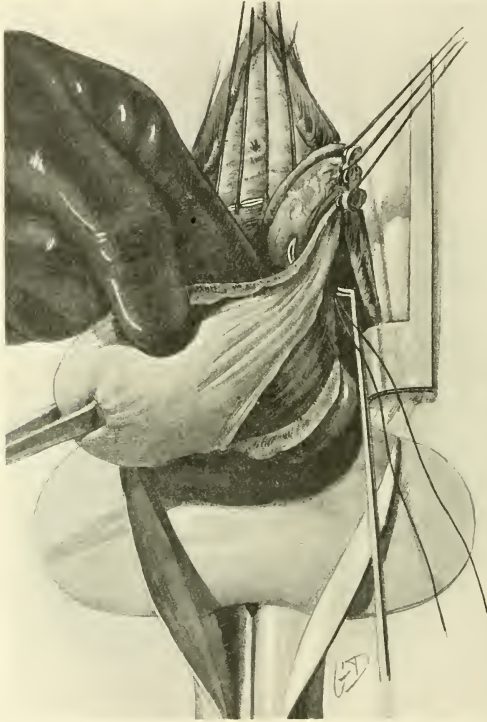


FIG. 265.—Cervix pushed out of vagina. Ligation of upper part of parametrium.

The cervix is now drawn down by forceps and the lower part of the parametrium is divided (Fig. 266), care being taken to keep close to the cervix and thus avoid injury to the ureter. With the parametrium divided, the uterus is completely separated on the left side as far down as the vaginal vault. The same process is now

carried out on the opposite side (Fig. 267). When the adnexal structures and parametric tissues have been divided on this side the uterus hangs only by the posterior vaginal vault (Fig. 268), from which it is separated transversely

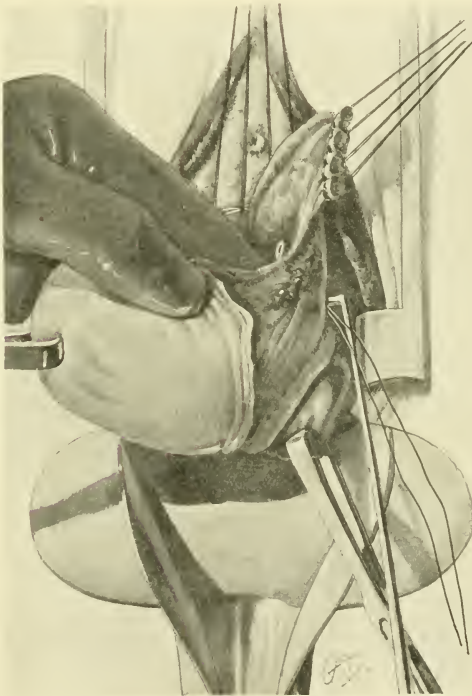


FIG. 266.—Ligation of lower part of parametrium.

by scissors. The edges of the peritoneum of the pouch of Douglas are then sewn to the cut surface of the posterior vaginal wall. Finally the lateral stumps are sewn to the edges of the vaginal wound or united to one another across the mid-line, the long ligatures being cut short. If the stumps are fixed laterally a drain of subnitrate of bismuth gauze may be inserted between them. If the

peritoneal cavity is closed, as much as possible of the fixed stumps are made to lie in the vagina (see Fig. 275, page 474). Fig. 269 shows the appearance of the wound before the ligatures are cut short.

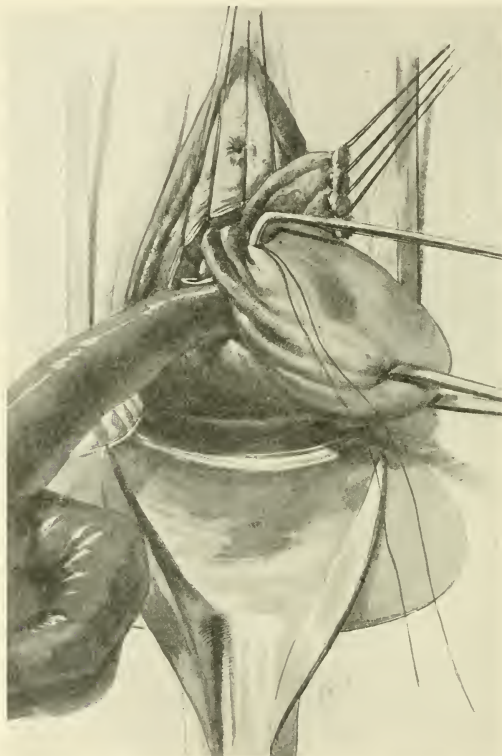


FIG. 267.—Ligation of adnexal structures on the right side.

Vaginal Hysterectomy from below upwards.—A circular incision is made around the *portio vaginalis*, and the vaginal skin pushed back in order to expose the lower parts of the parametrium (*ligamenta cardinalia*). The bladder is next separated from the cervix in the manner already

described on page 448. The *portio vaginalis* is then drawn to one side (Fig. 270).

The attachment of the parametrium to the cervix is very wide and includes the sacro-uterine ligament behind,



FIG. 268.—Uterus suspended only by the posterior vaginal vault.

and the vesico-uterine parametric tissue in front. It is advisable to ligate and divide these structures separately. The cervix should be drawn forwards during the tying of the sacro-uterine ligament, and backwards whilst ligating the vesico-uterine parametric tissue.

In tying off the right parametrium the *portio* is drawn to the left side. The tissue to be included in the ligature is grasped by the finger and thumb of the left hand, the thumb is placed in front at the point where the blunt-pointed

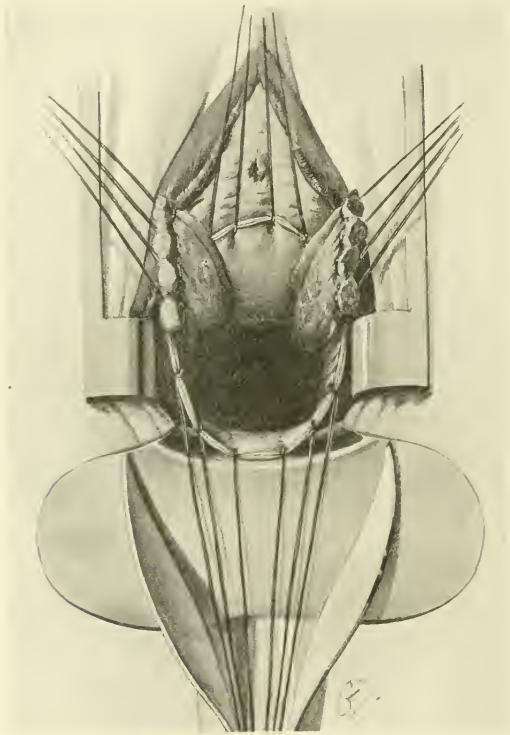


FIG. 269.—Appearance of wound after removal of the uterus.

pedicled needle is to pass, and the index finger is placed behind where the needle is to pass out. As soon as the point of the needle is introduced the thumb is removed, but the index finger remains as a guide until the tissues are transfixed, when it is ready in position to withdraw the ligature from

the eye of the needle (see Fig. 270). During ligation the traction on the *portio* must be relaxed (Fig. 271). Division of the tied parts is made at right angles to the direction of the tissues (Fig. 272). A stump which is cut

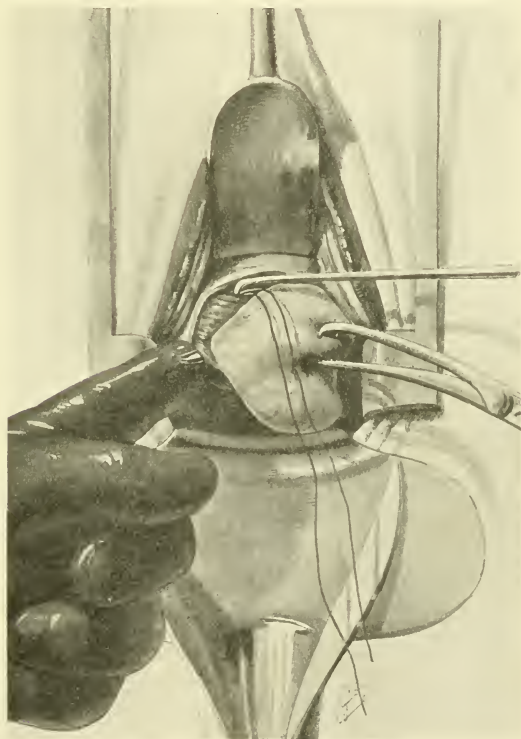


FIG. 270.—Tying off the parametric tissues on the right side.

obliquely will tend to slip off the ligature when traction is made.

After the parametrium of the one side has been tied and divided as high as possible, that on the other side is dealt with in a similar manner (Fig. 273). The uterus now

comes lower down and the anterior and posterior peritoneal folds are easily reached and divided. In opening the pouch of Douglas the cervix is drawn upwards, and in opening the vesico-uterine pouch traction on the cervix is made in a

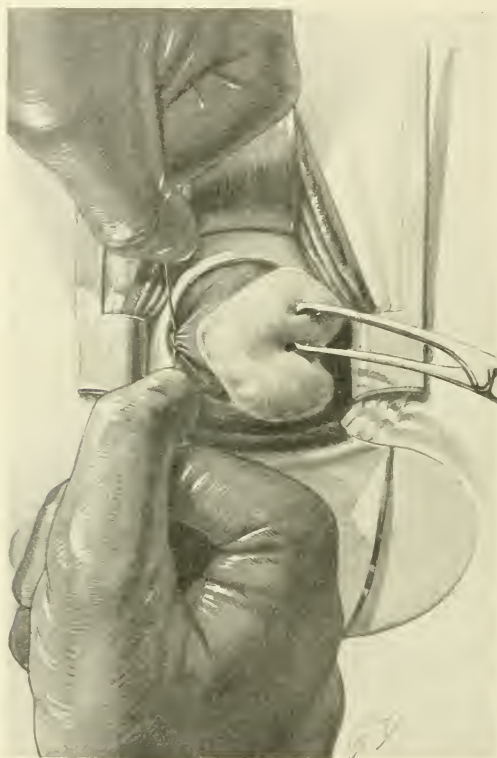


FIG. 271.—Method of tying suture. Traction on cervix relaxed.

downward direction. The remaining part of the parametrium is now tied and divided, and when this is completed on both sides the uterus can be drawn farther down, and after the thin *ligamenta lata* are severed, the uterus hangs only by its adnexa (Fig. 274). By separation of the latter

the hysterectomy is complete. The method of dealing with the stumps and wound generally has been already described.

Whichever plan of extirpation has been adopted, whether that from above downwards or from below upwards, the

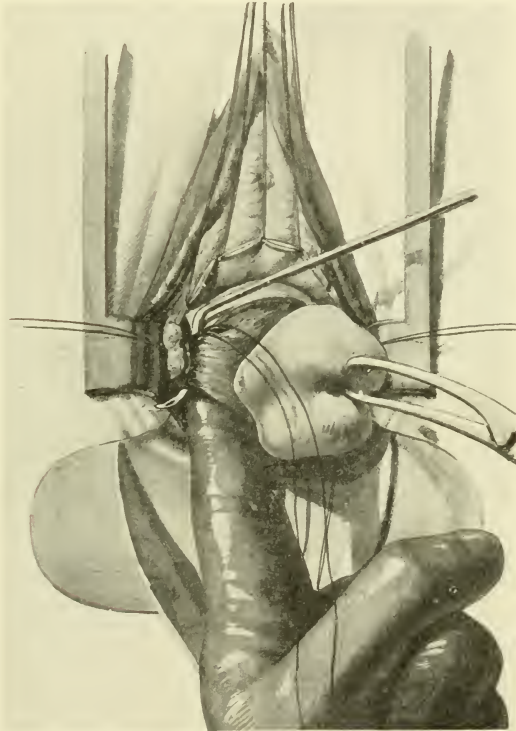


FIG. 272.—The tissues are divided at right angles to the direction of their fibres, thus producing a broad flat stump.

mode of closure of the vaginal vault is the same. The lateral stumps are held up by the long sutures, whilst another strong ligature is applied around the entire stumps external to the former ones. The ends of this safety-ligature are left long for the time being and the rest are cut short.

Figure 275 shows this completed on both sides. One strand of each ligature is passed through the anterior flap and the other through the posterior flap of the vagina, and then tied across the nose of the stump. This anchors the latter

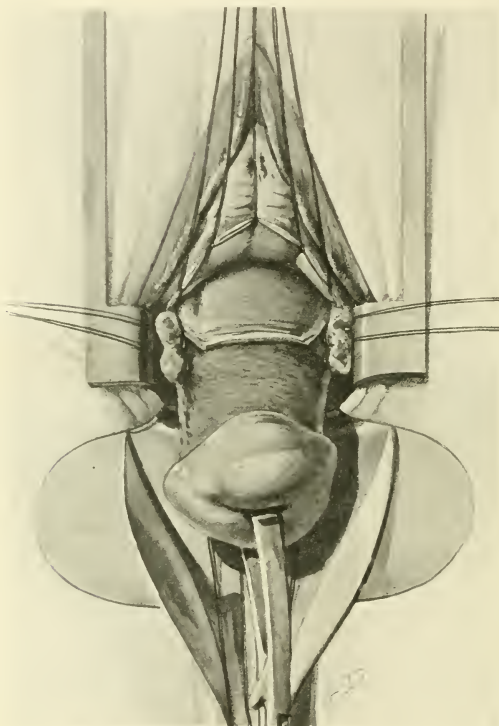


FIG. 273.—Parametric tissue divided on both sides. Utero-vesical pouch opened up. The uterus is brought lower down.

to the vagina. A stitch through the flaps on either side of the stumps (four in all) closes the vaginal roof except for a tiny aperture in the middle (Fig. 275), through which a small wick of bismuth gauze may be passed and left *in situ* for twenty-four hours.

General Remarks on Vaginal Hysterectomy.—The success of the operation depends on securing complete haemostasis, and for this purpose I consider that the principle of

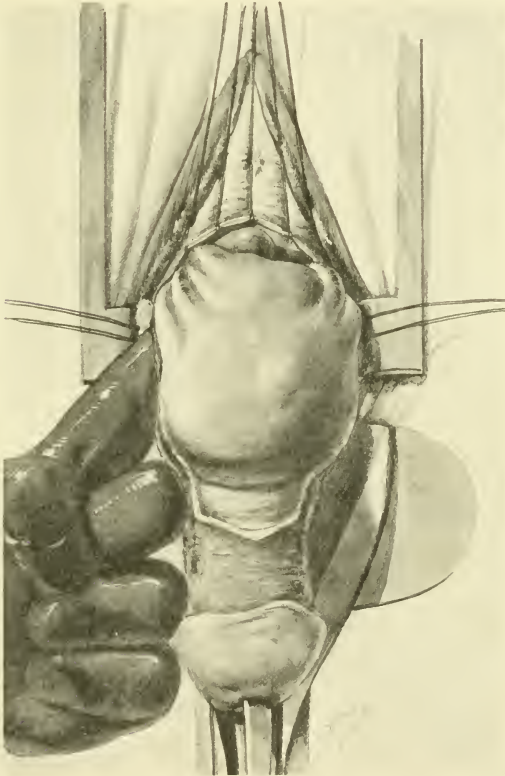


FIG. 274.—Parametric tissues still further divided. The uterus is attached by its adnexa only.

tying vessels before their division is a safer method than that of clamping. In difficult cases it may be necessary to leave a few clamps on the stumps for twelve hours, and it is often advisable temporarily to clamp thick parametric tissue

and then apply the ligature in the groove made by the compression ; but to dispense with ligatures and use clamps exclusively for securing haemostasis is not to be upheld. It will have been noticed that the ligation of the tissues is of

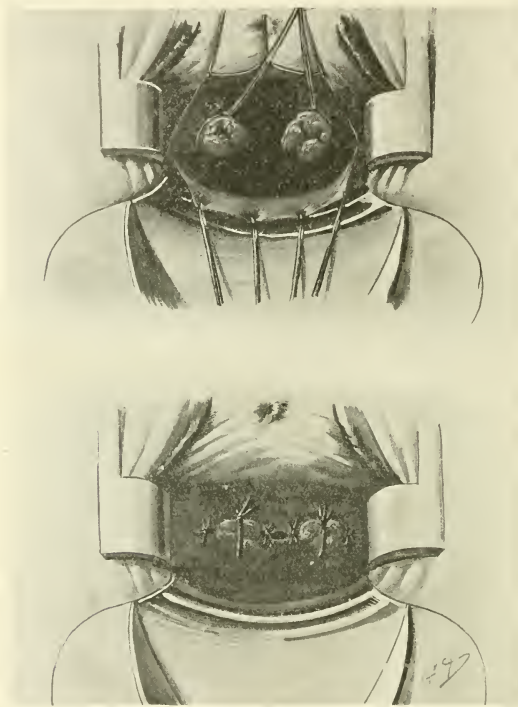


FIG. 275.—The upper figure shows the safety-suture applied to the lateral stumps, and the original ligatures cut short. The lower figure shows the method of closure of the vaginal vault.

necessity *en masse*, i.e. vessels and adjacent tissues are tied together. This being so, the greatest care must be taken in tightening and securing the knots or else the lumina of the vessels may not be closed completely, or the vessels may retract and bleed into the tissues. Large haematomas may form in this way.

The choice of material for ligatures is a matter of importance. After trying every variety of ligature obtainable, my conviction is that floss silk is the safest material with which to obtain perfect haemostasis. For the last two years I have, as a routine, used a 20-day catgut which is cut short and the vaginal vault is closed; but in a difficult case silk is the ligature chosen and the vaginal vault is left open and drained with gauze.

Pulling on ligatures which are left long should be avoided; it is responsible for knots slipping off.

To avoid slipping of ligatures or retraction of ligamentous stumps, care must be taken not to divide the tissues too near the ligature and also to divide them parallel with the ligature; this ensures the stump being well formed and not too small. Whenever a large vessel is seen in a stump it should be tied separately.

All stumps must be carefully examined at the end of the operation, and fresh ligatures or a clamp applied to any oozing point. For the purpose of inspection it is helpful to tilt the operating table and use a ventroscope (see Fig. 260, page 459). Fixation of the stumps to the vaginal wall is of value because it helps to close the paravaginal spongy tissue and thus renders haemostasis more complete; it also enables the stumps to be reached in case of future haemorrhage. For the after-treatment of vaginal-operation cases, see page 509.

II. Abdominal Operations

The relative value of the different methods of dealing with myoma by operating through the abdomen has been discussed on pages 256-260. It now remains to describe the operations of (1) Myomectomy, (2) Supravaginal amputation, (3) Panhysterectomy.

Preparation for Laparotomy.—On the morning of the day

before the operation one ounce of 'tasteless' castor oil is given, and on the evening of the same day the lower bowel is washed out with a simple enema. The patient is then shaved and takes a bath. The abdomen is now swabbed with acetone and painted with a 2 per cent solution of iodine, after which a sterile dressing is unnecessary. One hour before operation $\frac{1}{6}$ grain of morphine hydrochloride and $\frac{1}{120}$ grain of atropin are given by hypodermic injection. A catheter is passed immediately before operation.

Ether, administered by the open method, is the best form of general anaesthesia to employ, unless contra-indicated by the presence of chronic bronchitis. As soon as the patient is anaesthetised the abdomen is again painted with the iodine solution, and the frame of Faure's automatic retractor is inserted between the thighs (Fig. 277). A sterile pad is placed between the vulva and the metal retractor-holder, to prevent chafing and pressure-effects. The table is now tilted into the Trendelenberg position, and the patient is covered with a large sterile sheet in which a central slit, 12 inches in length, has been cut. The lower limit of this hole in the sheet rests on the pubes, to which it may be clipped or sewn. Another smaller hole admits the screw of the retractor (see Fig. 277). Beyond this again a pleat can be made in the sheet to act as a pocket for the instruments which are in use, or a tray, shaped to lie on the patient's thighs and over her knees, may be arranged for this purpose after the manner devised by Victor Bonney (Fig. 286, page 494). A solution of 0.25 per cent novocain is now injected into the skin along the whole area of the proposed incision, and this is repeated successively through the different layers of tissue until the peritoneum is reached (see Fig. 276).

The abdomen is opened in the mid-line and the fascial incision is carried down to the pubic bone. The upward limit of the wound will vary according to the size of the

tumour and the thickness of the abdominal wall. If it reaches above the umbilicus the incision must be carried to one or other side of that structure ; it must not pass through it. A rubber guard (see Fig. 277) is then inserted, and clamped to the edges of the wound by means of malleable retractors. The Faure's retractor is now inserted, and fixed to the screw which was previously introduced between the thighs, and all is ready for the uterine operation (see Fig. 286, page 494).

1. **Myomectomy.**—The amount of exposure to which

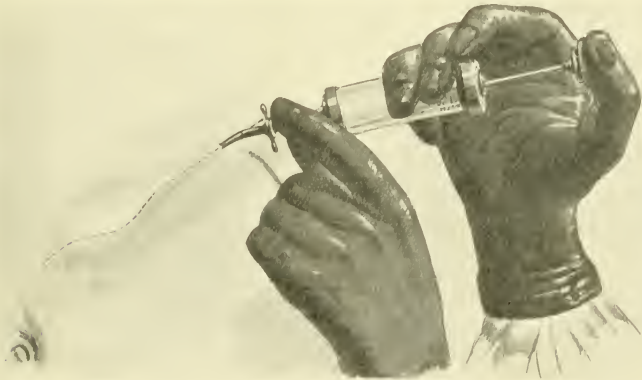


FIG. 276.—Injecting the tissues of the anterior abdominal wall with a solution of novocain prior to making the preliminary incision. (From article on "Technique," by T. W. Eden, in *The New System of Gynaecology*, Eden and Lockyer, 1917.)

the uterus is subjected will depend upon the situation of the myoma or myomas. When the growth is in the lower segment the uterus may have to be eventrated. If the uterus has to be drawn outside the abdomen it should be covered with a sterile towel which has been dipped in hot saline solution. In dealing with a sessile subserous myoma or with an interstitial growth, a linear incision across the summit of the tumour, or a circumferential incision some distance from its uterine attachment, is made through the entire thickness of its capsule (see Fig. 278). Before this is

done some operators apply clamps guarded with rubber to

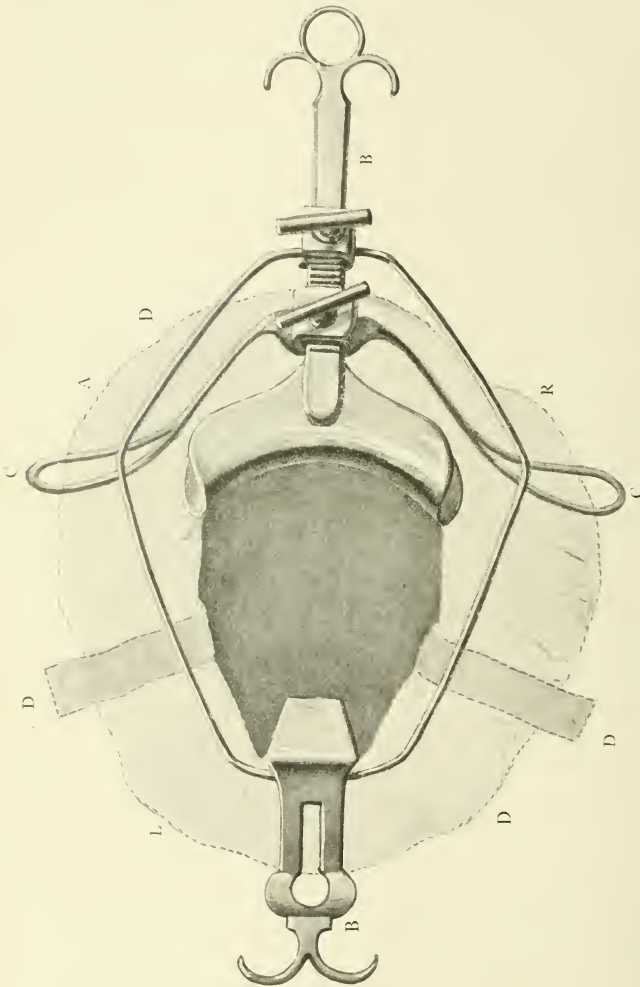


FIG. 277.—Showing the abdomen opened; the edges of the wound are retracted and guarded by a double flange of rubber sheeting as recommended by Carleton Oldfield.

BB = Faure's retractor; *CC* = parts of retractor which lie under thighs; *DD* = malleable metal retractors for keeping the rubber sheeting applied to the abdominal wall; *L* = left side; *R* = right side. *A, B.*—The screw at *B* has been omitted by the artist; it is seen in position in Fig. 286, page 494.

both broad ligaments. The growth is then seized with a volsella and the enucleation is commenced. This is done

mainly by blunt dissection. The edge of the capsule is pressed off the tumour with a gauze swab ; some operators use a Kelly's *spud* for enucleation, but firm pressure on the tumour with a swab, aided by a few snips here and there with scissors, is entirely satisfactory. In the case of a



FIG. 278.—Commencement of myomectomy by (a) linear, (b) circumferential incision.

gravid uterus all manipulations must be carried out with the utmost gentleness, undue traction must be avoided, the uterus must be steadied but not squeezed by the assistant, and care must be taken to avoid opening the cavity of the uterus. As soon as the enucleation is completed, the closure of the cavity previously occupied by the tumour is proceeded with. For this, buried catgut sutures are used. Beginning at the bottom of the wound, many layers of mattress sutures may

be required before the apposition reaches the surface-level (see Fig. 279). For small cavities purse-string sutures may be used, but when the wound is wide and deep, running purse-string sutures are liable to cause distortion of the shape of the uterus, and when gestation is present, this may set up uterine contractions. The edges of the wound should come together without tension and without puckering. The peritoneum may be made to cover the wound by using a Lembert's suture of fine linen thread. Pedunculated myoma are removed in the manner described under "Colpotomy and Myomectomy" (page 456).

2. **Supravaginal Amputation (Subtotal Hysterectomy).**—*Instruments required.*—Scalpels, scissors, toothed dissecting forceps; 18 large Spencer Wells artery forceps; volsellae, swab-holders, automatic retractor, needle-holders, curved and straight needles.

Steps of the Operation.—The preparatory steps as far as the laparotomy is concerned have already been mentioned. With the abdomen opened as seen in Figure 286, and with the operator standing on the right side of the patient, the tumour is drawn up into the wound, and the intestines are then packed off with thin rubber sheeting taken out of sterile saline solution. Large gamgee mattresses, or a six-yard roll of gauze, may be used, if necessary, to assist in keeping the intestines out of the pelvic cavity. The advantage of applying the rubber sheeting first, is that it does not stick to the intestines; but it must always be withdrawn before the guard is removed from the edges of the wound, because the sheeting is liable to carry with it a lot of blood-stained fluid, which might soil the edges of the abdominal incision. The uterus having been drawn up, the appendages are examined, in order to decide whether, or not, it is necessary to remove an ovary. In a case where both ovaries may safely be left *in situ*, the amputation of the uterus through the cervix proceeds as follows :

The operator draws the uterus and tumour to his (right) side. The left round ligament is divided between two clamps. A second pair of clamps are then applied to the remaining structures arising from the cornu, viz. to the Fallopian tube and to the ligament of the ovary, and these tissues are divided between the grips of two pairs of forceps.

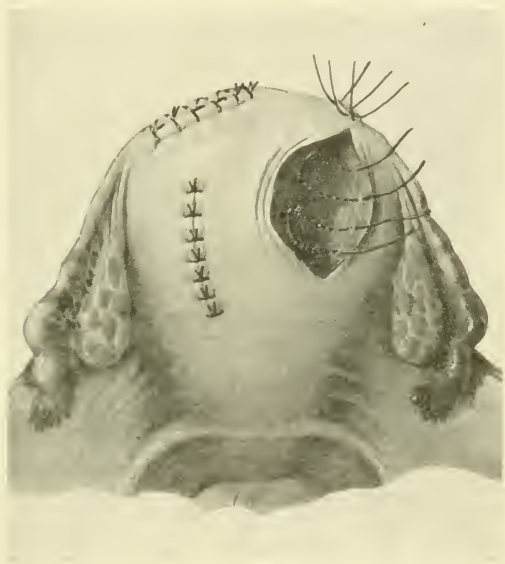


FIG. 279.—Showing the method of closing a myomectomy wound.

The assistant then raises the peritoneum of the utero-vesical pouch with toothed dissecting forceps, and the operator inserts one blade of the scissors under the peritoneum and divides the fold from left to right, close to, and across the front of the isthmus of the uterus. After its division, the peritoneal flap is pushed down together with the upper part of the bladder, by means of a swab in a holder. It will be found necessary to use a few snips with scissors in order to free the bladder in the mid-line. The left uterine vessels are next exposed,

and then isolated by passing a dissector between the vessels and side of the cervix, and running it up and down between the two. The isolated vessels are now clamped in two places, about 1 inch apart, with stout artery forceps, and then cut across. The appendages and vessels upon the right side are dealt with in the same manner, and when this is done, the uterus is attached to the pelvis by the cervix and the peritoneum of the posterior uterine wall. The amputation through the cervix is made low down, to effect which, the uterus is drawn well up by the operator, who takes a swab in a holder, and with it rolls the bladder downwards in front, and the uterine vessels outwards at the sides. Then with a scalpel, a V-shaped incision is made from front to back, the anterior cut running downwards and backwards through the bared cervix, and the posterior cut running downwards and forwards through peritoneum and cervix.

Before amputation is complete, the assistant grasps the cervical stump with a volsella, and when the uterus and tumour are removed the stump is drawn up, and the cervical endometrium painted with iodine. The operator then inserts one or two mattress sutures of catgut through the shelving cervical flaps. Some surgeons scallop out the core of the cervix, leaving only a shell—this is not necessary; others scrape out or cut away the cervical endometrium—this is also superfluous. When the cervical flaps are brought into apposition by sutures, the latter are left long for traction and the volsella removed. The uterine vessels are next tied off by inserting a ligature behind the clamp in each case. These ligatures are cut short as soon as they are tied, and an encircling ligature is now passed through the lateral wall of the cervix and made to embrace the uterine artery, thus bracing the latter to the cervical wall. Subsequently, the round-ligament clamps and those of the tubes and ovarian ligaments are replaced by ligatures, which are all left long for the time being.

When all clamps are removed, there remain three sets of long ligatures on either side of the pelvis. From above downwards they are : those (1) on the tube and ovarian ligament ; (2) on the round ligament ; (3) on the corner of the cervical stump. One of each pair is now cut off, and the remaining three are united to the one lying next to it thus : the cervix to the round ligament, and one of these to the ligature on the tube and ovarian ligament. The latter ligature may be augmented by a second transfixion ligature if there is the slightest degree of tension (see Fig. 292A, page 500).

When the ligatures on either side are thus brought together, the cervix is held up at the corners by all the lateral structures which have thus been brought together. The peritoneal surfaces are finally apposed by a running suture from left to right (see Fig. 292, page 499). The wound must be absolutely dry at the finish.

The mattresses and rubber sheet are now removed, and the abdomen closed in a manner to be described on page 487. Figure 280 shows a scheme of the supravaginal amputation of the uterus in which it is intended to remove both appendages.

3. Total Abdominal Hysterectomy (Panhysterectomy).—Before performing panhysterectomy it is essential that the vagina be systematically cleansed by antiseptic douches during two or three days preceding the operation. If there is any evidence of catarrh of the cervix, the latter should be painted with iodised phenol before the anaesthetic is administered. Whether the cervix is painted or not, it is a good plan to pack the vagina lightly with gauze, an end of which is left hanging through the vulva. The gauze will take up any haemorrhage which flows into the vagina at the time of its division, after which it is withdrawn by a nurse whilst the operation proceeds.

In the description of supravaginal amputation both ovaries were retained. The case in which it is necessary

to remove one or both of these organs will now be considered.

It will be understood that the question of the removal of the ovaries stands quite apart from that of deciding which kind of hysterectomy is the more advisable, *i.e.* if the operation is carried out for cases of myoma. It is only in carcinoma-cases that the ovaries are systematically removed in the operation of panhysterectomy. In myoma-cases the ovaries

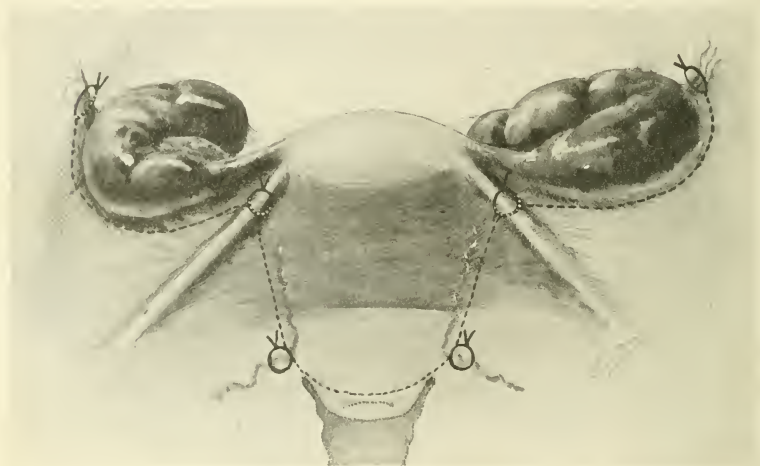


FIG. 280.—Scheme for subtotal hysterectomy with removal of both appendages.

may have to be removed during a supravaginal amputation (see Fig. 280) and retained whilst performing panhysterectomy, and *vice versa*.

When the ovaries are to be removed, the preceding technique as applied to the appendages is modified in the following way: After tying off and dividing the round ligaments, the infundibulo-pelvic folds are clearly defined by gentle traction on the outer half of the Fallopian tube, which can be done by the assistant. If on the left side the sigmoid is found adherent to the free edge of the broad

ligament by accessory peritoneal folds, these are carefully divided with scissors and the bowel pushed back. With the left thumb and index finger the ovarian vessels are grasped, whilst a ligature is passed from within outwards through the avascular thin portion of the broad ligament which lies internal to the ovarian vessels. The latter are then tied and the ligatures *cut short*. This is done on both sides and then the operation proceeds as before, excepting that it is better to ligate rather than clamp the *vessels* at every stage, because with the increased depth of the wound it may be found that a number of large forceps will get in the way. After ligating the left uterine vessels they are rolled back, together with the ureter, by firm pressure, applied by a swab in a holder which is pressed against the lateral wall of the cervix. The uterus is now drawn forcibly upwards by means of a stout volsella, with a lateral curve (see Fig. 290, page 497). This instrument should be applied to the lateral wall of the isthmus. Traction by means of the volsella puts the parametrium on the stretch, and as the uterine vessels and ureter have already been displaced, the parametric tissues may be clamped by forceps. The first pair of forceps grasps the utero-sacral ligament, which is divided on the uterine side of the clamp. The second pair is applied to the utero-sacral ligament on the opposite side, which is then likewise severed. The scissors are then inserted on the flat under the peritoneum at the back of the uterus and pushed across from right to left from one cut utero-sacral ligament to the other (see Fig. 281). The peritoneum thus freed is then divided, and the rectum, which is thereby exposed, is pushed down from off its loose attachment to the vagina.

A third and fourth clamp are now used to grasp the lateral parametric tissues on either side of the cervix. This lateral parametric tissue is now divided by keeping the scalpel close to, and by cutting on, the cervix. The deep

lateral dissection is carried on on either side until the vagina is reached: a point which is easy to notice, because the vaginal walls are laxer and less resistant than the cervix. As to where the vagina is to be opened is a matter of choice: some operators open in front, others at the side. The latter has the advantage of allowing the lateral incision to proceed through the parametric and paravaginal tissue until the

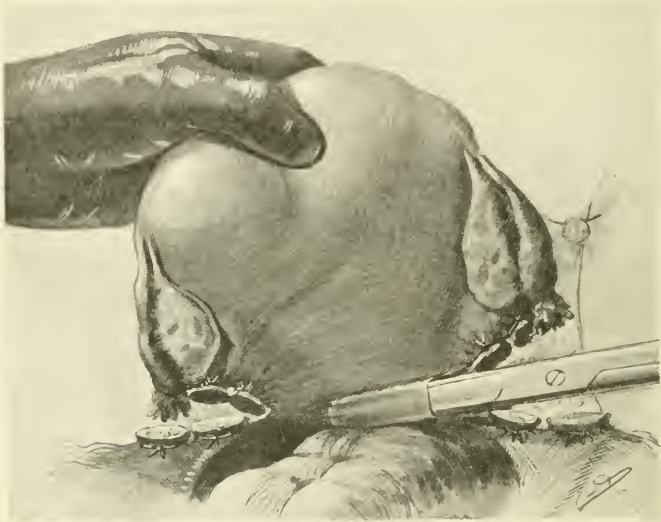


FIG. 281.—Total hysterectomy. The infundibulo-pelvic and utero-sacral ligaments have been tied and divided on both sides. The peritoneum is being separated from the posterior uterine wall by inserting closed scissors from one cut utero-sacral fold to the other. After thus freeing the peritoneum its division is easy and safe.

vagina is cut into, when its vascular lateral angle can be clamped and drawn up, whilst the remainder of the vagina is divided from left to right along the anterior and then along the posterior walls. When the vagina is divided, its edges should be caught by four pairs of clamps—one on the centre of the anterior wall, one on the posterior wall, and one on each lateral angle. These clamps are immediately replaced by ligatures, which are left long and brought

together in one pair of forceps. They can then be left for the moment to hang over the pubes in the front of the wound. The utero-sacral clamps and those on the parametrium are now replaced by ligatures which may be transfixed in the tissues to prevent their slipping off. The entire deep area is now carefully examined for oozing points.

When the raw surfaces are quite dry, the closure of the pelvic connective tissue is begun. The round ligaments are sewn to the corners of the vagina, and the original vaginal sutures are then cut short. The peritoneum is next brought together by a running glover's stitch from left to right (Fig. 292, page 499). When there is a good supply of peritoneum in the flaps this membrane can be easily brought together by means of a purse-string suture, a method adopted by Herbert R. Spencer. It is a very rapid means of establishing the peritoneal floor of the pelvis, but when it is done, the lateral vaginal angle is tied to the parametric suture, instead of to the round ligament, as a means of support. When the work in the pelvic floor is accomplished the vermiform appendix and gall-bladder are examined and dealt with if diseased. Finally, the omentum is drawn down so as to cover the small intestines, instruments and swabs are counted, and the abdomen is then closed.

Closure of the Laparotomy-Wound.—The operative technique employed for the closure of the abdomen varies much in detail, but the main principle of closure by layers of buried sutures is now almost universally conceded. Experience has shown that incisional hernia is far less frequent after closure in layers than after closure by through-and-through interrupted sutures. One only of the many methods of suturing in layers will be described.

The lower (pubic) angle of the peritoneal wound is grasped by forceps and drawn up. It may then be necessary to use one or two interrupted sutures for the purpose of

closing or reducing the size of the *cavum Retzii*; this is especially needed in cases where the normal relations have been disturbed by burrowing tumours which have displaced the bladder. There is then a lot of slack in the peritoneum, and the wound in the latter, when held up by forceps, will lie an inch or two farther up in the abdominal opening than the lower end of the skin-incision. A few stitches should, in such cases, be placed through the intact peritoneum, cellular tissues, and muscle, beyond (on the pubic side) the peritoneal incision, and by this means a large space can be closed.

When this is done, the peritoneal wound is closed by two running sutures of catgut. One suture starts from the lower angle, and the other from the upper angle of the wound. There is sometimes a difficulty in picking up peritoneum only, whilst suturing in the region of the umbilicus, especially in a fat subject; but this must be overcome when necessary by prolonging the incision through skin and fat. If the peritoneum cannot be clearly defined without this being done, Moynihan's *tetra-clamps* (see Fig. 282) may be applied to the upper angle of the wound; they will provide a better view of what is often a deep angle for efficient suturing. Near the umbilicus the peritoneum is closely adherent to the posterior layer of the rectal sheath; the latter may here be included in the peritoneal sutures.

The two running sutures meet at the centre of the wound, where they are tied together (see Fig. 283). When properly sutured by the continuous method the peritoneal wound loses two inches in six of its original length.

The rectus muscle is not sutured, so that the second layer of stitches are used to bring together the anterior layer of the rectal sheaths. Stout catgut is used for this purpose, and the suturing is begun as before, *i.e.* by two ligatures, one starting at the lower angle (pubic bone), and the other at, or

above, the upper end of the abdominal incision, where, again, Moynihan's *tetra-clamps* are most useful for displaying

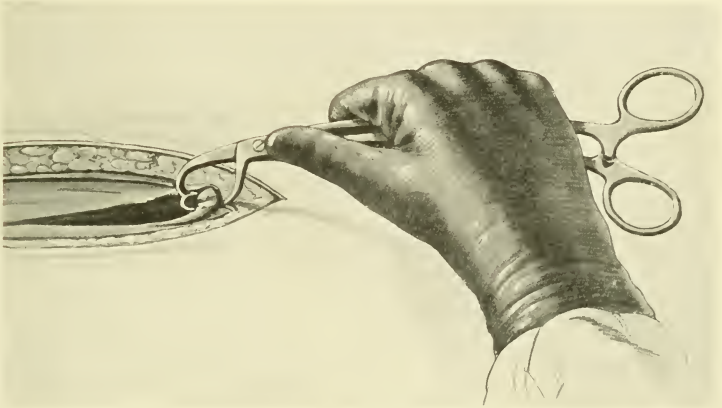


FIG. 282.—Peritoneum at upper angle of wound everted by forceps prior to suture.

the upper end of the wound. These fascial sutures are

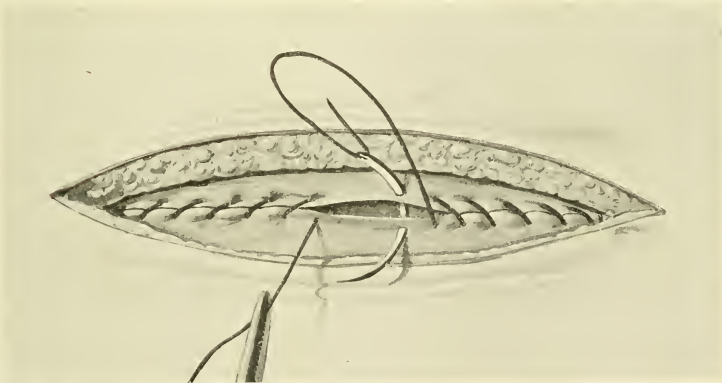


FIG. 283.—Suture of peritoneum commencing top and bottom, and ending in middle of wound.

conveniently applied by means of a slot-needle, such as the one shown in Figure 284. The assistant with his left

hand keeps up tension on the last stitch which has been passed, whilst he feeds the needle with a terminal loop of the catgut with his right hand. The suturing of the upper half of the wound proceeds from above downwards, and that of the lower half from below upwards, and the two sutures are finally knotted and divided at the central point of the long axis of the wound. As no stay-sutures are used, this running fascial stitch is most important in ensuring the ultimate strength of the abdominal wall; therefore firm tension on each loop must be made continuously during the whole time that fresh stitches are applied. A good assistant ensures this being done. The needle should be made to include a good width of the fascia on each side of the wound,



FIG. 284.—Slot-needle holder.

especially when the sheaths are thin, in which case surface-apposition is more reliable than edge-apposition. The third and fourth layers of sutures run through fat and subcuticular tissue. A single long suture is made to do duty for both. One end of the catgut is threaded through the eye of a large curved needle, whilst a straight needle is attached to the other end. The curved needle is passed into the fat under the lower angle of the wound and half the length of the ligature is drawn through, the remaining half being left for the skin-apposition. The curved needle is now used to bring the fat edges together by wide loops which pass for an inch or more outside the lateral cut edges of the wound; each succeeding loop is pulled tight, but not sufficiently so, to risk causing fat-necrosis. When the upper end of the wound is reached the ligature is left long. With the straight needle the remaining half of the ligature is used to

bring the skin together by subcuticular stitches. The skin-edge is steadied by means of toothed dissecting forceps during the passage of the straight needle. When the wound is closed, the needles are cut away, the two long ends of the ligature are pulled taut and tied, the ligatures are then divided beneath the skin-surface, and the knot disappears out of sight. The wound is then painted with 2 per cent iodine in ethylene dichloride,¹ and a dressing is usually applied, although some surgeons dispense with a covering for the wound altogether. Personally, I prefer a dressing, but have abandoned the collodion-scab. The best form of a many-tailed abdominal binder is one the tails of which are made to fold from above downwards, and in which the last pair of tails are three times the length of the others, so that they can be used as a spica, *i.e.* to pass over the pubes and around the opposite hip, thigh, and groin, before being pinned to the folds lying on the front of the abdomen.

By the proper use of such a bandage there is no fear of the lower part of the dressing rucking up or becoming displaced.

Special Methods of Hysterectomy

(a) *Kelly's Supravaginal Amputation by Continuous Incision from Left to Right or from Right to Left.*—This is a very rapid mode of performing subtotal hysterectomy, and when the ovaries can be saved it is carried out most expeditiously by the use of clamps to control the vessels, no ligature being applied until the uterus is removed.

Forci-pressure is not advisable, however, for securing haemostasis when the ovaries are to be taken away with the uterus, as they may slip from off the infundibulo-pelvic fold during subsequent manipulations, especially when applied far back near the pelvic brim. In such cases before incising

¹ This solution has a pleasant sea-weed odour and does not cause lachrymation.—C. L.

the mesosalpinx it is best to tie the ovarian vessels in the manner already described.

Kelly's rapid method of continuous incision may be used for straightforward uncomplicated cases of hysterectomy, *i.e.* where the uterus can be drawn well up into the wound; it is also better adapted to meet the difficulties of dealing with a burrowing myoma than is the form of subtotal hysterectomy already described.

Two clamps are applied to the left appendages at the *cornu uteri*, and these structures are then divided with a scalpel. The left round ligament is treated in the same way; the vesical peritoneum is divided and pushed down together with the apex of the bladder.

The left uterine vessels are then divided between forceps, and the cervix cut straight across from left to right until it hangs by a thin strand of tissue carrying the right uterine vessels. The latter are seized with a pair of curved museaux or with Moynihan's colectomy forceps, whilst the uterus and tumour are rolled still farther to the right and dragged up (see Fig. 285). Its only attachment then will be the right appendages. These are clamped and divided from below upwards.

The uterus shown in Figure 122, page 111, was removed in the above way by Professor Kelly at St. Mary's Hospital, Plaistow, in about sixty seconds.

(*b*) *Doyen's Panhysterectomy*.—This is a modification of the classical method of performing total hysterectomy, and several surgeons, including Herbert Spencer, prefer it to the usual plan. After drawing the uterus well up and packing off the intestines, the tumour and uterus are held forwards to obtain a good view of the lower part of the posterior uterine wall. The posterior vaginal fornix is then opened and the cervix is exposed from behind. With a stout volsella the cervix is drawn through the opening in the vagina, and its attachments to the vagina, laterally and

in front, are severed from below upwards. The utero-vesical pouch is divided, the uterine vessels are clamped and severed, and finally the broad ligaments are treated likewise.

(c) *Pryor's Total Hysterectomy*.—By this method the surgeon proceeds as is done in Kelly's continuous left-to-right subtotal hysterectomy, excepting that the lateral dissection is carried lower down, *i.e.* beyond the cervix,



FIG. 285.—Kelly's supravaginal amputation from right to left. No vessels are tied until the uterine body is removed.

until the paravaginal tissue is reached, then the transverse incision passes through the vagina instead of through the substance of the cervix (see Figs. 286 to 292). This is the method I always adopt myself, just as I always used Kelly's method for performing subtotal hysterectomy before I decided in my own mind that the total hysterectomy was the better operation. My belief is, that it is the most expeditious manner of performing panhysterectomy.

(d) *Kelly's Modifications in certain Atypical Cases*.—In

myoma-cases complicated by adhesions to bowel or with inflamed adnexal conditions, and where the anatomical relationships are so altered as to cause displacement of the cardinal vessels, Kelly proceeds (1) by making a sagittal incision through the whole uterus, and in suitable cases

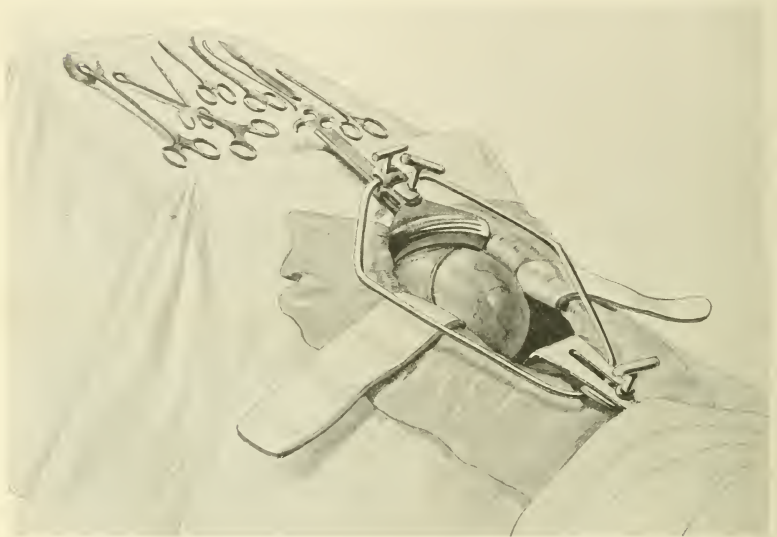


FIG. 286.—The preparatory stage of hysterectomy (drawn from life). The instruments lie on a Bonney's tray, which rests on the patient's thighs and is covered by the operation sheet. The wound-edges are protected by Oldfield's double rubber-collar. The uterus is torsioned through about 120° , so that the left tube is seen crossing the front of the myoma.

enucleating the tumour, or (2) by first stripping down the bladder and transversely dividing cervix from uterus. By these methods it is possible to work from below upwards, which is a great advantage in certain cases of adherent pyosalpinx, and where it is impossible to gain access to the pelvis from above. It was by splitting the uterus in the mesial line, and working upwards from below, that I was enabled best to deal with the difficult case of

adenomyoma and tuberculous pus-tubes described on pages 435-436.

(e) *Hysterectomy for Cervical Myoma.*—When, as is usually the case, cervical myomas occur singly, they can be removed without any great difficulty by the process of

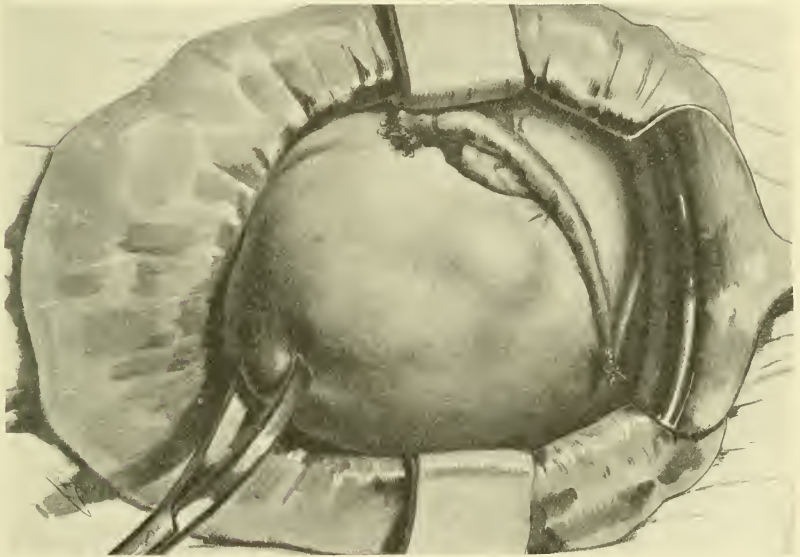


FIG. 287.—Showing abdomen opened, and a myoma drawn up into the wound. There has been axial torsion of the uterus from left to right ; hence the left cornu lies near the right side of the opening in the abdomen. The round ligament and Fallopian tube are tied preparatory to division (same case as shown in Fig. 286). X, position of operator.

enucleation. It is often impossible to reach the uterine vessels so as to clamp or tie them as a preliminary stage in the operation, but if, after severing the appendages on either side and dividing the round ligaments, a circumferential incision is made in the peritoneum at a convenient level, first one finger, and then others can be inserted, and by a sweeping movement the tumour can be separated from its

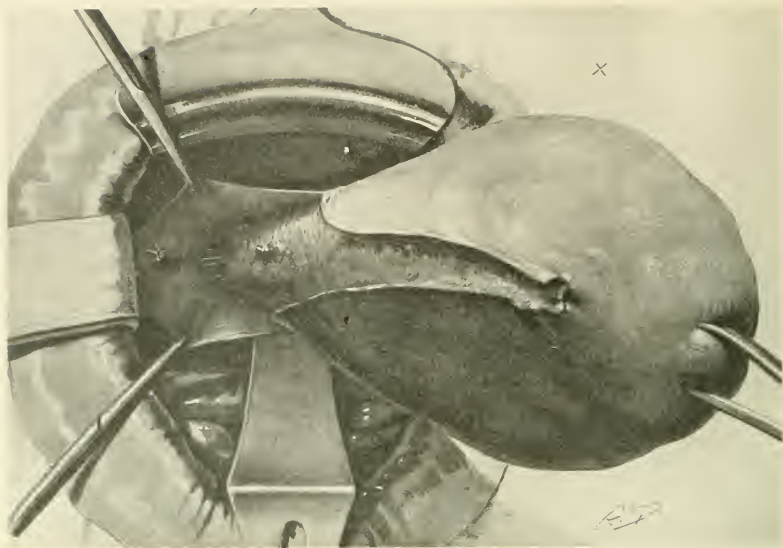


FIG. 288.—Showing the uterus drawn to the right side, the left appendages severed, and the left uterine artery tied and divided. X, position of operator.

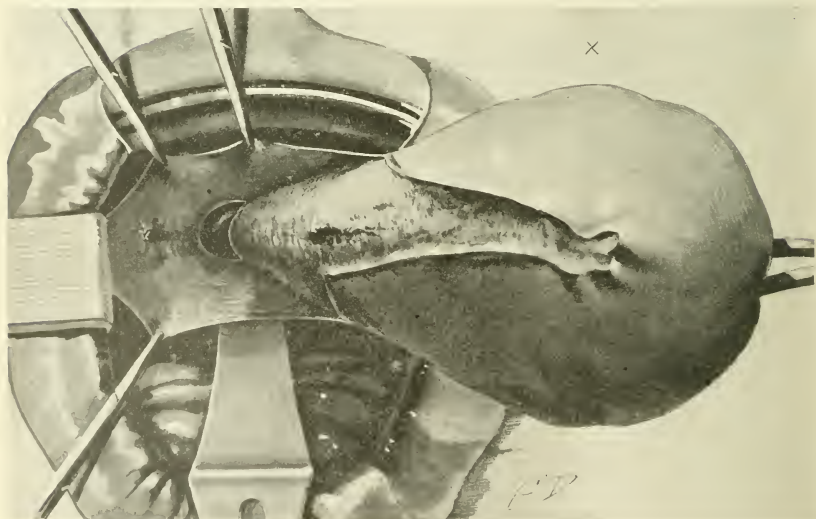


FIG. 289.—The bladder has been stripped back, the ureter rolled outwards, and the vagina opened at the side. X, position of operator.

cellular bed both back and front. When this is done the uterine vessels (often displaced forwards on one side and backwards on the other, see Fig. 33, page 28) are easily found, and can be ligatured straight away. The displacement of the bladder in front will require a few snips with the scissors, and a few of the denser strands of connective tissue

X

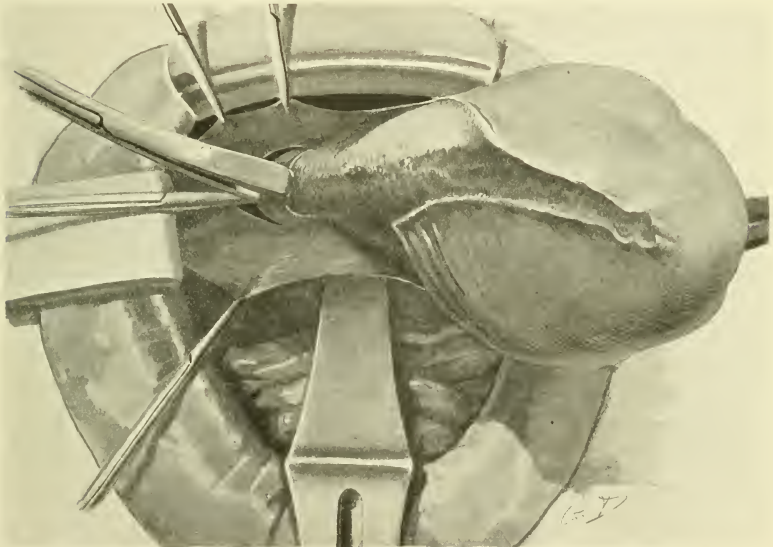


FIG. 290.—The vaginal cervix is grasped with a volsella, which has been introduced through the opening made in the vagina. The operation now proceeds as shown in Figs. 291 and 285. X, position of operator.

may require the same treatment. When this is done the tumour, which was formerly fixed in the pelvis, can be dragged well up into the wound. After this is accomplished, panhysterectomy is performed by dividing the vagina in the way previously described. The enucleation of a cervix-myoma from its retroperitoneal bed of connective tissue should cause no serious bleeding. As soon as the hysterectomy is finished, the deep hole from whence the tumour

was removed should be carefully explored, and oozing points and ragged strands of fibrous tissue ligated at once. The same principle applies to a lateral cervical myoma, *i.e.* the peritoneum is incised over the projecting surface of the tumour after dividing the round ligament, and the lump is separated all round by the fingers or hand. When thus

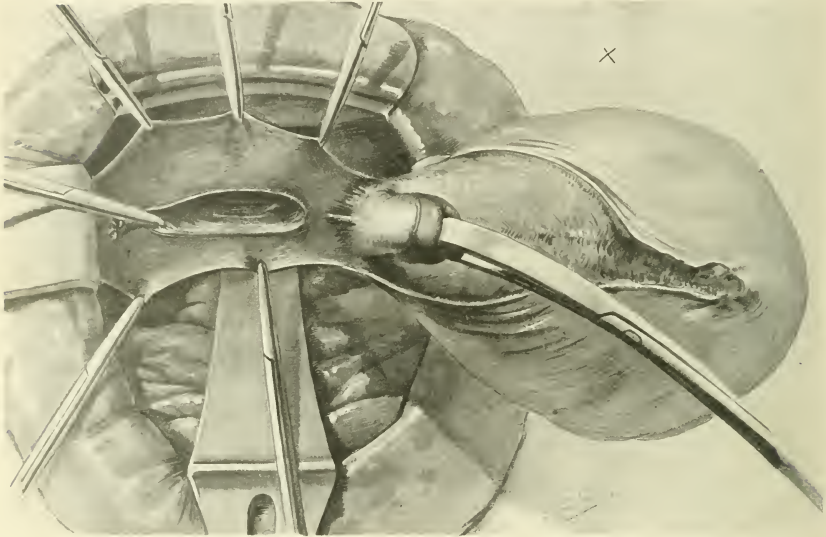


FIG. 291.—The cervix has been freed from its vaginal attachments, and with the uterus is rolled outwards to the right side. The right broad ligament and uterine appendages are divided from below upwards. X, position of operator. The clamps are attached to peritoneal flaps; they *should* have been shown applied to the edges of the vagina.

freed the tumour can be drawn up sufficiently to enable the principal vessels to be reached, and the rest of the operation to proceed along the ordinary lines.

In cases where secondary lobes project from a cervix-myoma, as seen in Fig. 29, page 24, great care must be taken in dealing with the ureter. In the instance referred to, this structure was displaced, and was found to lie in the interval between the principal and the smaller growths

and had to be raised and displaced outwards whilst drawing up the uterus and freeing the intraligamentary lobe. After carefully stripping off the bladder, the position of the ureter may be defined, by drawing the bladder forwards and upwards by means of a bayonet-shaped spatula.

(f) *Hysterectomy for other Retroperitoneal Myomas.*—Retroperitoneal myomas other than the solitary cervical variety (which form a class by themselves) may grow from

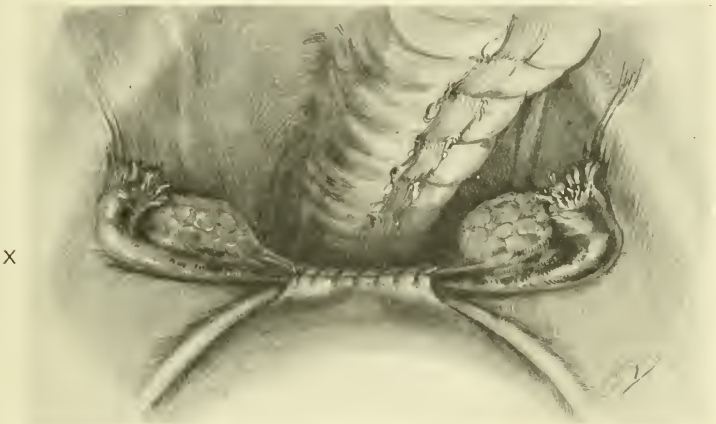


FIG. 292.—Appearance of floor of pelvis after the preceding operation of total hysterectomy. X, position of operator.

the front, back, and sides of the uterus, and burrow in the corresponding directions, so as to raise the bladder or the pouch of Douglas, open up the mesosigmoid on the left, and even the mesocaecum on the right side.

In some of these cases the broad ligaments are so opened up that there is no room to ligate the ovarian vessels in the usual way. In such circumstances the round ligaments should first be tied off and the peritoneum opened up from the outer side. When this is freely done the tumour can be raised, and by further division of the peritoneum anteriorly, the bladder can be reached and pushed down.

Care must be exercised in dealing with the colon when it is stretched over the tumour ; the peritoneum should be divided external to the bowel and as far away from it as

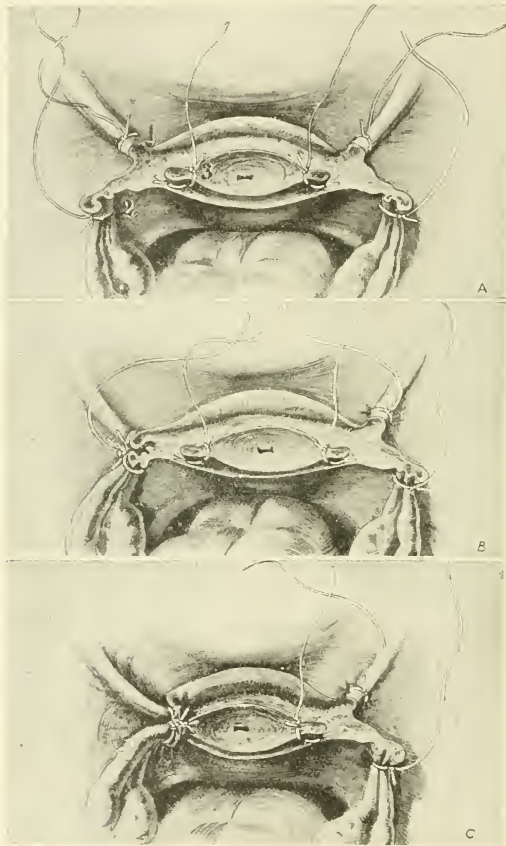


FIG. 292A.—The mode of tying sutures in subtotal hysterectomy described on page 484.

Figure A, (1) Round ligament ; (2) Fallopian tube and ovarian ligament ; (3) corner of cervical stump. Figure B shows (1) and (2) united. Figure C shows (1), (2), and (3) united on the left-hand side of the diagrams.

possible, since the inner layer of that membrane carries the vascular supply to the gut.

When the bowel is separated, if the ovarian vessels previously could not be found, they are now exposed to view at the brim of the pelvis, and are ligatured forthwith. If the tumour has burrowed deeply into the pelvis, the bladder is carefully dissected off, and the uterine vessels sought for, tied and divided; after which there is no risk of serious haemorrhage.

(g) *Hysterectomy for Myoma complicated by adherent Pus-Tubes.*—In these cases it is best either to bisect the uterus and work upwards from below, or to remove the uterus after clamping or ligating the broad ligaments close to their uterine attachments. After removal of the uterus more room is left in which to deal with the diseased appendages. With very extensive adhesions the posterior peritoneum may be so ragged or deficient that large raw areas exist with no posterior flap left to cover them. If the anterior flap of peritoneum is sufficiently extensive it may be sewn up to the posterior pelvic wall at a much higher level than normal, rather than that raw surfaces should be left. The absence of a posterior cul-de-sac is a matter of no consequence, but the leaving of a raw surface may lead to serious bowel-complications.

CHAPTER II

THE AFTER-TREATMENT OF OPERATIONS FOR MYOMA

THE post-operative treatment of myoma-cases will necessarily vary with the nature of the operation. It will be convenient first to consider the after-treatment of major operations.

I. Abdominal Operations

Immediate Treatment.—The patient, wrapped in a blanket, should be placed in bed in a darkened room which is well ventilated, but kept at a temperature of 68° F. A nurse must be provided whose sole duty it is to watch over, and care for, the patient. The bed should be warmed with hot-water bottles wrapped in flannel. The patient should be placed on her back, with her head kept low and turned to one side; the nurse supports the lower jaw and places a towel under the head and face. Some anaesthetists ask to have the patient placed on her side with a long bolster tucked between her back and the bed; they say this prevents vomiting. I know of no objection to the lateral decubitus, provided the face is not smothered and the nurse has free access to the patient's mouth. A porringer is kept in readiness at the head of the bed in case of vomiting. If the operation has been prolonged, the foot of the bed may be raised on blocks. When consciousness returns the

patient should be placed upon her back, a pillow placed under her head and another put under her thighs, so that she lies with the knees flexed. There is no objection to changing the position of the patient from time to time during the first forty-eight hours, so that she may lie for a while on her side and then be placed again upon her back. The nurse notes the temperature, and the frequency of pulse and respirations, as soon as the patient is settled in bed and before the return to consciousness. These data are registered on a chart, and are recorded every four hours during the first week of convalescence.

After an abdominal operation the patient will suffer from vomiting, thirst, and pain.

Vomiting.—This is mainly due to the anaesthetic, and may be reduced in amount by the administration of morphine gr. $\frac{1}{6}$ and atropin gr. $\frac{1}{120}$ half an hour before operation, and also by giving due time to the preparation of the patient before operation (see page 475). In spite of all prophylactic measures, post-operative vomiting must be expected after prolonged abdominal operations. The anaesthetic is not to be held accountable for vomiting which continues for longer than twelve hours. If it continues for twenty-four hours or more, it is symptomatic of gastritis; if it persists for beyond forty-eight hours, and is accompanied by fever, frequent pulse, and a turgid abdomen, peritonitis is the most likely cause.

The treatment of post-operative vomiting consists in keeping the stomach empty for the first twelve hours and in administration of saline solution and glucose *per rectum*. The mouth may be frequently rinsed with sips of hot water, but cold water and ice, when swallowed, only aggravate the condition.

If at the end of twelve hours there is evidence of gastric catarrh, such as constant nausea and the vomiting of stringy mucus, a modified gastric lavage is invaluable.

This consists in giving a drachm of bicarbonate of soda in a tumblerful of hot water. This long drink will dissolve the mucus, and after cleansing the gastric mucosa it will be ejected, when the vomiting frequently ceases entirely. For vomiting in neurotic subjects, such measures as a mustard-leaf or ice applied to the epigastrium may be of service. In all cases of prolonged vomiting the patient must be fed exclusively by the bowel, and a stomach-tube may have to be used for gastric lavage. After the stomach has been found to retain sips of hot water, this is followed by egg albumen, whey, weak China tea, and meat-juice.

Thirst.—This complaint is not easy to treat because of the accompanying emesis. Atropin given before operation will in part account for the sensation of dryness in the mouth. It is one of the indications for giving a pint of saline *per rectum* as soon as the patient is returned to bed after the operation. Thirst and vomiting may both be combated by frequent sips of *hot* water, but cold water and ice should never be given.

Pain.—After laparotomy there is always a certain amount of pain. This at first is confined to the wound, and can be lessened by Criles' method of anoci-association. Later on it is due to distension of the intestines, from flatulence, *ileus paralyticus*, peritonitis or definite obstruction. Pain inevitable to trauma is worse during the first night after operation, and may be treated by a hypodermic injection of $\frac{1}{6}$ gr. of heroin. The pain due to flatulence and colic is relieved by the use of the rectal tube and by the administration of a turpentine enema.

Pulse and Temperature.—*The character of the pulse is the most reliable guide as to the state of the patient after operation.* During the first twenty-four hours the frequency of the pulse-rate varies according to the duration of the operation and with the amount of blood which has been lost. After the bowels have acted on the third day, the frequency

should be about 80, and the quality full, steady, and soft. A pulse maintained at 120, and becoming thin and thready after the first forty-eight hours, or after the bowels have acted, is of serious import. A pulse-rate of 140 and more is met with in haemorrhage, and in shock, under which conditions the beat may be so feeble as to be almost imperceptible.

Temperature.—As stated previously, the temperature and pulse are noted every four hours during the first week, after this it may be recorded diurnally in normal cases. The first record is taken *per rectum* and is often subnormal, but during the first twelve hours the temperature rises to the normal or higher. The rise is highest on the second day, when it may reach 101° F., after which there may be an evening rise to 99° F. Even in normal cases the evening temperature may reach 99° F. several times during the first week. If the temperature keeps up persistently after the bowels have acted, the wound should be examined for stitch-abscess. A rising temperature at the end of the first week may indicate a haematoma in the pelvic cellular tissues. A rising temperature accompanied by a rapid pulse, anxious expression, tympanites, and vomiting, indicates peritonitis. A transient rise of temperature is often noted at the end of ‘visiting day.’

Respiration.—After the sickness has stopped, respiration assumes a normal rhythm of about twenty* *per* minute. Shallow, rapid breathing will accompany great pain, and is a symptom of shock and of haemorrhage. The rate of breathing is also increased in bronchitis, in ‘ether-pneumonia,’ in peritonitis, and in intestinal obstruction.

Micturition and Defaecation.—*Micturition.*—Many patients find a great difficulty in voiding urine whilst in the recumbent posture. They may be made to practise the act during the two days devoted to preparation for the operation. Before resorting to the use of a catheter the usual devices employed by a midwife should be tried, *i.e.*

hot applications, steaming the bed-pan, and letting the patient go for twelve hours before passing the catheter. In drawing off urine a boiled glass catheter should be used and the vulva cleansed with an antiseptic. The nurse's hands must also be cleansed and rendered as aseptic as possible. If there is any difficulty from the patient being obese, or other cause, the nurse must obtain assistance, since too much care cannot be taken in securing absolute cleanliness, and this means that the catheter must not touch any part of the patient before it is introduced into the urethra. Twelve hours should elapse before a catheter is passed a second time. The repeated use of a catheter is to be strongly deprecated. Franklin Martin says, "Where, however, its use becomes necessary repeatedly, *i.e.* ten times or oftener, cystitis nearly always follows."¹ In all cases where a catheter has to be used continuously the patient should be given thrice daily a mixture containing 15 grains of acid sodium phosphate and followed later by 10 grains of hexamethylenetetramin.

Defaecation.—If on the second day following the operation vomiting has ceased and the patient is able to take liquid diet, an aperient should be given. Various opinions are given as to the best drug to use—Thornton and also Herman advised ordinary white mixture and sulphate of magnesia respectively. The routine method at the Samaritan Hospital consists in giving 6 drachms of castor-oil on the third day, followed by a soap-and-water enema, to which turpentine is added if there is distension. When peristalsis has once been started it usually continues, but an occasional dose of cascara evacuant or other vegetable aperient may be necessary for the establishment of regular evacuations. In cases of mechanical obstruction due to enteroptosis, repeated high enemata, given through a long tube, form the necessary treatment. Quite independently of peritonitis, a condition

¹ "The After-Treatment of Gynaecological Operations," *The New System of Gynaecology*, edited by Eden and Lockyer. Macmillan and Co., London, 1917.

of tympanites or pseudo-ileus sometimes supervenes in which it is extremely difficult to get the bowels to act even to the extent of expelling flatus. Here the flatus tube already mentioned will give some relief; it should be used several times daily, and left *in situ* for half an hour at a time. Infundibulin, hormonal, eserine, and strychnine have all been used for this condition (see "Wound-Complications," page 519).

As the administration of rectal enemata, both nutritive and purgative, may form a large part of the after-treatment of abdominal sections, the operator should never be tempted to remove haemorrhoids at the same time as performing hysterectomy.

Management of the Wound.—If the wound has been closed by the method described on page 487, no stitches require to be removed, in which case the dressings are left undisturbed until the eighth day, provided the convalescence is normal. By the eighth day the skin-edges should have healed completely. After removing the initial dressing the scar is again painted with iodine solution and a lighter dressing applied, which at this stage may consist solely of gauze. If strapping had previously been used it should now be removed and not replaced. The flanks and back should be dusted with zinc oxide, boric acid, and starch, before the fresh abdominal binder is applied.

Drainage.—Sometimes small superficial drains are used in cases where the abdominal wall is very fat. Such tubes should be removed on the third or fourth day.

In myoma-cases complicated by pus-sacs or other forms of suppuration it may be necessary to drain *per abdomen* as well as *per vaginam*. When a rubber drainage tube is fixed to the abdominal wound it may be necessary to remove the soiled dressings frequently, but if there is no discharge, the tube may be taken out at the end of forty-eight hours, and the wound closed by a suture which was left untied at the time of operation. In cases where deep

drainage is to be established, the subcuticular mode of closure of the skin is not to be recommended ; when there is the least risk of wound infection, interrupted sutures of fishing-gut had better be employed.

Drainage of the peritoneal cavity is facilitated by raising the patient into the Fowler position, but if the patient is too weak for the half-sitting posture, the head of the bed may be raised.

In cases of injury to the bladder requiring suture, and where a divided ureter has been implanted in the bladder, it is necessary to drain that viscus by a self-retaining rubber catheter ; this should be joined up to a rubber tube, leading to a vessel under the bed. The free end of the tube drops into a solution of 1-20 carbolic acid or other antiseptic.

Feeding.—For the first twelve hours after laparotomy nothing should be given by the mouth. After the first twelve hours sips of hot water may be taken, but feeding *per rectum* must be carried out until all sickness ceases. Generally speaking, it is possible to start a liquid diet at the end of the second day. Albumen water, whey, beef-juice, and weak tea may be given, but solids are not to be taken until after the bowels have acted. Benger's food makes a very good intermediary between fluid and solid diet. If milk is given it should be peptonised. Solid diet is commenced by adding a slice of toast to the dish of tea ; this is followed by minced steamed fish ; then by boiled chicken and brains. When a solid diet is given at regular intervals, it may be supplemented by nourishing liquids, such as cocoa, or chocolate, or egg-flip between meals.

Rest in Bed.—As soon as the shock and the effect of the anaesthetic have passed off, the patient's head is raised, and by the end of twenty-four hours she may be placed in the half-sitting posture (Fowler's position) by day, and allowed to lie lower if she prefers it at night. It is usual to

keep a patient in bed for eighteen to twenty-one days after abdominal hysterectomy. With hospital cases it is often in the best interest of the patient to give her an extra week in bed.

Abdominal Support.—Opinions differ as to the value of an abdominal support after laparotomy. All my patients wear a support of some kind. The hospital cases are fitted with a belt to which two pads are so applied as to lie on either side of the wound, which is thus protected from friction and pressure. Private cases have the same kind of pads applied to specially-made corsets. Such supports are worn for six months or a year, according to the character of the abdominal wall and the length of the scar.

General Treatment.—There are various aids to complete recovery which must not be lost sight of. Amongst the foremost of these is massage. The help which a skilled masseuse can give towards completing the patient's recovery to perfect health is considerable. When means permit, the patient should be sent to the seaside accompanied by a nurse who is also a masseuse.

Medicinal tonics, such as quinine, iron, and strychnine, are useful for a time. Later on, a course of special exercises are very beneficial. Walking, as the best exercise of all, is to be encouraged. Strenuous games, such as tennis, are not to be played during the first year.

II. Vaginal Operations

The after-effects of major vaginal operations for myoma as compared with those which involve laparotomy, show that with the former there is less vomiting and less shock. Drainage being better, there is less likelihood of high temperature; tympanites and pseudo-ileus are less frequently met with in vaginal operations than after abdominal section.

There may be a good deal of pain after vaginal hyster-

ectomy, especially where clamps are left on the stumps, so that it is a good plan to insert into the rectum a suppository containing half a grain of morphine sulphate before the patient is removed from the operating table.

If haemorrhage occurs after vaginal section it will be visible ; therefore the immediate after-treatment consists in keeping a close watch on the vulval pad. There is a certain amount of oozing in most cases, but it should not be enough to influence the pulse or temperature, nor will such bleeding, as may be considered inevitable, rapidly soak through a gamgee pad. If a severe loss occurs, the patient must be anaesthetised and the bleeding part sought for by the aid of a forehead-light and illuminated specula (see Fig. 260). When the site of the haemorrhage is discovered, the vessel should be clamped and the forceps left on for forty-eight hours.

In cases where gauze has been used, it should be removed gradually, a few inches at the end of twenty-four hours, and the last strand on the third or fourth day. Gauze impregnated with subnitrate or subgallate of bismuth is best suited for vaginal packing. When either gauze, or clamps, or both, have been left in the vagina, it is necessary to catheterise the patient every eight to twelve hours until the gauze or clamps are removed ; with this exception the patient should be encouraged to void urine naturally. The half-sitting posture is the most comfortable after vaginal hysterectomy, as it is after abdominal section, and there is nothing in the nature of the operations already described (pages 447, 475) to contra-indicate this posture.

When silk has been used for the broad ligament, and the stumps tied to the edges of the vagina, the long strands are knotted together on each side. These come away one by one, or *en masse*, by gentle traction at about the fourteenth day. If a ligature does not yield to traction, the vagina must be dilated, and the knot found and divided before the

patient is allowed to go home. One week after vaginal hysterectomy a douche under low pressure should be given daily, or more often if there is a purulent discharge. Chromic catgut ligatures, which are always cut short (see Fig. 275), come away with post-operative douching.

The patient is generally fit to leave her bed on the fifteenth day after vaginal hysterectomy. In cases of myomectomy for large submucous tumours it is often necessary to pack the uterus and vagina tightly with bismuth gauze. The vaginal gauze-pack lies entirely inside the vulva with a ligature attached, the end of which lies outside. The vaginal portion may be removed after twelve to eighteen hours. That in the uterus is removed gradually day by day, and five or six days may elapse before it is all removed. This will naturally depend upon the amount of gauze which has been used.

In very septic cases, as with a sloughing submucous myoma, repeated intrauterine douches of dilute peroxide of hydrogen will be necessary as soon as the gauze has been left in long enough to secure haemostasis. After myomectomy for large submucous myomas, 1 c.c. of infundibulin or $\frac{1}{50}$ grain of ergotin citrate or 20 minims of ernutin should be injected into the buttock, and an acid ergot mixture given during convalescence. In cases of colpotomy followed by myomectomy, where the vagina is subsequently closed, the case will resemble a laparotomy so far as after-treatment is concerned. When the posterior cul-de-sac has been left opened and drained, the drain, whether of gauze or of rubber, may be removed in forty-eight hours.

If the vaginal orifice is enlarged by episiotomy or if the whole passage has been divided by Schuchardt's incision, the catheter must be passed every eight to ten hours for the first four or five days, and the wound dressed twice daily with dry sterile gauze.

Minor operations for myoma, such as the removal of a polypus and curettage, require the removal of the gauze drain (if one be used) on the day after operation, and then a vaginal douche is given daily for four days, and the patient gets up at the end of a week. Ergot may be given for a fortnight, followed by iron and arsenic if indicated by the presence of anaemia.

CHAPTER III.

COMPLICATIONS FOLLOWING OPERATIONS FOR MYOMA

Shock and Haemorrhage.—The symptoms of these two conditions are very similar ; the distinction between them is a matter of the most vital importance, since the treatment indicated in shock is diametrically opposed to that of haemorrhage.

Shock.—Whilst the nature of this alarming complication is a matter of dispute, its causes, in the case of gynaecological work, are known to be (1) prolonged operation ; (2) severe haemorrhage ; (3) extensive trauma. In operations for uncomplicated myomas there is not the same risk from any of these factors as there is in performing the extended operation for cervical cancer ; but when a myomatous uterus is complicated by adhesions to bowel, by the presence of pus-sacs, or when the tumour has burrowed extensively, a total clearance of the pelvis may be as prolonged and as haemorrhagic an operation as any in surgery, and *trauma of the viscera* may be severe. Moreover, in myoma-cases which call for operation, the patients are frequently anaemic from menorrhagia, so that an important antecedent to shock may be present before the operation (see "The Heart in Cases of Myoma," pages 180, 181). Hence the treatment of shock begins by minimising the predisposing cause, *i.e.* raising the haemoglobin-content to a safe percentage prior to undertaking an

operation for the removal of the tumour. Prophylaxis during operation consists in exercising deliberate care in the ligation of vessels, making sure that the stump is cut long enough to spread out over the part constricted by the knot, and finally by covering the raw surface of all stumps by peritoneum. The process of nerve-blocking advocated by Crile (see page 476) is a very valuable aid in reducing the risk of shock. *Gentleness and care in the handling of viscera and peritoneum cannot be too forcibly insisted on.*

In an admirable article on the after-treatment of gynaecological operations, Franklin Martin¹ has tabulated the differential signs and symptoms of *shock* and *haemorrhage* as follows :—

SHOCK.	HAEMORRHAGE.
1. After prolonged operations, especially if loss of blood or much trauma.	1. Irrespective of length or character of operation.
2. More apt to occur in patients who have been acutely ill, or who are weak and exhausted.	2. Irrespective of previous condition of patient.
3. Signs date from operation, collapse coming on suddenly where general conditions and pulse have not been satisfactory.	3. Signs develop gradually some hours after operation, patient having recovered from anaesthetic.
4. Signs tend to get better.	4. Signs tend to get worse.
5. Patient is relaxed and apathetic, lying quietly on her back.	5. Patient is restless, tossing her head and arms, and is anxious and worried.
6. No abdominal pain : abdomen soft.	6. Abdominal pain may be severe ; abdomen tender and may be rigid.
7. Skin is blanched, cold, and clammy.	7. Skin is very pale, cold, and clammy.
8. Face is pallid and pinched.	8. Face is white and pinched.
9. Mucous membranes blanched.	9. Mucous membranes blanched.
10. Finger-nails bluish, and may be squeezed into a blush.	10. Finger-nails livid, and cannot be squeezed into a blush.
11. Eyes closed ; reflex absent.	11. Eyes staring and glassy : pupils dilated.
12. Recurrence of syncope seldom.	12. Recurrent attacks of syncope frequent.
13. Temperature low : may be subnormal.	13. Temperature usually subnormal.
14. Pulse small and weak, usually rapid, but artery is <i>full</i> .	14. Pulse weak and thready, nearly always rapid ; arterial cord not palpable.

¹ "The After-Treatment of Gynaecological Operations," *The New System of Gynaecology*, Eden and Lockyer, 1917.

SHOCK.

15. Respiration rapid and shallow.
16. No complaint of faintness.
17. No complaint of thirst.
18. Superficial veins full of blood (noted in transfusion).
19. Blood - finding negative ; haemoglobin not changed.
20. General stimulating treatment improves the pulse.

HAEMORRHAGE.

15. Respiration laboured, deep, and gasping.
16. Faintness and ringing in the ears.
17. Thirst.
18. Superficial veins collapsed.
19. Moderate leucocytosis, with sudden decrease in percentage of haemoglobin and in number of red cells. Increased coagulability of blood.
20. General stimulating treatment alone of no avail, and may increase haemorrhage.

As Franklin Martin says, no greater error could be made than to treat active haemorrhage as for shock ; therefore the differentiation of the two conditions, which diverge so widely in their physiology, is most important.

Treatment of Shock.—The first indications are to keep the patient warm, to stimulate the heart, and to supply fluid to the circulation.

The patient must be wrapped in hot blankets, outside which hot-water bottles are arranged around her body and lower limbs. The foot of the bed should be raised and no pillow allowed for the head. A pint of normal saline, to which 1 oz. of brandy has been added, is given *per rectum*, and $\frac{1}{60}$ grain of strychnine administered hypodermically. The latter may be repeated in an hour. Franklin Martin also advises that nitroglycerin (gr. $\frac{1}{100}$) and atropin (gr. $\frac{1}{150}$) be injected every four hours. In the more severe cases continuous administration of saline solution, either into the cellular tissues or *per rectum*, should be adopted, and oxygen is useful, especially for syncopal attacks. As an alternative to intracellular infusion, the saline solution may be run into the median basilic vein. Some surgeons recommend the use of adrenalin, 1 c.c. to 1 pint of saline, but it is not clear whether this drug adds any real benefit to the effect of the saline solution. Infundibulin is likewise thought of highly, but Franklin Martin criticises the use of both adrenalin and

infundibulin, saying that "the increased resistance of vaso-constrictors such as adrenalin and pituitarin [infundibulin] might be positively dangerous to the heart in shock." For much the same reason he condemns digitalin.

Until such time as food can be given by the mouth, rectal injections containing coffee and beef-tea should be given. As signs of recovery become manifest, liquid food in concentrated form is given in frequent small quantities, and the foot of the bed is gradually lowered. Recovery is generally speedy once the condition has passed off.

Treatment of Haemorrhage.—The treatment of post-operative bleeding is summed up in few words. The bleeding point must be found and tied without delay. This involves an anaesthetic and reopening the wound (if abdominal section has been performed). Chloroform should not be given; the general anaesthesia should be as slight in degree as is compatible with efficient work, and may be lessened in amount by the administration of morphine subcutaneously.

If no bleeding point can be found, a displaced ligature must be sought, and whilst the abdomen is open the assistant should give an injection of saline into the median basilic vein and thus raise the blood-pressure. This will help to reveal the bleeding point, which may then be tied. As soon as the vessel or vessels have been ligated, the treatment is that for shock, and strychnine may be given at once whilst the patient is on the table. In the case of myomectomy or subtotal hysterectomy, where the vaginal vault has not been opened, the peritoneal space should be filled with saline solution and the abdomen closed. The method of dealing with haemorrhage after vaginal section has already been described (see page 510).

Peritonitis.—This complication may be either *diffuse* or *localised* in its extent. Diffuse peritonitis is the result of the entrance of pyogenic organisms into the wound-area. The commonest organisms found responsible for the production

of peritonitis are streptococci, staphylococci, and the *bacillus coli communis*. The causes which lead to infection are (1) imperfect asepsis ; (2) oozing and the presence of haematoma ; (3) leaving badly injured tissues uncovered, thus allowing of intestinal adhesions and invasion by the colon bacillus.

In a 'clean' uncomplicated hysterectomy for myoma diffuse peritonitis ought to be unknown ; but in the case of extensive bowel-adhesions, pyosalpinx, and ovarian abscess, the risks of this complication are often great.

Symptoms.—During the second or third day the usual post-operative rise of temperature advances to 103° F. or 104° F., and the frequency of the pulse reaches 120 or even higher. The character of the pulse changes rapidly : it becomes small, weak, thready, and even imperceptible. The anaesthetic sickness merges into a more aggravated form of vomiting, which is at first green and then dark brown or even black. Abdominal pain may be intense. The abdomen becomes distended, tympanitic, and rigid ; it does not move with respiration ; the breathing becomes rapid and entirely thoracic. The bowels become paralysed, not even flatus escapes *per rectum*, and enemata are returned 'clear.' The patient is restless and unable to sleep ; finally, the temperature continues to rise, the skin becomes cold and clammy, the face takes on the Hippocratic expression, the vomit becomes faecal ; delirium, coma, and death end the scene.¹

Septic Peritonitis is the name given to a virulent streptococcal infection in which grave symptoms are marked from the first. There is evidence of a lowered resistance from the time the patient is put to bed after the operation, so that this condition requires to be differentiated from haemorrhage and shock. The patient is desperately ill, all the signs of collapse are present—the pulse is very rapid

¹ It cannot be too forcibly emphasised that in general peritonitis all the classical symptoms may be absent. Usually when these are established the time for active interference is past.

and feeble—the temperature subnormal, the abdomen is hard and not distended, and there is no leucocytosis. *Septic peritonitis* is rapidly fatal. Treatment is of no avail for this acute form of toxæmia.

Treatment of Peritonitis.—The treatment of *diffuse suppurative peritonitis* to be of any avail must be prompt, which means that the condition must be recognised early. The cases which recover are those which have been treated early. The lower end of the abdominal wound should be reopened under light ether-anaesthesia, and a large rubber drain inserted into the pelvis. Other drains may be used through incisions in the iliac and lumbar regions or through the pouch of Douglas. Irrigation is contra-indicated. The patient is then kept in Fowler's position and proctoclysis employed through a bent rectal tube. Pain should be relieved by injections of heroin. Eserin, infundibulin, strychnine, and brandy are all useful. Glucose should be added to the rectal saline if acidosis develops. Vaccines are disappointing, but if used they should be employed early by starting with polyvalent sera until such time as an auto-genous preparation can be made. The use of vaccines does no harm. Tepid sponging soothes the patient, and may help to influence a persistent high temperature.

Localised Peritonitis may result from a spread of inflammation from a suppurating abdominal or vaginal wound. It may follow the removal of suppurating foci such as pus-tubes. The symptoms appear later than those of the *diffuse* variety, and may be delayed until the end of the first week. They begin with a sudden rise of temperature accompanied by localised pain and tenderness. The graver symptoms of *diffuse* peritonitis are absent, the temperature is not so high, the frequency of the pulse is less, and in quality it is strong and full. Eventually, a swelling forms in the lower abdomen or deep in the pelvis, and the exudation will create dyschesia and colic; if it is

extensive, tympanites may be set up and the case will assume the features of partial obstruction. Such cases run a slow course, and lead to a localised abscess which, if not opened, may burst into the abdominal wound or open into the vagina, or even lead to general peritoneal infection.

The treatment consists in evacuating the pus and subsequent drainage, using a tube with a retention-flange (H. R. Spencer) if the drainage is to be through the pouch of Douglas.

Wound-Complications.—*Haematoma.*—One criticism of the subcuticular mode of closure of an abdominal wound which I have described is that accumulations of blood and serum may collect in the fatty tissues if haemostasis of vessels (notably those just above the pubes) is not carefully carried out; this objection also holds good against the use of collodion as a dressing. Large haematomas may form in this way, and cause much pain and a rise of temperature; suppuration of the haematoma may occur, and the whole wound become infected. If a haematoma forms, a small opening must be made by severing a few of the subcuticular stitches, the blood expressed by lateral pressure, and a gauze wick inserted. The wound will then need a daily dressing.

Stitch-abscess.—This as a rule causes no general reaction, and is discovered when removing the first dressing. If an entire strand of the ligature has become infected, the symptoms produced are generally severe enough to call attention to the wound. If early attention is not paid to an infected ligature, the wound will break down along its whole length. The treatment therefore consists in examining the wound as soon as local symptoms develop, removing the infected ligature, and inserting a drain, which will need subsequent daily attention.

General Suppuration.—When more than one layer of stitches are infected, or where local suppuration has been neglected, the whole wound may be laid open down to the

peritoneal layer, and the pus may spread wide of the wound in the subcutaneous tissues above the muscle-planes. Sometimes the wound may be secondarily involved by suppuration tracking up from an infected stump in the pelvis, in which case there will be cellulitic induration and dusky discoloration of the suprapubic skin. Deep pus may in this way undermine the healed skin, and travel up between the layers as high as the umbilicus before finding a point of egress. In operating on myoma, such cases are only to be seen when pus existed prior to operation. The treatment consists in laying the wound freely open, cleansing the tissues with peroxide of hydrogen solution or eusol, and approximating the gaping edges with strapping to which tapes are applied, which are tied across the middle line. When the wound is clean and has begun to granulate, the edges must be undermined, freshened with a scalpel, the granulations scraped, and the tissues sutured with interrupted salmon-gut sutures. This is the only way to obtain a reliable scar.

Stitch-sinuses may arise from buried sutures, when non-absorbable material such as thread or silk is used. They may occur as late as a year or more after operation. The offending suture will generally work its way to the surface so as to be seen or felt; it should then be caught up in a crochet-hook and removed. Sometimes it is necessary to cut down and remove the stitch. In this case, if the ligature happens to be a deep one attached to the broad ligament, the operation is difficult and involves some risk.

Bursting of the Wound.—This accident is less common than formerly, when it was the universal custom to stitch up with interrupted through-and-through sutures. It may result from post-operative bronchitis, with its associated cough. It may also be produced by excessive vomiting, and is predisposed to by weakness of the abdominal wall. The opening may be complete or partial, *i.e.* there may be a

covering of skin over the protruding bowel, or the latter may be shot out into the dressing by a fit of coughing. The accompanying symptoms are local pain and a varying degree of collapse, with an increased pulse-rate. The treatment consists in cleansing the exposed coils of bowel with warm saline solution, returning them to the abdomen, and reclosing the wound by layers of sutures without irrigation or drainage.

Faecal Fistula.—After hysterectomy for myoma, faecal fistulae occur where there have been dense adhesions to a necrotic or suppurating tumour, or where the adherent intestine has actually become necrosed itself, or where pus-tubes have adhered to the bowel and have been separated therefrom during the operation.

The majority of faecal fistulae occur in the large intestine, and in many cases they open into the vagina. More rarely the small intestine is involved, and the fistula opens through the abdominal wound, leading to excoriation of skin and delaying spontaneous closure. Fortunately, the majority of faecal fistulae tend to close spontaneously. For the treatment of a permanent fistula, see page 550.

Intestinal Obstruction.—*Organic obstruction* may follow a difficult hysterectomy for myoma, *i.e.* where the operation is complicated by adherent tubo-ovarian masses, pyosalpinx, and adhesions to bowel. In such cases injury to rectum, sigmoid, and coils of small intestine may occur; denuded areas of bowel may be overlooked, and by becoming adherent to another coil, or to any proximate structure, lead to kinking of the lumen. Even with the bowel intact it is possible for mechanical obstruction to occur in cases where raw surfaces are left exposed, either from omission to cover stumps with peritoneum, or from extensive denudation of peritoneum in the freeing of pre-operative adhesions. Thus the pouch of Douglas may be found to be rough and ragged after the separation of pyosalpinges, and here a pendulous coil of ileum

or the sigmoid flexure may become densely fixed and lead to organic obstruction. I have known complete obstruction produced by a coil of small intestine adhering to the cervical stump after supravaginal amputation, from which it would appear that inefficient haemostasis may be a sufficient cause to produce this dangerous complication. In this particular instance the obstruction occurred some weeks after the patient had returned to her home in the country, and after an uneventful and afebrile convalescence in hospital. The symptoms were successfully relieved by her general practitioner, who opened the abdomen and found the condition above described. It is quite certain that a sero-fibrinous exudate from a raw surface is the commonest cause of mechanical obstruction following gynaecological operations. Even when actual obstruction does not occur, a serous exudate will cause filmy adhesions, which become a source of colicky pains and constipation. Later on, bands may form and lead to strangulation long after the date of the operation which must be held responsible for their causation.

A raw surface may produce obstruction soon after an operation; for at this time the bowel is apt to be over-distended by flatus, and peristalsis may cause a kink which becomes speedily fixed by the exudation.

The fixation of a portion of bowel in a kinked position brings about a stoppage of the onward movement of its contents; this is followed by paresis of the muscular coats, leading to distension above the block. The muscular stasis may be favoured by the action of ptomaines, which accumulate in the arrested contents. It thus happens that the *mechanical* or organic factor is succeeded by the *pathological* factor, paralysis. Mechanical obstruction may be associated with general peritonitis from the first; it will certainly lead to this condition if not relieved. In cases where the two conditions are primarily associated, the diagnosis is difficult

and the prognosis extremely grave, the obstruction having more to do with a fatal issue than the peritonitis.

Paralytic obstruction or paralytic ileus is a rare condition. It may be associated with paresis of the stomach, a condition to which further reference will be made. It must be sharply differentiated from the ultimate paresis seen in mechanical obstruction and in diffuse peritonitis. *Ileus paralyticus* occurs quite independently of either of the above complications. It is seen after abdomino-pelvic operations which have been prolonged by extensive manipulation, and in subjects who are badly nourished and asthenic. The bowel passes into a condition of true stasis in which it refuses to respond to the ordinary stimuli which are customarily used, after an operation, to set up peristalsis. It may be that in an asthenic subject there are bacteria in the upper alimentary tract in a state of increased virulence which brings about a paretic condition by toxic means; it may be that prolonged exposure and trauma may fully account for the paralysis of the bowel. One thing is certain: it can undoubtedly occur without any apparent injury to the blood-supply in the mesentery of the bowel. Whatever its cause, the condition which obtains is that a segment of the bowel will be found to be collapsed, with the coils above it much distended. If not treated the end is fatal, death being said to be due not to toxæmia but to cerebral circulatory disturbance, caused by the depletion of the fluids in the circulation, which is brought about by non-absorption, or diminished absorption, from the bowel.

Signs and Symptoms of Obstruction.—During the first two days the patient may seem to be doing well, the anaesthetic vomiting may have ceased, or it may never entirely pass off. In either case the emesis increases, being worse on the third or fourth day than it was before. The bowels are constipated, but occasionally there is diarrhoea at first and the abdomen becomes distended. Then follows an

increase in the frequency of the pulse, and the temperature may rise slightly. *The rise in pulse follows the vomiting ; it does not precede it as in peritonitis.* At first a small amount of flatus and even faeces may be passed, but as the symptoms increase in severity nothing escapes *per anum*. Intermittent colic is severe. These symptoms supervene any time between the second and the seventh day, or they may be delayed for several weeks, as in the case to which I have referred. The vomit wells up spontaneously and more or less constantly, the amount ejected being out of all proportion to the ingesta. The abdominal distension is a gradually increasing condition, and if watched from the onset may reveal the site of obstruction ; thus, if most apparent in the left iliac region, it points to obstruction in the sigmoid. Dilated coils may be seen in thin subjects. The abdomen becomes rigid and tympanitic, but there is no marked tenderness in the absence of peritonitis. In *ileus paralyticus* there is no sickness at first, but in all other respects the emesis is similar to that above described. The vomit in both forms of obstruction is at first green, then dark brown, and, finally, faecal. In the paralytic form the temperature does not rise as it does in mechanical obstruction, in fact it tends to become subnormal.

Diagnosis.—The three acute complications which may come on in the first week after abdominal section, viz. organic obstruction, paralytic ileus, and peritonitis, are difficult to differentiate. As an aid thereto Franklin Martin¹ has drawn up a most useful table, showing the points of contrast and resemblance of these conditions. This diagnostic table is here quoted in full :—

ORGANIC OBSTRUCTION.	PARALYTIC ILEUS.	PERITONITIS.
Vomiting spontaneous, early, persistent. Large amounts. Eventually faecal.	Vomiting later, then copious and persistent ; eventually faecal.	Vomiting intermittent ; may be prolonged. Worse after taking food.

¹ *Loc. supra cit.*

ORGANIC OBSTRUCTION.	PARALYTIC ILEUS.	PERITONITIS.
Colon tube may be passed but a short distance. Enema not retained, and no flatus after obstruction is permanent. Constipation the rule. Intermittent discharge of mucus.	No spontaneous stools but flatus obtained with colon tube. No obstruction to tube. Enema retained. Constipation the rule.	Little or no flatus, but colon tube passes readily and enemata retained and returned with faecal material. Constipation absolute.
Distension early and constant, gradually increasing. Most marked in left region, with dysperistalsis. May become extreme. Intestinal coils may be seen; some rigidity.	Distension later, general, constant, aperistalsis. May be extreme. Intestinal coils may be seen; no rigidity.	Distension general from the first; no peristalsis felt or heard. Never so extreme. Rigidity marked. No abdominal respiratory movement.
Tympany pronounced.	Tympany pronounced.	Tympany moderate.
Tenderness little or moderate.	No tenderness.	Tenderness always marked.
Pain in paroxysms of colic, severe.	No pain, but sense of fullness.	Pain intense, both constant and colicky.
Pulse rapid early, and remains high, 100 to 140; weak and feeble later.	Pulse rapid later, but remains up, and soon weak and feeble.	Pulse rapid, but in proportion to temperature thin and thready.
Temperature not high, rarely over 101° F. Subnormal with collapse.	Temperature normal, later subnormal.	Temperature high at once and fluctuant in sepsis.
Leucocytosis 20,000 at first. Later a drop to 10,000 may indicate gangrene.	Leucocytosis 12,000 to 15,000. Decrease with collapse.	Leucocytosis high from the start; polynuclear percentage raised.
Aspect of acute distress during paroxysm, relief after.	Distress only in proportion to amount of distension.	Aspect of constant agony. ¹

Prognosis.—Where the symptoms come on during the first week and treatment is delayed by obscure diagnosis the result may be fatal. When clear signs of obstruction supervene later and the treatment is immediate the outlook is good.

Treatment.—This is symptomatic until such time as the diagnosis of probable obstruction is made, *i.e.* efforts are directed to the control of sickness and to stimulate intestinal peristalsis. Eserin, infundibulin, digitalin, strychnine may all be used subcutaneously. Enemata containing soap, turpentine, glycerine, castor-oil and magnesium sulphate,

¹ See footnote on page 517.

should be persevered with. Saline solution and nutritives should also be given *per rectum*.

Obstruction.—When obstruction is diagnosed the abdomen must be opened and coil after coil followed up, commencing at the ileo-caecal junction, until the constriction is found and liberated. If serious lesions exist, and there is a good deal of localised peritonitis, it is best to establish an artificial anus rather than subject the patient to a prolonged operation (see page 540).

Paresis.—In the case of *ileus paralyticus* in which drug treatment has failed, the abdomen should be opened above and to the left of the umbilicus, and the first coil of jejunum picked up and fixed by a couple of stitches to the abdominal incision. It is then opened, and its contents drained. No attempt should be made to explore the whole abdomen. Through the jejunostomy-wound a rubber tube is passed, and the fluid led away to a vessel under the bed. Saline is introduced through the tube from time to time. The tube should remain *in situ* for a fortnight, the time of its removal being determined by the patient's condition. Spontaneous closure is not to be expected, resection and lateral anastomosis must be done later. For the method of performing jejunostomy recommended by Moynihan, see page 541.

Acute Dilatation of the Stomach.—This serious complication, which is almost always fatal if not early recognised, may arise after abdominal section performed on an asthenic subject. As mentioned already, it may be found associated with paralytic ileus. As the result of paresis the stomach becomes distended and filled with enormous quantities of fluid or gas. It has been especially noted to occur in cases of general enteroptosis. The condition is characterised by sudden collapse, distended abdomen, rapid pulse, and subnormal temperature. The abdomen becomes very tense and tympanitic, but is not tender. Thirst is marked, the expression is pinched, the patient is restless.

Vomiting may or may not be present. Death is certain if relief is not afforded. This is obtained by turning the patient on her side or prone on the abdomen, so as to prevent congestion of the superior mesenteric artery and pressure on the duodenum, and also by the use of the stomach-tube and the administration of eserine salicylate. Nutrients and saline solution are given *per rectum*. The treatment by the stomach-tube must be repeated again and again until the stomach ceases to dilate and the abdominal distension subsides, after which feeding by the mouth may be gradually resumed. Only in the most severe cases are such procedures as gastrotomy and gastro-enterostomy to be considered.¹

Urinary Complications.—*Anuria*.—This may occur after a complicated hysterectomy, either from injury to both ureters or from a pre-existing nephritis becoming acute. If both ureters have been ligatured anuria will be complete. This happened in the case recorded on pages 124-125, Chapter VII. In this instance the right kidney was removed during the operation because its duct had been severed above the level of the pelvis. During the first seventeen hours there was absolute anuria. The bladder contained one ounce of blood, which was drawn off by catheter. The abdomen was reopened, the remaining (left) ureter was found to be cut close to the bladder; it was implanted in that viscus with success, and the patient was in good health when seen three years after the operation.

In cases of nephritis in which hysterectomy becomes imperative, the possibility of the renal shock or of the disease becoming acute is always present. As already stated in Chapter VII., damage to the kidneys from pressure on ureters is not a common complication of myoma, but that retroperitoneal growths *may* lead to such a condition the following case clearly proves.

¹ Ulcer of the pyloric end of the stomach as a complication of myoma of the uterus, for which hysterectomy and gastro-enterectomy was performed, is recorded by J. Garland Sherrill, *Louisville Monthly Jour. Med. and Surg.*, 1914, vol. xx, page 307.

B. T., aged 43, seen on July 1, 1905. Complaint, strangury and passage of blood in the urine. Married 5 years; no children; no miscarriage. Menstruation normal, leucorrhœa profuse, constipation. There had been difficulty with micturition for two months. The patient had been in bed for twelve days suffering from severe pain in the left iliac, lumbar, and loin regions. This was accompanied with vesical tenesmus and frequency of micturition. The urine was smoky from the presence of blood. On examination the left kidney was painful and tender; there was no tumour palpable *per abdomen*.

Per vaginam a hard mass continuous with the uterus occupied the posterior and left half of the pelvis. The cervix was drawn up into the expanded uterus; the external os was felt as a small dimple high up under the pubes. Diagnosis: burrowing myoma and compression of left ureter. The operation consisted in enucleating a large myomatous lobe from the left broad ligament, the removal of a pus-tube which was adherent to the rectum, and Kelly's supravaginal amputation of the uterus. The immediate after-treatment included saline *per rectum*, and wrapping the patient in blankets and applying hot-water bottles. The immediate symptoms were intense thirst and a dry mouth, a small pulse with a frequency of 104. Four ounces of blood-stained urine was voided naturally during the first 18 hours, and 12 ounces was the total output for 48 hours. A catheter-specimen taken later, contained a large amount of albumen, blood, and casts. Sickness was troublesome for three days, when it ceased after repeated rectal saline injections had been given. The amount of urine gradually increased; it contained blood for sixteen days after the operation. The total daily secretion after three weeks' convalescence varied between 36 and 48 ounces. The albuminuria did not clear up whilst the patient was under observation.

After any severe abdominal operation it is to be expected that the urine will be diminished in amount during the first twenty-four hours, subsequently the output should gradually increase up to normal. In cases of partial suppression, where the question of injury to the ureters may be excluded, the treatment consists in giving diaphoretics, diuretics, and in saline purgation. Subcutaneous injection of saline in large quantities is the best form of diuretic treatment. Franklin

Martin recommends the injection of pilocarpine gr. $\frac{1}{6}$, or spartein gr. $\frac{1}{6}$, to be given hypodermically every four hours; and if coma supervenes, venesection should be tried.

Incontinence of urine is rare after operations for myoma. If proper after-treatment is carried out, the dribbling incontinence from overflow is an impossibility. Incontinence after vaginal or abdominal total hysterectomy is commoner in cancer-cases; and in former times, when extensive cervical carcinomas were removed *per vaginam*, this complication was not infrequent. It results from injury to bladder or to ureter, and when these structures are damaged there is a continual risk of infection ascending to the kidney. A vesico-vaginal fistula entails the daily washing out of the bladder with a solution of boro-glyceride. Many such lesions heal spontaneously, and should therefore be given a good chance so to do. Intractable cases must be treated by a free separation of the bladder, freshening the edges of the fistula, and closing in layers. A ureteral fistula also tends to close spontaneously. When it does not do so, the cystoscope must be used to discover which duct is at fault, and an attempt made at implantation into the bladder (page 554). If this is impossible, the corresponding kidney must be removed.

In a case of adenomyoma of the recto-vaginal septum (Fig. 208, page 354) a ureteral fistula developed. Cystoscopic examination showed blue-coloured urine passing through the right ureter into the bladder, but none passed through the left ureteric aperture. I cut down in the left loin and tied the left ureter, urine escaped through the loin and later *per vaginam*, therefore the left kidney had to be removed. After this the patient's health was completely restored.

Cystitis.—This complication, as already seen, may be the result of catheterisation. A *bacillus coli* infection may follow from secondary pelvic suppuration after the removal of suppurating appendages during hysterectomy. It is prone to follow lesions of the bladder itself.

The treatment consists in washing out the bladder once or twice daily with boric acid or boro-glyceride solution, and in giving a mixture containing 15 grains of acid phosphate of soda followed an hour later by 10 grains of hexamine.

Retention is common after gynaecological operations; the dorsal decubitus and nervousness render some patients unable to void their urine. Packing of the vagina after vaginal section acts mechanically in this way. When other means fail the catheter must be passed.¹

Secondary Parotitis is now a very uncommon complication. Thirty-one years ago (1887) Stephen Paget collected 101 cases, and his analysis of the operations in which this complication arose are quoted by Moynihan as follows:

“Ten cases of parotitis arose after disease or injury of the urinary tract.

“Eighteen cases of parotitis arose after disease or injury of the alimentary canal.

“Twenty-three cases of parotitis arose after disease or injury of the abdominal wall, peritoneum, or cellular tissue.

“Fifty cases of parotitis arose after disease or temporary derangement of the generative organs.”

Moynihan attributes the preponderance of parotitis following upon gynaecological operations to two facts: (1) that at the above date records of abdominal surgery were confined to the pelvic organs to a great extent, and (2) to the starvation of the patient, which was the vogue in the immediate after-treatment of laparotomy-cases.

Parotitis following operation appears usually at the end of the first week. Both glands may be affected, first one and then the other being involved in about one-third of the cases. The condition differs from mumps in being non-infective or non-contagious and in its liability to end in suppuration. It also differs from parotitis of pyaemic

¹ Intra-abdominal rupture of the bladder in a case of uterine myoma is recorded by N. Bogoras (*Zeitschr. f. Geb.*, 1914, Bd. xxix. S. 225-230).

origin, in which cases the metastases in the parotid have only developed at a late stage of the disease ; and, moreover, the microscopic findings are different, as pointed out by Bucknall, who found that in secondary parotitis the process of inflammation begins around the ducts in the centre of the lobules (duct-infection), whereas in pyaemic parotitis it begins around the arteries which run in the perilobular tissue, *i.e.* in the former the ducts are blocked with débris and surrounded by a zone of inflammatory reaction, but the vessels are normal ; in the latter the ducts are normal and a certain vessel or vessels thrombosed.

From a careful research Bucknall concluded that secondary parotitis is an ascending infection of the ducts—a conclusion which was supported by the finding of microorganisms in the ducts themselves ; and these organisms were frequently quite different from those of the primary disease. From the above it will be seen that a mouth-infection is to be regarded as the cause of secondary parotitis, and this points to the need for early treatment by fluids, to prevent a dry mouth after operations upon the abdomen. The swollen gland should be fomented and a sedative given for pain. Incision is necessary if suppuration occurs.

Cardiac Failure.—In elderly hospital patients, the subjects of prolonged ill-health, fatty degeneration of the heart is common, and under the strain of a severe operation the heart may become acutely dilated. Strychnine and alcohol are the two drugs most likely to be of service, but the condition is a very grave one.

Pulmonary Complications.—*Bronchitis* and *Bronchopneumonia*.—These troubles are attributable to the anaesthetic. In varying degree they are not uncommon after prolonged anaesthesia.

The patient should be placed in the Fowler position ; the chest enveloped in a jacket of gamgee tissue, and a steam-tent should be arranged around the bed. Stimu-

lant expectorants should be given and pleural effusions aspirated.¹

Thrombophlebitis.—It is estimated that thrombosis occurs as a complication in about 2 per cent of all abdomino-pelvic operations. It is usually preceded by phlebitis, but in rare instances it may arise as a primary condition consequent on a retardation of the blood-current and impoverished blood in cases of cardiac debility and anaemia. In most instances it is safe to assume that phlebitis is the primary lesion, and that thrombosis is secondary thereto. Sepsis must be regarded as the cause of phlebitis. Moynihan sums up the factors concerned by stating that “stasis and sepsis” are the probable causes of thrombophlebitis, but he adds that “the etiology is still as obscure as it was twenty years ago.” In spite of this confession I take the liberty of quoting Moynihan’s own account of the processes concerned, and the causes which lead up to them. He says: “A thrombophlebitis is dependent upon the quantity and quality of the circulating blood and the condition of the vascular endothelium. For coagulation to take place there must be fibrinogen and fibrin ferment. Fibrin ferment does not exist normally in the circulating blood as such, but results from a combination of thrombogen and thrombokinase in the presence of calcium salts. Thrombokinase is probably produced from the breaking down of the blood-platelets or of the white blood-corpuscles. Under normal circumstances the vascular endothelium appears to be able to deal with small quantities of thrombokinase, but its ability to do so is diminished by injury to or inflammation of the blood-vessels, retardation of the blood-current, sepsis, increase of CO₂ in the blood, by general conditions, such as chlorosis and the other anaemias where vascular nutrition is poor, and by the specific fevers.”²

¹ For Pulmonary Embolism see page 534.

² *Abdominal Operations*, 1915, vol. i. page 97.

The veins most frequently affected are the saphenous and femoral of the left side. As a post-operative complication it is far more common after procedures in the strictly gynaecological area than after surgical manipulations in the upper abdomen. In Cordier's list of 232 cases quoted by Moynihan, "hysterectomy for fibroids, so-called aseptic cases," accounted for 69, *i.e.* about 30 per cent. Against this my own small experience, which is limited to 270 major operations for myoma, shows three cases of thrombophlebitis, *i.e.* 1.1 per cent. In one the myoma was complicated with necrotic ovarian cysts, which were densely adherent to the floor of the pelvis, where ragged fragments of the cyst-wall were left, and drainage was established through the pouch of Douglas. The case had been treated by X-rays over a period of five years, and the myoma had shrunk to small dimensions. In this instance both legs were involved. In the other two cases there were no adnexal complications, nor was there evidence of local sepsis. If therefore the relative frequency of thrombophlebitis after hysterectomy for myoma is 30 per cent (Cordier) and the absolute frequency after the same operation is 1.1 per cent (as in my own series), the total absolute frequency after abdominal operations in general must be very small, *i.e.* about .7 per cent. I have no means of testing the absolute frequency of thrombophlebitis in abdominal operations generally, but judging from experience gained from my own work and that of my colleagues whom I have assisted for the past sixteen years, I should conclude that it is a rare complication of hysterectomy for myoma. It occurs in the second or third week of convalescence following hysterectomy complicated by severe inflammatory lesions of the adnexa. The left leg is usually affected, but both may be involved.

The symptoms are severe pain along the line of the affected vessel, high temperature, and rapid pulse. The

vein most usually inflamed is the femoral, and the corresponding thigh and leg becomes swollen, hard, and shiny. The swelling may last for weeks or even months, and resembles the white leg of the puerperium. The treatment consists in the elevation of the leg on a patella-board and applying cotton wool and a firm bandage. The pain is treated with aspirin, heroin, or morphine. The diet must be light and the bowels carefully regulated.

The risk is embolism, therefore massage is contra-indicated until at least a month after all swelling has subsided. A supporting bandage must be worn for many months after the patient has begun to get about.

Pulmonary Embolism.—This is the most tragic of all post-operative complications. L. B. Wilson's record of all the cases of fatal post-operative embolism occurring in the Rochester (Mayo's) Clinic, U.S.A., during twelve years, contains 47 cases in a series of 63,573 major operations. Of these, 36 were cases of pulmonary embolism. The total mortality in the above series was 864. Therefore embolism accounted for 5.44 per cent of the total mortality, and the absolute mortality from embolism was therefore 0.073 per cent. The number of operations on the uterus, tubes, and ovaries amounted to 7993, among which there were ten deaths from embolism, *i.e.* a percentage mortality of 0.13 (nearly), figures which show that pulmonary embolism is commoner after operations in the gynaecological area than after those performed by the same surgeons in other parts of the body. Bland-Sutton,¹ quoting from Klein's statistics, points out that pulmonary embolism occurs very frequently as a sequel of abdominal hysterectomy, but it rarely happens after vaginal hysterectomy. Klein recorded nine fatal cases in 1720 abdominal sections, whilst in 1992 vaginal operations there was no instance of fatal embolism.

Further statistics by Bland-Sutton are as follows :

¹ Sir John Bland-Sutton, *Fibroids of the Uterus*, 1913, chap. xxiv. page 222.

In the Gynecean Hospital, Philadelphia, Balding found that among 366 operations for myoma there were thirteen sudden deaths attributed to embolism. In the Middlesex Hospital, between 1896 and 1906 inclusive, there were performed 212 abdominal hysterectomies for myoma; three patients died from pulmonary embolism. Among 1500 abdominal operations for myoma the above author lost three patients from pulmonary embolism, and he goes on to say that he estimates its occurrence in at least 1 per cent of the patients who have abdominal hysterectomy performed for myoma. This is the same percentage as shown by Petren's figures, quoted by Franklin Martin (*l.s.c.*), in half of which the thrombus first developed in an iliac or hypogastric vein, and generally on the left side.

According to Bland-Sutton, pulmonary embolism may occur as a sequel to hysterectomy at any time from the hour of the operation onward to the thirteenth day. Franklin Martin states that in two-thirds of the 439 fatal cases collected by Petren, death occurred between the fourth and fourteenth days.

Causation.—Bland-Sutton considers that the chief cause is sepsis, and most surgeons will agree with him. The embolism may be regarded as secondary to a septic thrombosis, which is so slight as to allow of a loose attachment of the clot to an area of subacute phlebitis. Contributing causes are no doubt found in anaemia and weak heart-action where there is a marked slowing of the bloodstream, whilst the immediate causation is frequently a sudden movement, such as sitting up in bed or coughing.

Symptoms.—Following immediately on some physical effort on the part of the patient there are urgent dyspnoea and great pain in the chest. In spite of the absence of physical signs in the chest the respirations are gasping, the face becomes cyanotic, and a cold clammy sweat appears

on the forehead. The pulse is very feeble and uncountable, but the heart can be observed to beat after the respirations have ceased.

Death may follow in a few minutes, or it may be delayed for several hours. Recovery may occur, when the temperature will rise to 102° F. or higher, and the sputum will be rusty; whilst the physical signs will be those of pleuro-pneumonia. Where the emboli have been examined they have been found to be sterile.

Prophylaxis includes raising the erythrocyte-count and haemoglobin-percentage prior to operation, by rest in bed and suitable medicines; also by care in avoiding undue loss of blood during operation, and, of course, by rigid asepsis.

Treatment.—For a severe attack no treatment is of any avail. Oxygen and artificial respiration are indicated as long as the heart beats. For a slight attack a subcutaneous injection of ether may be given, also brandy by the mouth.

Trendelenberg advised and has practised the operative removal of the clot, but without success. In the majority of cases there is no time available for surgical aid.

CHAPTER IV

OPERATIONS ON THE BOWEL AND URETER IN CERTAIN CASES OF MYOMA

Adherent Intestines.—Slight velamentous adhesions uniting coils of small bowel or rectum to the uterus, or to a myoma, can easily be severed by scissors. When the intervening space is too narrow to allow of snipping with safety, it may be widened by making gentle traction on the bowel, being careful, whilst cutting, to direct the points of the scissors towards the uterus and away from the intestine.



FIG. 293.—Showing intestine adherent to a myoma. (After Kelly and Cullen.)
A, intestine ; *M*, myoma ; *a-b*, line of adhesion ; *B* shows the method of closing the site of adhesions.

With dense fibrous adhesions, involving wide areas, it is best to dissect a superficial layer of the tumour about a millimetre in thickness and leave it attached to the intact intestine (see Fig. 293). When large raw areas are left, Cullen advises that a short circuit be done and the raw areas turned in upon themselves as in Fig. 294.

Suture of the Intestine.—This is indicated (1) for the covering in of raw areas ; (2) for the closure of lacerations involving all the coats of the bowel ; and (3) for fistulae.

Straight or curved needles, which must be rounded, *i.e.* without cutting edges, are to be used. Thin needles with a slot leading to the eye are the most convenient. The only objection to these round needles is that no holder has as yet been invented which will keep them steady whilst the sutures are being passed. Whilst suturing in difficult situations, therefore, such as low down in the

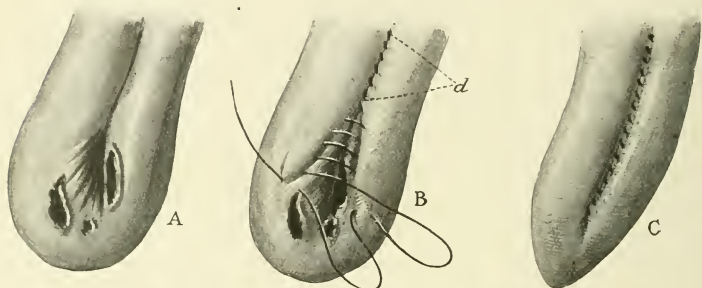


FIG. 294. (After Kelly and Cullen.)

A, coil of small intestine showing sites of injury ; *B*, method of closing injured areas ; *d*, site of short circuit ; *C*, short circuit and closure of wounds completed.

rectum, it is better to use a fine Bonney's needle, because the flat surface allows of a firm grasp in the holder. As the rectal coats are thick, the fact that a fine, *flat* needle is used is of less importance than it is when suturing the thin coats of the small intestine.

In the passing of sutures, it is insufficient to pick up merely the serous and muscular coats ; the ligature must include a portion of the fibrous submucosa as well. This tough intestinal *skin* offers considerable resistance to a round needle, but it is possible easily to pick up a strand of this tissue without penetrating the mucosa. The mattress-suture is the best form to adopt for closure of a laceration ;

it enters and emerges on the serous surfaces external to the margin of the wound, and thus the edges of the bowel are turned in. Wherever possible, the bowel should be brought outside the abdominal wound and protected by gauze pads whilst an opening is being closed.

A rent involving only the muscular coat, may be closed by a simple continuous suture of catgut; here, of course, the submucosa need not be penetrated, the aim must be not to constrict the lumen of the gut.

A tiny button-hole may be closed by a purse-string suture.

After closure of lacerations situated low down in the rectum, it is a good plan to open the pouch of Douglas and drain for a few days *per vaginam*.

Enterotomy.—This operation may sometimes be necessary as a temporary measure in distension of the colon,

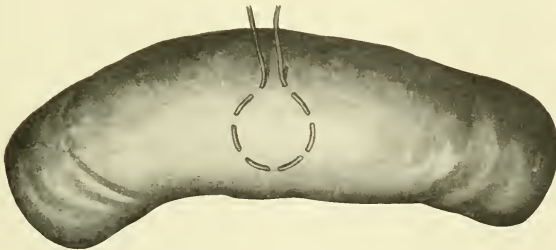


FIG. 295.—Enterotomy. Area of puncture surrounded by a purse-string suture. (After the late E. W. Scott Carmichael, *The New System of Gynaecology*, Eden and Lockyer, 1917.)

where the operator finds himself hampered for want of room. The distended coil is drawn out of the abdominal wound and isolated by gauze. A purse-string suture is passed into the anti-mesenteric border, and in the area mapped out by the suture (Fig. 295); a trochar and cannula are introduced and the gas allowed to escape. After the coil has collapsed, the purse-string is drawn tight whilst the cannula is being removed. The area is subsequently covered by a few Lembert's sutures.

In performing enterotomy on the small bowel, Moynihan's method is the best one to adopt. An opening is made on the anti-mesenteric aspect of the bowel, and a glass tube carrying a long rubber drain is inserted. The glass tube should be 6 inches in length, it should not be pushed up the bowel, but the latter must be *milked* gradually and cautiously along the tube (see Fig. 296). In this way about 8 or 10 feet of bowel can be drawn on to the tube and the contents emptied. The bowel may be washed out through the tube before the latter is withdrawn. Finally, after withdrawal of the tube, the bowel is closed by

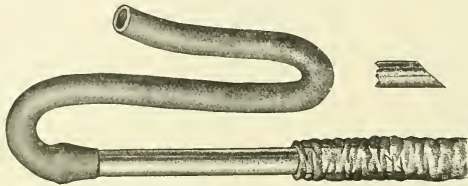


FIG. 296.—Enterotomy. Emptying contents of intestine. (After the late E. W. Scott Carmichael, *The New System of Gynaecology*, Eden and Lockyer, 1917.)

two rows of Lembert's sutures, cleansed with saline solution, and then replaced.

In cases of obstruction, or paresis, the most urgent indication is to rid the bowel of its contents, since they possess an exalted bacterial virulence; in referring to the above procedure, Moynihan says it removes, "at the expense of a trifling expenditure of time, that condition which makes most speedily for failure."

Enterostomy.—In some cases of obstruction, simple relief of the over-distension of the bowel is enough to cause a return to the normal. It thus happens that in acute ileus, enterostomy, and the insertion of a catheter or Paul's tube, may be attended with success. On page 527 it was pointed out that when enterostomy is performed for ileus the best plan is to open the jejunum. This can be done under

local anaesthesia. The technique of the operation as performed by Moynihan¹ is as follows :—

The abdomen is opened a little to the left of, and above, the umbilicus. A loop of jejunum is then drawn out of the abdomen, and an opening is made on its anti-mesenteric

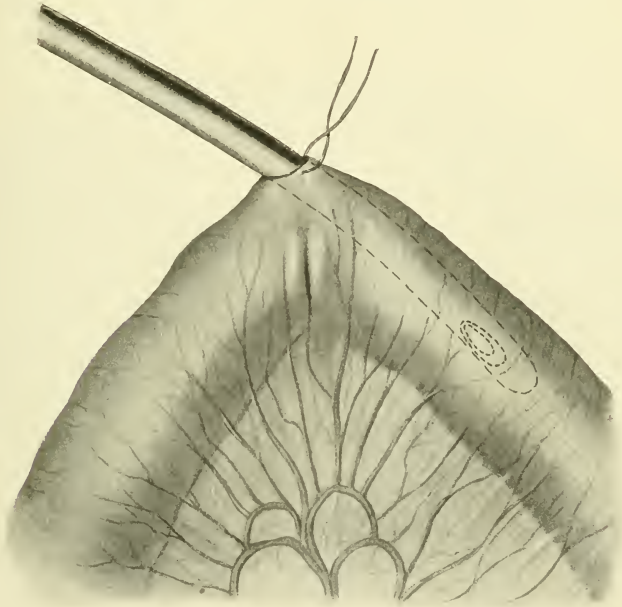


FIG. 297.—Enterostomy. Insertion and fixation in bowel of a No. 12 catheter. Moynihan and Mayo's method. (After the late E. W. Scott Carmichael, *The New System of Gynaecology*, Eden and Lockyer, 1917.)

aspect. A No. 12 catheter is introduced so as to project 3 to 4 inches into the bowel ; it is then fixed by a single catgut stitch, which includes the cut edge of the bowel and side of the tube (Fig. 297). The tube is then laid along the bowel in an upward direction (Fig. 298), and in this position it is fixed as follows : As the catheter lies in a

¹ *British Medical Journal*, June 1902, page 1599.

groove formed of the bowel-wall it is embedded therein by a continuous suture, which is started $\frac{3}{4}$ inch below the opening in the jejunum (Fig. 298), and which runs across the catheter and through the edges of the groove. When

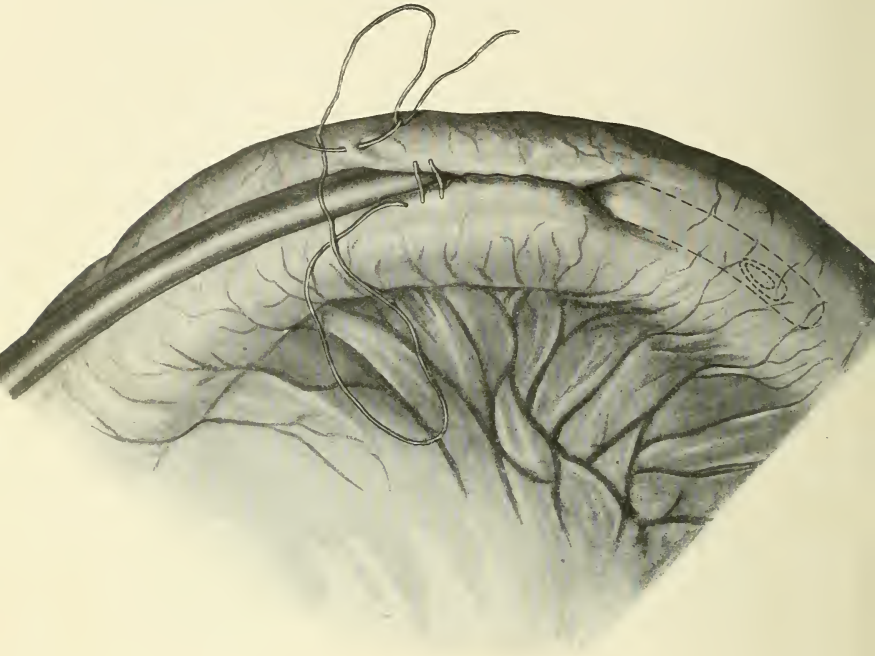


FIG. 298.—Enterostomy. Suturing bowel-wall over catheter. Moynihan and Mayo's method. (After the late E. W. Scott Carmichael, *The New System of Gynaecology*, Eden and Lockyer, 1917.)

the stitches are tightened the catheter lies buried in the bowel-wall. After about 2 inches of the catheter are thus hidden, the ligature is tied and cut short. The bare portion of the catheter is brought through the abdominal wall (Fig. 299), and before closure, the line of suture in the bowel is anchored to the parietes by a stitch at each extremity. Finally, the abdominal incision is tightly closed

around the tube, the latter projecting externally for about 10 inches. Through the tube the patient can be fed slowly from a funnel fixed on to its end. Moynihan recommends that only 6 ounces of fluid diet be given at first, but after

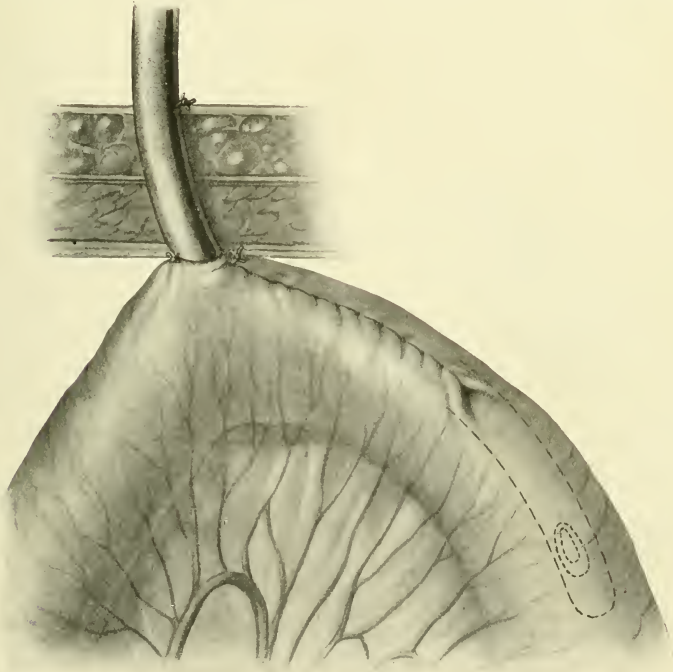


FIG. 299.—Enterostomy. Final stage. Moynihan and Mayo's method. (After the late E. W. Scott Carmichael, *The New System of Gynaecology*, Eden and Lockyer, 1917.)

a few days up to a pint may be given in the space of ten minutes.

To be successful, enterostomy must be performed early, before the bowel has become too distended. It rarely saves life after the fourth day.

Lateral Anastomosis.—This is but seldom indicated in operations for myoma, but when a suppurating myoma

communicates with the lumen of the bowel it may be necessary to resect the piece of intestine communicating with the myomatous abscess, and join up by an end-to-end anastomosis, or *preferably by closure of the ends and anastomosing laterally*. Kelly and Cullen record a case where the cavity of a suppurating myoma communicated with the lumen of the transverse colon. A resection was prevented by removing the uterus from below, beginning by coronal division of the cervix and working upwards until the tumour was attached only to the transverse colon by dense adhesions at its upper pole. The latter was then separated without injury and the fistulous opening closed by suture.

In a very similar case, where the small intestine was densely adherent to the body of the uterus, I found, on attempting to separate the bowel, that pus welled out from between the myoma and the intestine. This was mopped up and the area cleansed. I then adopted the above plan of commencing to remove the uterus from below, but instead of making a coronal section through the cervix, I amputated through the vagina. Finally, the entire uterus was freed from all structures save the adherent bowel, which in its turn was separated from below upwards. This was only possible by leaving a large mass of myomatous tissue on the bowel-wall. There was a large Meckel's diverticulum (see Fig. 300) running from the adherent coil to the floor of the pouch of Douglas, to which its blind end was firmly adherent. This vestigial relic, together with the coil of adherent ileum, was removed. The bowel was then united by lateral anastomosis after end-closure. The patient, a woman aged 49 years, made an uneventful recovery.

Resection of the Small Intestine.—In removing a segment of the bowel the aim of the surgeon is not to damage the vitality of the parts which are to be united subsequently; therefore the mesenteric attachment should not be

encroached upon more than is necessary. The resection must be made by oblique incision, so that more of the bowel is removed on its anti-mesenteric aspect than at the mesenteric border. The coil to be resected should be brought outside the abdominal wound and carefully packed

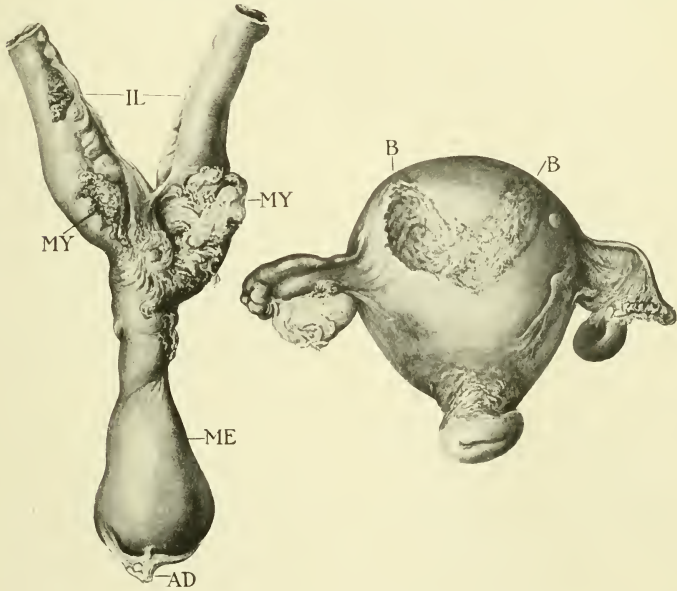


FIG. 300.—Enterectomy following hysterectomy for myoma.

IL = ileum ; *MY* = myomatous tissue adherent to bowel ; *ME* = Meckel's diverticulum ; *AD* = adhesion to pouch of Douglas ; *BB* = site of adhesion of bowel to uterus.

off. Two pairs of clamps are applied at each resection-site, and they are placed obliquely, so that their points are inclined to each other towards the root of the mesentery. As the mesenteric vessels are divided they are at once tied off. After the removal of a segment of bowel, the proximal cut-ends are closed by a catgut ligature tied in the compression-groove, made by clamping the bowel (Fig. 301, 1). This ligature is cut short, the stump invaginated and

buried by a purse-string suture (Fig. 301, 2). The end-closure is thus completed and lateral anastomosis is begun.

For this purpose the portions of bowel to be united are placed side by side and lie parallel (Fig. 301, 3). Two fixation sutures are placed $3\frac{1}{2}$ inches apart on the anti-mesenteric borders, and are held up by an assistant, so as to steady the line of union. The two pieces of gut are now united by continuous *sero-muscular* stitches, which begin close to one fixation stitch and end close to the other (see Fig. 301, 3). The ends of these sutures are left long. Parallel incisions are now made on either side of this suture-line for nearly its whole length (the opening should be nearly 3 inches in length, so as to allow of the possibility of contraction). *Through-and-through* sutures are next applied (see Fig. 301, 4), and carried all around the free edges, thus closing the lumen. The anastomosis is completed by continuing the sero-muscular suture (which was begun behind) over the anterior segment of the bowel (Fig. 301, 5 and 6). Thus the bowel-union consists of—(1) a buried continuous *through-and-through* suture, and (2) a superficial continuous *sero-muscular* suture. The object of making the anastomosis on the side of the bowel instead of end-to-end, is to keep the junction away from the dangerous mesenteric border and thus to avoid the risk of injury to vessels.

Accurate and efficient suturing is much more easy to carry out through the peritoneal coat than it is at the uncovered edge where fatty tissue and blood-vessels abound.

End-to-End Anastomosis.—The immediate functional results after end-to-end suture are better than after lateral anastomosis. Cannon has shown experimentally that there is delay in the passage of the contents through a lateral communication, but that this does not occur with end-to-end

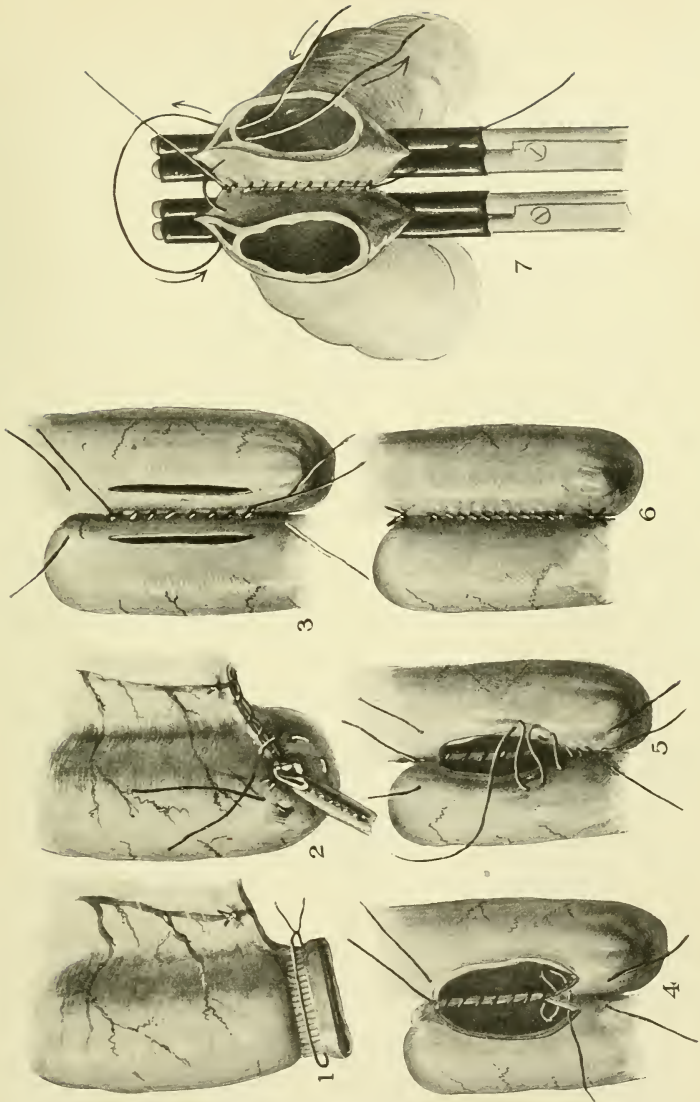


FIG. 301.—1-6. Lateral anastomosis. 7. End-to-end anastomosis

1. Suture of crushed end of bowel.
2. Invagination of tied cut-end.
3. Lateral communication begun.

4. The through-and-through stitch.
5. The sero-muscular stitch.
6. Lateral anastomosis complete.

7. End-to-end suture. The mesenteric stitch.

union. In the opinion of the late E. W. Scott Carmichael,¹ end-to-end anastomosis is to be preferred in cases of *chronic* obstruction, whilst lateral anastomosis is the operation of choice in cases of *acute* obstruction.

The Operation.—After the limits of the excision are determined, the area of the operation is isolated with swabs and rubber-sheeting. In the case of the small bowel it is possible to work outside the abdomen. Four pairs of clamps are necessary, two pairs being applied at each point of section. They are applied obliquely, so that their tips approach one another. The parts included in the clamps represent a Δ with the bowel as its base, and its apex directed towards the root of the mesentery; this arrangement assures an adequate vascular supply from the mesentery to the bowel. The bowel is divided between two pairs of clamps, and the cut surface is cleansed with saline and covered with gauze. With a fresh pair of scissors the mesentery is then divided, and as each vessel is cut it is picked up and tied. The portions of bowel to be united are now brought together by laying the clamps side by side and wrapping them round with gauze. All is now ready for the introduction of the sutures. These are of the same character as those used in effecting lateral anastomosis, *i.e.* they consist of an external *sero-muscular* and an internal or buried *through-and-through* layer, but inasmuch as the mesenteric folds open out and leave a triangular gap on reaching the intestine, this gap must first be closed before the through-and-through sutures are applied. This closure is effected by the *mesenteric stitch*, and its method of application is best understood by following the direction of the arrows in Fig. 301, 7. When passed as indicated, the stitch is tied with the knot lying in the lumen of the bowel.

After the insertion of the mesenteric stitch, the con-

¹ "Intestinal Complications in Gynaecological Surgery," *The New System of Gynaecology*, Eden and Lockyer, 1917.

tinuous suturing proceeds exactly in the same way as was described for lateral anastomosis. The final stage of the operation consists in the closure of aperture made in the mesentery.

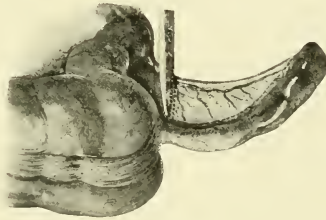


FIG. 302.—Appendectomy.

The base of the mesentery is clamped. The dotted line indicates the incision.

Appendectomy.—As in other pelvic operations, the gynaecologist may be called upon to remove a diseased or adherent appendix whilst operating for myoma. The



FIG. 303.—Appendectomy.

A=ligature applied to the crushed base of appendix; *B*=invagination of stump—a purse-string suture is seen ready for tying; *C*=purse-string suture tied over buried stump.

details of appendectomy must therefore be briefly described. The meso-appendix is exposed and displayed by clipping the mesentery near the tip of the appendix and holding it up with forceps. A clamp is then applied to the base of the

mesentery at the level of origin of the appendix from the bowel (see Fig. 302). The mesentery is then divided close to its attachment to the appendix, and bleeding points at once secured and tied. The base of the appendix is now crushed with stout forceps, and ligatured with catgut close to the caecal attachment (Fig. 303, A). A clamp is applied beyond the ligature, and the appendix removed by knife or cautery. The stump is painted with pure liquid carbolic acid, and is then invaginated and buried by a purse-string suture (Fig. 303, B). Finally, the mesentery is sewn over the position of the buried stump (Fig. 303, C).

In cases where the appendix is adherent to the right Fallopian tube or other structures in the pelvis, I have found it convenient first to amputate the appendix and bury the stump, leaving the appendix adherent to the structures which have to be removed from the pelvis. In such cases both of the cut-ends must be painted with liquid phenol and the amputated appendix wrapped round with gauze. When the appendix is densely adherent to bowel it may be amputated, then opened up, its mucosa scraped away, and its fibro-muscular shell left *in situ*.

Closure of Faecal Fistulae.—As previously stated (page 521), a faecal fistula tends to spontaneous cure, but when it persists for upwards of a year or more, it must be dealt with by surgical means. The bowel must be isolated by separating it from its attachment to the abdominal wall and to other structures. When this is done, the edges of the fistula are inverted into the lumen of the bowel by a purse-string suture over which a few covering sutures may be placed; very rarely is resection for a fistula necessary. Whether a drainage tube should be used or not, will depend upon the relative cleanliness of the case, and the depth of the fistulous tract.

Ureteral Injuries.—Surgical injuries to ureters rarely occur during operation for myoma or adenomyoma, nevertheless with burrowing tumours, and in cases where these tumours are complicated by extensive adnexal inflammation or adherent ovarian cysts, the ureter may be pulled up during dissection and enucleation, and may then be divided unwittingly even at a level above the pelvic brim.

If a ureter be separated from the posterior leaf of the broad ligament for a considerable distance, serious interference with its blood-supply results, leading to a risk of necrosis of its walls and the establishment of a ureteric fistula. Most operators have had experience of this kind in cases of cancer of the cervix, for which they have done an extensive pelvic dissection. In myoma-cases it is practically unknown, but with adenomyoma of the recto-vaginal septum it may occur (see page 353).

The method of dealing with a ureter divided during operation will depend upon the situation of the injury. If the duct is divided at the pelvic brim or in the posterior half of its pelvic course, the proximal end is too far away from the bladder for the question of implantation into that viscus to be entertained. It will be necessary either to (1) anastomose the upper into the lower cut-end; (2) tie both ends and trust to inhibition of the secretory function of the corresponding kidney; (3) remove the kidney.

Ureteral Anastomosis.—Howard Kelly speaks favourably of ureteric anastomosis under these conditions. He says it is the best plan of treatment when the ureteral walls are thick enough to allow of suturing without penetrating the mucosa, and when the ends can be brought together without tension. Kelly ties the upper end temporarily (Fig. 304), and makes a longitudinal slit a short distance from the divided ends, and through this introduces a bougie (Fig. 305). Over the tip of the bougie both cut-ends are passed whilst

the sutures are being laid. When the suturing is completed the bougie is removed, and the linear slit closed; finally the constricting ligature is cut away (see Fig. 304).

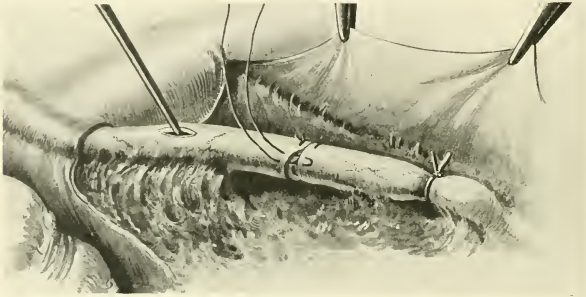


FIG. 304.—Ureteral anastomosis. (After Howard Kelly.)

Another method of uretero-ureteral anastomosis described, but not strongly recommended, by A. E. Giles¹ is as follows: The distal cut-end of the duct is enlarged by two short vertical incisions (see Fig. 306). The proximal end is now drawn through the lower end by means of a

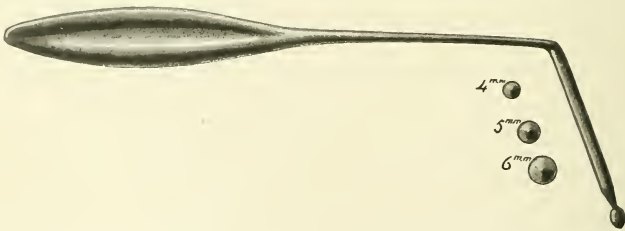


FIG. 305.—Kelly's bougie, used in ureteral anastomosis for steadying the cut-ends of the ureter whilst the sutures are being passed. (After Howard Kelly.)

traction-ligature as shown in Fig. 306, A. After the graft is fixed by a couple of stitches the traction-ligature is removed (see Fig. 306, B). Giles remarks on the

¹ *The New System of Gynaecology*, Eden and Lockyer, 1917, vol. ii. page 501.

difficulties of the technique and on the liability to stenosis, even supposing that the junction is perfect.

I have no personal experience of this operation, but have been agreeably surprised by the way a kidney will tolerate ligation of its excretory duct on the few occasions in which circumstances compelled me to resort to tying a ureter and leaving the kidney. Fig. 131, page 127, shows a ureter which was removed close to the pelvis of the right kidney; the isolated kidney has never given rise to trouble, and the patient is now in perfect health three years after the operation. This is only one of several instances that have come under my observation, which go to prove that ligation of both ends of a cut ureter may prove to be the wisest course to take in dealing with a grave surgical injury at the end of a long and exhausting operation.

Secondary ligation of a divided ureter, *i.e.* ligation of the duct through a wound in the loin some months after the establishment of a urinary fistula, appeared to me to be a logical corollary to success with *primary* ligation, *i.e.* the ligation of a ureter divided accidentally during operation. In the only case in which I put it to the test it was a failure, and the kidney had subsequently to be removed (see pages 354 and 529).

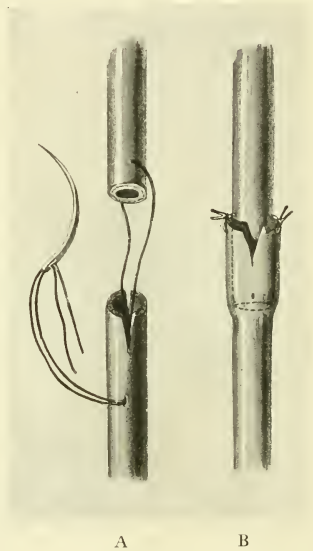


FIG. 306.—Uretero-ureteral anastomosis.
(After A. E. Giles.)

A—The lower end of the ureter has been split; a traction-ligature has been passed through the upper end and the ends passed down the lumen of the lower end and brought out through its wall. *B*—The upper cut-end has been drawn into the lower; the ligature has been removed, and the two portions of ureter fixed together with fine sutures.

If the ureter is divided near enough to the bladder to allow of its implantation without tension into that viscus, this can be done with a good chance of success, as I have been able to prove in two cases. The distal end is tied off; then two apertures are made in the bladder. Through the anterior one, long sinus-forceps are introduced, and their points are made to come out through the opening made for

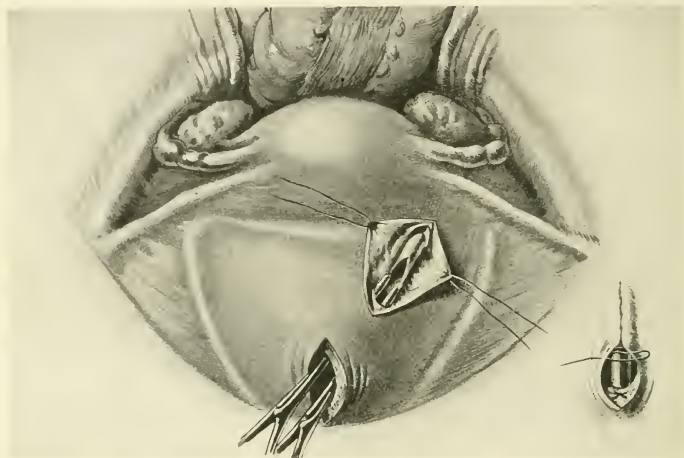


FIG. 307.—Implantation of ureter into bladder. (After Howard Kelly.)

The course taken by the duct to reach the bladder is not shown in the figure. The mode of implantation only is displayed.

the ureter. The duct is seized with the forceps and drawn through the bladder-wall (see Fig. 307). An assistant holds the forceps and steadies the ureter, whilst the sutures are being passed. These should include the fibro-muscular coats of the bladder and those of the ureter, but they should not pass through the mucosa of either structure. After a number of mattress-sutures have been applied, the small opening through which the ureter passes becomes tightly closed. A second layer of sutures may then be passed, uniting a further collar of bladder-wall to the ureter and thus

burying the first layer. Fibro-fatty tissue will sometimes be found in the neighbourhood, and this may be sewn around the graft. When this is done the area is covered by peritoneum. Lastly, after removal of the forceps the anterior slit into the bladder is closed.

The method of uretero-vesical implantation advised by

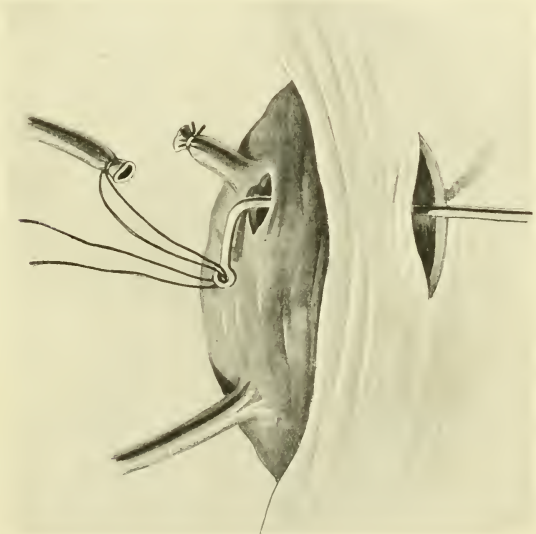


FIG. 308.—Uretero-vesical implantation. (After A. E. Giles.)

Upper cut-end of ureter about to be drawn through an incision made for the purpose in the bladder-wall.

A. E. Giles¹ is very similar to that adopted by Howard Kelly. A ligature is attached to the cut-end of the ureter which is about to be implanted. An opening is then made through the fundus of the bladder, and through this the index finger is passed to act as a guide. A small opening is made by cutting down on the finger placed close to the original ureteric opening in the bladder. An aneurysm

¹ *The New System of Gynaecology*, Eden and Lockyer, 1917, vol. iii. page 500.

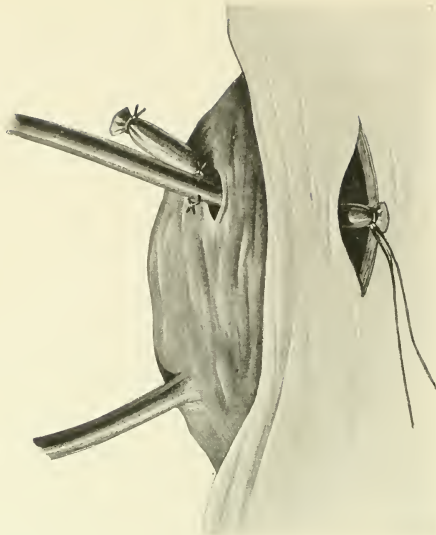


FIG. 309.—Uretero-vesical implantation. (After A. E. Giles.)

The ureter has been drawn into the bladder and an external fixation-stitch is seen anchoring it to the muscular coat.

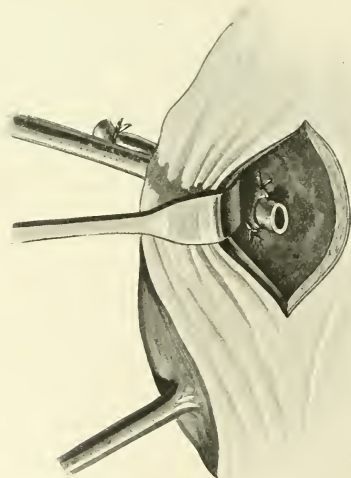


FIG. 310.—Uretero-vesical implantation. (After A. E. Giles.)

The traction-sutures have been removed and the stump of the ureter trimmed. The latter has been anchored to the bladder-wall by internal fixation-sutures.

needle is then passed through the anterior opening across the bladder-cavity and out through the small opening in the base. The ends of the ligature attached to the ureter are threaded into the needle (Fig. 308), and the latter withdrawn. By traction on the ligatures the end of the ureter is drawn into the basal-aperture made in the bladder

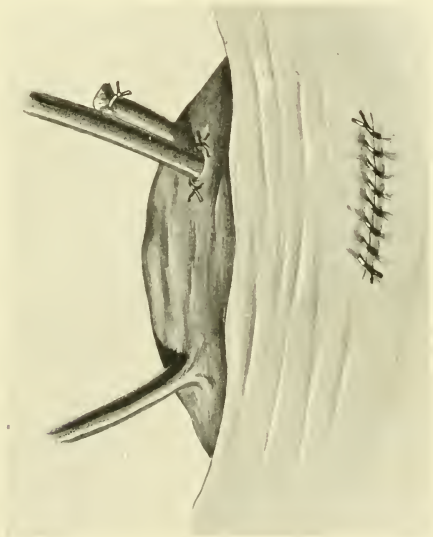


FIG. 311.—Uretero-vesical implantation. (After A. E. Giles.)

The anterior or fundal incision has been closed.

(Fig. 309). The sutures anchoring the ureter in position are now passed (Fig. 310) in the manner described on page 554. The long sutures, which were used as tractors and to steady the ureter whilst it was being anchored in position, are cut off, together with any portion of the ureter which may project into the cavity of the bladder (Fig. 310). Finally, the anterior (fundal) aperture is closed (Fig. 311). I have found it a good plan to strengthen the uretero-vesical graft at the base of the bladder by folding around

it some of the adjacent connective tissues, after inserting a few Lembert sutures to unite the muscular bladder-wall to the coats of the ureter.

In each of my two cases I fixed the ureter by threading a ligature through its cut-end and bringing it out through the urethra ; the loop, however, cannot easily be pulled out *per urethram* after the operation is finished, and in each case it had to be left to separate. This took place after encrustation with phosphates. I cannot therefore recommend this plan, and should prefer in future to adopt Kelly's or Giles's method of making an extra incision into the bladder, as described above.

Whatever method is adopted in carrying out ureteric implantation into the bladder, stress must be laid on the necessity of thoroughly obliterating the lumen of the distal cut-end by efficient ligation.

APPENDICES

I

ADDITIONAL NOTE ON MYOMA OF THE FALLOPIAN TUBE

M. AUVRAY in 1912¹ collated twenty-nine cases of tubal fibromyoma and he gives a brief account of each. Several cases are open to doubt: thus Doran considers that Simpson's and Schartz's tumours might have been pedunculated fibroids of the *broad ligament*. Very few of these growths attain dimensions sufficient to render them of clinical importance, but one recorded by Auvray weighed 2800 grammes. It was attached to the outer extremity of a malformed tube, the uterine end of which was blind and did not communicate with the cavity of the uterus, whilst the central portion was represented by a large hydrosalpinx. Other examples of considerable size are reported by Le Dentu, Stolz and Eppinger, Barette and Fehling.

Myoma may arise from any part of the tube, and three have been recorded as arising from the ovarian fimbria (Auvray, Le Dentu, and Lecène). In number they are generally single, but one notable exception is that reported by Péraire,² in which there were said to be two myomas weighing 1 lb. in the right tube, together with multiple 'fibroids' of the uterus and fibromyoma of both ovaries. Tubal 'fibroids' are almost invariably unilateral, only one case being recorded where both tubes were the seat of these growths. Quénu and Longuet classified tubal myoma after the uterine types; and Auvray also adopted the same classification, thus

¹ *Archiv. Mens. d'Obstétrique et de Gynéc.* 17^e Ann., No. 1, January 1912, pp. 1-25.

² *Bull. de la Société anatomique.* 1903, pages 378 and 379.

dividing them into subperitoneal, interstitial, and submucous, and he states that the submucous variety is rare, whilst the subperitoneal are the commonest. The latter generally project towards the peritoneal cavity, but they may open up the layers of the broad ligament, as happened in cases reported by Rudolph and Bland-Sutton.

Subperitoneal tubal myomas are usually pedunculated, and the pedicle may undergo torsion (Barette). They may also become calcified as in a case of my own, and in the second case of Barette, which grew from the middle segment of the tube and measured 12 cm. in its largest diameter.

The *interstitial tubal myoma* shows a disposition to a concentric arrangement, as though it represented a more or less regular increase in the fibro-muscular elements of the tube; e.g. in Carrière and Legrand's case the tubal canal passed through the centre of the 'fibroid,' which formed a small painful swelling diagnosed as an ovarian tumour. Such cases have been recorded by Pilliet, Low, Formiggini, and Taylor. This type is open to doubt as to their real nature: some at all events appear to be the product of inflammation, i.e. examples of *salpingitis nodosa* (see "Adenomyoma of the Tube," p. 307); some authorities hold them to be analogous to the fibrous nodules which are found in the epididymis as the result of gonorrhoeal orchitis, i.e. examples of local interstitial fibrosis. This view is supported by the fact that, histologically, it is often found that fibrous tissue predominates and that the muscle-fibres are few and far between. Auvray is, however, convinced that the *concentric interstitial myoma* has been demonstrated microscopically in the cases of Formiggini and Taylor.

The *submucous tubal myoma* is represented by the case of Wettergreen, in which a pedunculated tumour measuring $1\frac{1}{2} \times 3$ cm. protruded from, and partially obstructed, the abdominal ostium. Decidual tissue was detected at its base, and Doran raised doubt as to its being a myoma at all.

A tubal calculus discovered by J. L. Green at a necropsy on a widow, aged 80, was recorded by Ballantyne. It lay in the tubal canal and may possibly have been a calcified tubal myoma.

Tubal myomas which have attained a considerable size are liable to undergo the same secondary changes as seen in the uterine type. Examples of calcification have been mentioned, hyaline liquefaction

(cystic degeneration) and necrosis was present in Auvray's case. Several cases of lymphangiectatic change have been noted. Suppuration was said to have occurred in a case reported by Thomas. Adhesions to adjacent organs, *e.g.* intestine, omentum, are recorded. Torsion of pedunculated growths has already been referred to. The co-existence of tubal gestation has twice been observed (Wettergreen, Lecène). The co-existence of myoma in the uterus has frequently been noted.

Symptoms.—There is nothing pathognomonic in either the signs or the symptoms. *Pain* and *metrorrhagia* have several times been noted. Small nodules may be located on the tube with precision, but they will be regarded as nodular salpingitis; larger tubal growths will be diagnosed as uterine or ovarian, and for such, a tubal origin can only be made out by opening the abdomen.

The *treatment* is removal, and when the tumour is pedunculated the tube may be left *in situ*.

II

ADDITIONAL NOTE ON TORSION OF THE MYOMATOUS UTERUS

A moderate degree of torsion of the uterus may occur without producing any symptoms suggesting its presence; thus Kelly and Cullen record eight cases in which torsion of the body on the cervix had given rise to no special symptoms, even though in one instance the uterine body had been rotated through 180° (see Figs. 286, 287, pages 494-495).

Torsion of the entire uterus cannot occur. The twist usually takes place through the isthmus, the body above rotating upon the fixed cervical segment below. It may occur through the body itself, *i.e.* above the level of the supravaginal cervix.

Torsion of the uterine body on the cervix may be *gradual* or it may be *acute*; these two conditions differ in their pathology and in the train of symptoms to which they give rise.

With *gradual* torsion the parts in the neighbourhood of the twist undergo atrophy, and the pedicle is more and more attenuated, until complete severance of body from cervix may occur. Subsequent to this the body of the uterus acquires adhesions

to neighbouring parts, and the adnexa are matted together by inflammation. The symptoms in such a case are those of repeated attacks of peritonitis, more or less severe, and extending over a long period, it may be, of several years.

In *acute* torsion there is stasis of the circulation in the body of the uterus and in *both* appendages; the congested organs assume a dark plum-colour; there is thrombosis of the vessels, with a blood-stained exudation into the peritoneal cavity. Free haemorrhage has also occurred with this condition, due to severance of a large vessel caused by axial rotation.

The symptoms are sudden in onset, and are similar to those produced by acute torsion of an ovarian pedicle.

The causation of torsion of the uterine body is a subject for speculation. In cases of subperitoneal pedunculated myoma in which the growth has rotated it is easy to understand that a small senile uterine body lying below may share in the process (Fig. 312); especially since torsion when once started is apt to be progressive.

When the growth has a wide attachment to the uterus, and lies in the pouch of Douglas, it must be assumed that in trying to rise out of the pelvis it meets with resistance, to overcome which, rotation of the tumour and of the uterine body is brought into play. The fact that these cases occur in women over fifty years of age is noteworthy. The best example on record of the effects of gradual torsion is that of Bastianelli of Rome. An account of this case is published in Kelly and Cullen's work on "Myomata." The patient was aged 53. A myoma had been known to exist for twenty years, and there had been several severe attacks of peritonitis. At the operation it was found that the myomatous uterus was completely severed from the cervix owing to atrophy of a torsioned isthmus. The uterine body was adherent to the anterior abdominal wall. The appendages were rolled up to form a single pedicle attached to the floor of the right iliac fossa. The pelvis was as empty as if a supravaginal hysterectomy had been performed.

The effect of torsion is also well shown in Cullen's Figure 61 (on page 78 of Kelly and Cullen's *Myomata of the Uterus*). The isthmus is here seen to be reduced to a narrow pedicle.

Acute torsion is sufficiently rare to justify my mentioning nine cases, two of which have not been published.

(1) Poth showed a case at the Berlin Obstetrical and Gynaeco-

logical Society in May 1913, in which torsion of a subserous myoma was accompanied by torsion of the uterus itself. The patient was aged 56. She had suffered from severe abdominal pain twenty-one years before operation, and three years later was urged to have a large tumour removed. The menopause occurred at the age of 51. During the four weeks before operation she suffered greatly from pelvic pain and dyschesia.

At the operation the abdomen contained blood-stained fluid; a pedunculated subserous myoma with a twisted pedicle was removed, and then the uterus was found to be twisted through 360° from right to left.¹

(2) Steinbüchel's case, quoted by Poth, illustrated the danger of internal haemorrhage. This was severe, and was produced by the torsion causing laceration of a large blood-vessel.

(3) Grunert² described a case where a moderate degree of torsion (90°) led to very acute symptoms simulating those due to torsion of the pedicle of an ovarian cyst.

(4) In Jolly's case³ a torsioned myomatous uterus became impacted in the pelvis, and led to displacement and blocking of the ureters, double surgical kidney, and death from uraemia.

(5) J. D. Malcolm⁴ exhibited a myomatous uterus strangulated by torsion of the body on the cervix. The patient, aged 70, was known to have a 'fibroid' before the climacteric. She was seized with pelvic pain, which soon became intense and was accompanied with vomiting and a rise of temperature (101° F.). The abdomen was opened twenty-eight hours after the onset of symptoms, and it was seen that "the uterine body had revolved one full turn on the cervix." The corpus uteri was blue-black in colour, and "the conditions caused a distinctly offensive odour."

"Supracervical hysterectomy was performed; the left ovary and Fallopian tube, which were raised by the new growth above the constriction, were taken away. The right ovary and the greater part of the corresponding tube were below the constriction and were not removed." The patient recovered.

(6) In August 1914 my colleague, T. W. Eden, removed a large myomatous uterus which had undergone acute torsion through its isthmus. The patient was a II-para, aged 52 years. The menopause

¹ *Zeitschr. f. Geb. u. Gyn.*, 1913, Bd. lxxiv. S. 1010.

² *Ibid.*

³ *Ibid.*

⁴ *Proc. Roy. Soc. Med. (Obst. and Gyn. Sect.)*, 1916, vol. ix. No. 9, pp. 89-91.

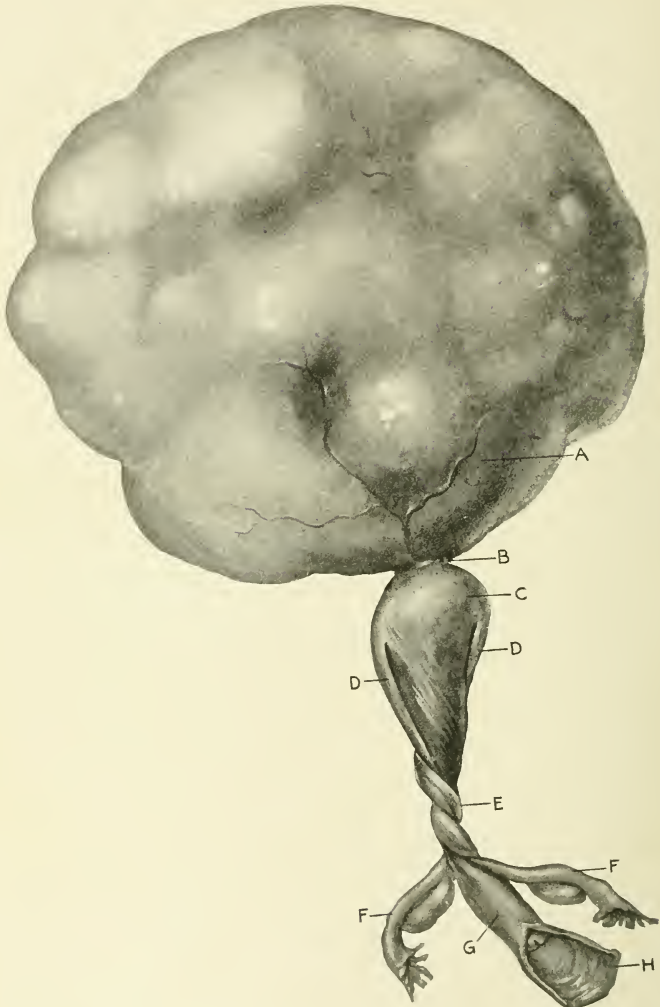


FIG. 312.—Showing uterine torsion caused by a calcified myoma (partially diagrammatic).
(C. Hubert Roberts.)

A = Calcified myoma ; *B* = pedicle ; *C* = body of uterus ; *D, D* = Fallopian tube ; *E* = torsion of isthmus uteri and appendages ; *F, F* = Fallopian tube ; *G* = cervix ; *H* = vagina.

occurred five years before operation ; there had been no haemorrhage nor discharge *per vaginam* since the climacteric. The symptoms were abdominal pain and progressive enlargement for ten years ; the pain had greatly increased in the week preceding the operation. *Per abdomen* there was a very large semi-solid central tumour with a smooth surface ; the flanks were flat and resonant. *Per vaginam* the uterus was apparently inseparable from the tumour.

At the operation on August 25, 1914, it was found that the uterus contained a large interstitial myoma. Axial rotation through 180° had occurred, so that the appendages had changed sides, the right tube and ovary lying on the left, and the left tube and ovary occupying the right side. Both broad ligaments and round ligaments were stiff and swollen from ecchymosis, and the uterus and tumour were deeply purple in colour.

(7) A case of Thorn's in which a gravid uterus was twisted through 180° by a subserous myoma, and in which myomectomy was performed, the pregnancy continuing to term, is mentioned on page 149 of this work.

(8) The following account of an unpublished¹ case in which there was complete torsion of the uterus, caused by a calcified myoma weighing $5\frac{1}{2}$ lbs., has been kindly supplied to me by my colleague, C. Hubert Roberts :—

H. M., aged 55, married 35 years, sterile. There was a history of a tumour in the abdomen for 15 years, but it had never given rise to trouble until August 1916. The menopause occurred ten years ago, previous to which menstruation was profuse.

In August 1916 the patient began to have violent attacks of abdominal pain, lasting a day or so at a time ; these rapidly became worse, and for this reason the patient was admitted into the Samaritan Hospital on November 11, 1916. There had been no trouble with the bladder nor with the bowels. On examination the general condition was found to be good.

A loose, hard, irregular swelling was felt, reaching to the umbilicus ; it was very movable in the abdomen from side to side. The tumour was painless to touch.

Per vaginam.—The cervix was senile and the abdominal tumour moved with it on bimanual examination. The diagnosis was made

¹ This case has since been published ; see *Proc. Roy. Soc. Med. Lond. (Obst. and Gyn. Sect.)*, 1917, vol. x. No. 7, pages 109-111.

of a uterine or ovarian 'fibroid.' At the operation a "very curious fibroid, the size of a cocoanut, absolutely calcified," was found; it was very mobile, having a pedicle $8\frac{1}{2}$ inches long, "which on closer inspection proved to be the elongated senile uterus." The tumour arose from the left side of the *fundus uteri*.

"At the level of the supravaginal cervix there was an acute torsion of the whole uterus [through] $2\frac{1}{2}$ turns from left to right (forwards)"; the appendages, which were elongated, were included in the twist (see Fig. 312). There were no adhesions, so that after untwisting the pedicle the appendages could be freed. The tumour was amputated from the *fundus uteri* (which was only $1\frac{1}{2}$ inches broad at the top), the uterus, tubes, and ovaries were left *in situ*. Convalescence was uneventful.

(9) Bilhaut père records three cases of myoma with twisted pedicles, the symptoms being severe pain and peritonism.¹

III

ADDITIONAL NOTE ON 'FIBROID' POLYPI

My friend, Thomas Wilson of Birmingham, has kindly supplied me with the following information relative to the incidence of 'fibroid polypi,' and he has compared this variety of myoma with the other types as regards the age and child-bearing capabilities of the patients upon whom he has operated for 'fibroids.'

<i>'Fibroid' Polypi.</i> <i>Details in 39 Cases operated upon.</i>	<i>Operations for 'Fibroids' excluding Polypi and Curetting.</i> <i>Details in 106 Cases.</i>
Age—	Age—
24 years and under 1	24 years and under 1
25 years to 34 years 4	25 years to 34 years 16
35 years to 49 years 25	35 years to 49 years 78
50 years and upwards 9 = 23 per cent	50 years and upwards 10 = 9.5 per cent
<u>39</u>	<u>105</u>
Married 32	Married 61
Widowed 1	Widowed 9
Single 6 = 15.3 per cent	Single 36 = 33.9 per cent
<u>39</u>	<u>106</u>

¹ *Ann. de Chirurg. et d'Orthop.*, 1914, xxvii. No. 2, pages 33-39.

Number of Pregnancies known in 30 Cases—

Number of children 142 Av. 4.73
 Number of miscarriages 24 Av. 0.8

Total Pregnancies 166 5.5

In 30 Cases—

Sterile . . . 2 = 6.6 per cent
 1 to 4 children . 13
 5 to 9 children . 10 = 33 per cent
 10 children and up-
 wards 5 = 16.6 per cent
30

Number of Pregnancies known in 54 Cases—

Number of children 90 Av. 1.66
 Number of miscarriages 31 Av. 0.57

Total Pregnancies 121 2.23

In 54 cases—

Sterile . . . 13 = 24 per cent
 1 to 4 children . 33
 5 to 9 children . 8
 10 children and up-
 wards 0
54

Wilson’s table shows (1) that as regards age-incidence the majority of polypi and other kinds of fibroids are operated upon between the ages of 35 and 49 years (see also page 166). (2) That after the age of 50 years polypi are nearly three times as frequent as are other varieties of fibroids. (3) That polypi are much more common than other ‘fibroids’ in fertile women, the average number of children borne by women from whom polypi were removed being more than double the number borne by the subjects of the other classes of fibroids. (4) That sterility was observed in a very small proportion of the ‘polypi-class’—in fact, 50 per cent had had from five to ten pregnancies.

I have several times had to remove corporeal myomatous polypi within twelve months following confinement, and this had led me to conclude that small interstitial growths, during uterine involution, are liable to become extruded from the muscular walls to form polypi. Such growths in the non-gravid state would be too small to reach either the mucosa or the serous coat of the uterus; they would not interfere with the uterine function, and would escape observation. It is quite possible, also, that a number of the ‘polypi’ included in the 39 cases from which Wilson has drawn his conclusions were cervical in origin; this would further account for the comparatively slight impairment of fertility in this small series. See also paragraph on ‘Sterility,’ pp. 166, 167.

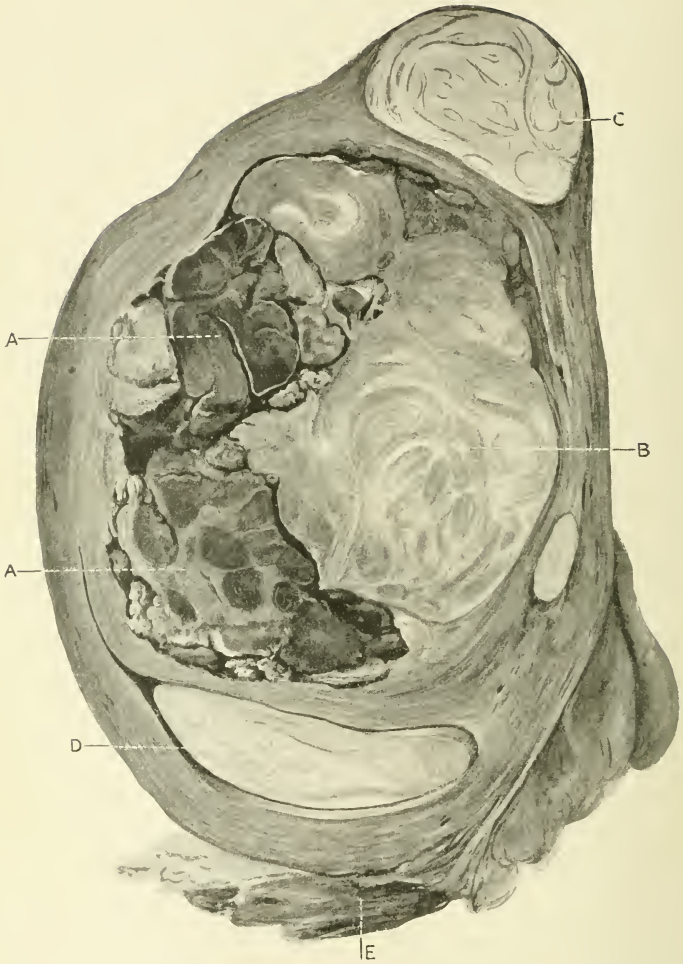


FIG. 313.—Hemi-section of uterus showing sarcomatous change in a myoma.
(No. 3015⁵³ St. Bartholomew's Hospital Museum. Herbert Williamson.)

A, A = Haemorrhagic sarcomatous areas ; *B* = myoma which is invaded by sarcoma ; *C* = myomatous nodule ; *D* = submucous myoma in cavity of uterus ; *E* = portion of cervix.

IV

ADDITIONAL NOTE ON SARCOMATOUS CHANGE IN MYOMA

In 1906, W. S. A. Griffith and Herbert Williamson published "A Case of Fibro-Myoma of the Uterus undergoing Sarcomatous Change,"¹ which is most instructive from both the clinical and the pathological aspect. The value of the authors' admirable paper is enhanced by a coloured illustration of a sagittal section taken through the uterus and growth.

The patient was a widow who had never been pregnant. She was known to have an abdominal tumour for six years, and also to have suffered from severe menorrhagia. Operation was not deemed advisable "as she was not a fit subject." The woman was admitted to hospital (six years after this decision had been made) with diarrhoea and pyrexia, thought to be due to enteric fever, but Widal's test proved to be negative. The temperature remained persistently above normal, and on several occasions rigors occurred. The "large fibroid" was freely movable, and there was "no reason to connect the temperature with any pelvic condition," but the presence of peptonuria "suggested that some necrosis was going on, possibly in the fibroid." Later still, large clots were passed *per vaginam*, and although nothing abnormal was discovered in the lungs at the time of admission, three months later there was evidence of consolidation over the front and apex of the right lung. Death occurred about four months after admission into hospital.

A large mass of soft growth the size of an orange was found, at the autopsy, to occupy the region of the upper lobe of the right lung. It was loosely attached to the lung and to the pleura, and came away easily in the hand. "On section it consisted of soft brownish-red material intersected by honeycomb-like structures similar to the large mass in the uterus. Both lungs contained several smaller masses, dark in colour, some of which were easily enucleated; on section they also reproduced closely the appearances of the uterine tumour."

Williamson's account of the uterine growth is as follows: "The specimen consists of the left half of the uterus. The organ is enlarged, the part preserved measures $8\frac{1}{2}$ inches in length, $4\frac{1}{2}$ inches antero-posteriorly, and $2\frac{3}{4}$ inches from side to side. The external

¹ *Journ. Obstet. and Gyn. Brit. Emp.*, 1906, vol. ix. pages 84-94.

surface, smooth and covered by peritoneum, presents a number of small bosses due to the presence of subperitoneal fibro-myomata. . . . On section the greater part of the specimen is composed of a group of tumours growing in the anterior wall of the uterus (Fig. 313). The uterine cavity lies at the lower part of the specimen; it is dilated, and occupied by a fibroid polypus. . . . The walls of the uterus are hypertrophied; the posterior measures



FIG. 314.—Section taken through the junction of the red and pale areas of the tumour shown in Figure 313. (After Herbert Williamson.)

A = A strand of sarcoma-cells which are invading the degenerate (hyaline) tissues of the myoma (*B*).

$\frac{2}{5}$ ths of an inch in thickness; the anterior contains interstitial tumours. One of these tumours occupies the highest part of the wall; it is the size of a golf ball, is encapsuled, and is composed of dense white tissue. Microscopical sections show that it is a fibro-myoma. A second growth, smaller, but possessing similar characters, lies lower down in the wall a short distance above the uterine cavity. The third tumour, much the largest of the three, presents very remarkable characters. It measures $5\frac{1}{2}$ inches in length, $4\frac{1}{2}$ inches antero-

posteriorly; it is interstitial, surrounded everywhere by the fibromuscular tissue which constitutes the anterior wall of the uterus, and is composed of two varieties of growth: (*a*) Dense, white, fibrous-looking tissue, the continuity of which has become broken by the presence of (*b*) masses of friable material of a deep red or brown colour. This latter material is situated chiefly in the posterior part of the tumour, and in its general appearance resembles

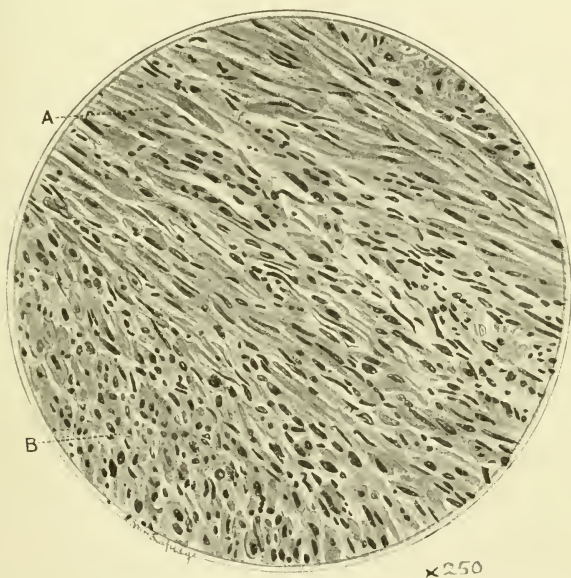


FIG. 315.—Sarcomatous metaplasia of the muscle-cells in a myoma of the uterus.
(After Herbert Williamson.)

A = Muscle-bundles; *B* = muscle-cells undergoing malignant change (sarcomatous).

blood-clot (see Fig. 313). Microscopic sections show that the dense white part of the tumour is a fibro-myoma, whilst the friable red portion is a sarcoma.

“The fibroid polypus which occupies the uterine cavity can be easily displaced; it is then found that the cavity is everywhere lined by smooth *mucosa* entirely free from new growth. It is important to note once again that the whole mass (fibro-myoma and sarcoma) is encapsuled, and whilst the sarcomatous elements have

extensively invaded the fibro-myoma, as far as can be ascertained without mutilating the specimen, the uterine wall is but little affected."

MICROSCOPICAL APPEARANCES

1. "*Section from the firm white part of the Tumour.*—The section presents the appearances commonly seen in a degenerate fibro-myoma. . . . Only a few thin-walled vessels are seen scattered in the section. At one spot the fibro-myomatous tissues are invaded by an elongated strand of sarcoma-cells" (see Fig. 314).

2. "*Section from the red, friable part of the Tumour.*—The friable portions of the tumour are composed of a mass of cells of whose malignancy there can be no question (see Fig. 315). They are of very different sizes and shapes; most of them are round, some are elongated and spindle-shaped, some are very large and contain as many as six or eight nuclei; these may be designated 'giant-cells.' In nearly all the cells, the nuclei are large, active, and deeply-staining; sometimes they occupy almost the whole of the cell. The cells are separated from one another by a homogeneous intercellular stroma, which stains clearly with eosin. At the periphery of the malignant portion are elongated cells with long, rod-shaped nuclei; these cells lie near to the muscle-cells of the fibro-myoma, and both can be seen in the same field of the microscope. *They are obviously malignant, but in their shape and form resemble muscle-cells.*¹ . . . No well-formed blood-vessels are seen, but there are many vascular channels traversing the section."

3. "*Sections from the secondary growth in the Lungs.*—The cells in these masses are all of the round and spindle-shaped varieties. There are no cells visible which resemble muscle-cells in either form or arrangement."

The authors of the paper from which the above quotations are taken enter into a very thorough and complete discussion as to the source of the sarcoma-cells which are found in a small percentage of myomas, and they raise the question as to whether a sarcoma may "arise *de novo* in a pre-existing fibro-myoma: a new growth within a new growth," or, whether "possibly the cells of which the

¹ My own italics. Williamson says: "It is important to pay attention to this point, for many pathologists hold that sarcoma of the uterus commonly arises from muscle-cells." This is my own view.—C. L.

existing fibro-myoma is constituted may assume malignant characters." So far as their own case is concerned they "do not pretend to say" which of these alternatives took place, but they "think it quite possible that the sarcoma may have, at least in part, originated in muscle-cells." As already stated on pages 87, 88, the sarcomas which develop in myomas tend to conform to the type of a non-stripped muscle-cell or to the connective-tissue cell, and those which conform to the muscle-cell, the "myoblast type" of Leith,¹ or myosarcomas, show the structure of a *fibro*-sarcoma, and in them multinucleated cells are rare; whereas in the sarcomas which arise in fibrous tissue the cells show a greater irregularity in size and shape, cell-masses being more common. When we apply these facts to the above case it seems impossible to relegate the new tumour-formation exclusively to one or other class. The apparent transition of muscle-cells into sarcoma-cells seen at the periphery strongly suggests an origin from muscle. The absence of such cells, as suggested this transition, in the secondary growths, and the large or giant cells which were present in the uterine growth favour a connective-tissue origin. It is possible that Mallory's differential staining for myoglia- and fibroglia-fibrils (see Plate II, page 5) would help to settle a question such as this, but it must not be forgotten that the growth may have arisen in this case from both muscle and fibrous tissue.

V

ADENOMYOMA OF THE UMBILICUS

Since the part of this book devoted to Adenomyoma was written, an exhaustive monograph, entitled *The Umbilicus and its Diseases*, by Thomas S. Cullen,² has been published. The author devotes twenty-six pages of this new work to the subject of "Adenomyoma of the Umbilicus." Cullen has been working at the pathology of the umbilicus since 1908, and in December 1911 he read a paper before the Southern Surgical and Gynaecological Society on "Umbilical Tumours containing Uterine Mucosa or Remnants of Mueller's Ducts." This paper was printed in *Surgery, Gynaecology, and*

¹ "Pathology of Tumours of the Corpus Uteri," *Journ. Obst. and Gyn. Brit. Emp.*, 1911, quotation from page 449.

² W. B. Saunders Company, 1916.

Obstetrics in May 1912, but I had overlooked it in compiling references for the account of Adenomyoma given in Part II. of this work. Speaking of umbilical tumours, in the above paper, Cullen says: "While gathering together from the literature the numerous cases of primary tumour of the umbilicus, I found several that did not seem to belong to any of the classes hitherto recognised, and yet all of these cases, in one or more points, bear a certain amount of resemblance to one another. . . . The clinical histories in this class of cases, coupled with the gross appearance of the tumours, leave no doubt that we are dealing with a variety of umbilical tumour never before clearly understood." Cullen tells us that these tumours are found *only in women*, that they develop between the 30th and 55th year as a small growth at the umbilicus, which reaches its full size (that of a nut) in a few months. It may be painful, especially at the menstrual period, when it may emit a brownish bloody discharge.

Naked-eye Anatomy.—As I have never seen one of these growths I must rely upon the lucid account of the macroscopic appearances given by Cullen as follows: "The overlying skin is usually pigmented, and there may be one or two bluish or brownish cysts just beneath the skin. These may rupture and discharge a little brownish fluid—old blood. On section the nodule is found to be intimately attached to the skin, is very dense, and is traversed by glistening bands of fibrous tissue. Scattered throughout the nodule one sometimes finds small spaces presenting a sieve-like appearance. These spaces are filled with brownish fluid. Occasionally there may be a small cyst several millimetres in diameter filled with brownish contents. Exceptionally greyish, somewhat homogeneous areas are distinguishable in the tumour."

Histology.—"The stroma of the growth is composed of dense fibrous tissue. Sometimes a few bundles of non-stripped muscle are noted here and there in the fibrous stroma. In other specimens the non-stripped muscle is much more abundant than is the fibrous tissue. Scattered throughout the field are glands. . . . They occur singly or in groups, and are lined with cylindrical epithelium. When occurring singly they frequently lie in direct contact with the fibrous tissue, but when found in groups are usually surrounded by a characteristic stroma that stains more deeply and is much more cellular than the surrounding fibrous tissue. . . . The cyst-spaces noted macroscopically, and filled with brownish fluid, are likewise

dilated glands, and the fluid is old blood. The stroma around the glands frequently shows fresh haemorrhage or remnants of old blood to be recognised by the deposit of blood-pigment."

It will be observed that this description is that of an essentially benign growth, but in a case of Mintz (quoted by Cullen) four years after the nodule was removed two others developed and were extirpated. Including one of his own, Cullen has collected nine cases which he considers should be classified as adenomyomas. Eight of these have been published under various names, *e.g.*



FIG. 316.—Adenomyoma of the umbilicus ($\times 8$). (Charles D. Green.)

The section was taken at right angles to the free surface of a growth which was the size of a marble. *A* and *B* mark the sites from which the drawings on Plate XXXVI. were prepared.

papilloma, adenoma, and cystadenoma, Cullen apparently being the first observer to describe a group of umbilical tumours as adenomyomas. For a detailed account of these growths the reader is referred to Cullen's monograph mentioned above; but as I have been able to obtain access to a section of one of these tumours through the courtesy of Charles D. Green, I have been able to study the histology of the growth for myself, and have had drawings made of its characteristic parts (see Fig. 316 in the text and Plate XXXVI., opposite page 577). It was Charles Green who first drew my attention to the publication of his umbilical tumour

in Cullen's monograph, and he kindly lent me a similar slide to the one sent to Cullen. To Cullen the credit must be given of unearthing this tumour from the *Transactions of the Pathological Society of London*,¹ published seventeen years ago. It was then described by Charles D. Green as an "umbilical papilloma which showed some activity of growth in a patient 50 years of age, and which was apparently due to inclusion of a portion of Meckel's diverticulum." It is clear from his report that Green could not reconcile his case with those of papilloma previously recorded with respect to either its clinical or histological features. The nature of the gland-elements and the presence of so much unstriped muscle were a puzzle to the reporter. The report of the Morbid Growths Committee reads:—

We do not consider that this tumour is a papilloma. We agree in the main with the author's histological description, and we regard the growth as a columnar-celled carcinoma. Whether this is primary or secondary we are at present unable to decide. Should the absence of further symptoms show that the tumour was not secondary to an intra-abdominal carcinoma we agree with the author's suggestion that it arose in Meckel's diverticulum.

(Signed) D'ARCY POWER.
H. D. ROLLESTON.

March 23, 1899.

Some members of the Committee present who examined the specimen are not inclined to regard it as malignant.

R. G. HEBB, *Chairman*.

April 29, 1899.

The patient was known to be in good health two and a half years after the operation, and the non-malignant character of the growth is well shown in the two coloured drawings on Plate XXXVI. These figures demonstrate all the typical features of an adenomyoma, *i.e.* the presence of gland-tubules surrounded by a very cellular, deeply-staining stroma ('cytogenous mantle,' p. 373), and lying embedded in a denser stroma composed of an abundance of unstriped muscle with an admixture of fibrous tissue. The 'single-file' arrangement of the tubules is well seen in one part of Figure A, whilst the 'scattered' or discrete distribution is seen in both figures. Several of the tubules have become dilated to form small cysts, and there is a good deal of interstitial haemorrhage especially well seen in Figure B. The irregular shape of several of the tubules in the latter figure recall the drawings of Pick (Fig. 171, p. 272), which

¹ *Trans. Path. Soc. Lond.*, 1899, vol. i. page 243.



A. Section of the umbilical adenomyoma taken from area A in Figure 316 (x 105) (Chas. D. Green), showing (1) gland-tubules surrounded by a cytotogenous mantle. (2) Stroma composed mainly of unstriated muscle. (3) Hæmorrhage into cytotogenous tissue.



B. Section of umbilical adenomyoma (x 105) taken from area B in Figure 316 (Chas. D. Green), showing (1) cystic gland spaces, (b) extensive hæmorrhage into (3) fibromuscular stroma.

were intended to show the supposed 'organoid' morphology of adenomyoma.

Cases of umbilical tumours published by Mintz and by Ehrlich are illustrated in Cullen's paper and in his monograph. These give quite as convincing a picture of adenomyoma as does the case of Charles D. Green. There is no doubt that so far as the tumours of umbilical origin are concerned, Cullen has revealed to us a new class—the adenomyomas, and it may seem presumptuous on my part to question his explanation of their histogenesis. What he emphasises is this. The histology of these growths is identical with that of uterine adenomyoma, therefore the gland-elements with their cellular halo are "uterine mucosa." That this must be so is proved, because this tissue bleeds and becomes painful during menstruation; in fact, we have "umbilical tumours containing uterine mucosa or remnants of Mueller's Ducts." I agree that (thanks to Cullen) we now know that there are umbilical tumours which are adenomyomas, but I do not agree that they have anything to do with the mature uterus or with the embryonic Muellerian system. A duct-papilloma of the breast will emit a bloody discharge, which may be noted during menstruation; but a mammary papilloma is not Muellerian. The strikingly close resemblance between the gland-elements and stroma of extrauterine adenomyomas and the uterine mucosa is the feature by which these growths are diagnosed, but Meyer claims to have shown that the cellular mantle around the glands contains elastic fibres in these cases, and as the uterine mucosa contains no elastic fibres this authority argues that the 'cytogenous tissue' is not uterine. This point has already been dealt with in the chapter on "Adenomyoma of the Alimentary Tract" (p. 373), to which the reader is referred for fuller discussion.

Cullen tells us he finds the adenomyomas of the umbilicus are totally unlike any growths arising from the omphalomesenteric duct in which Lieberkühn's glands are reproduced; that being so, the origin of the epithelium must remain obscure. Green's case, to my mind, affords a good example of an adenomyoma arising as a product of inflammation. The patient had complained of irritation around the umbilicus for about two and a half years before the growth was removed, and fourteen months before the removal there was some eczematous irritation of the skin in the neighbour-

hood of the umbilicus, but no projecting growth. The latter followed on a chronic inflammatory process. The sections show that the skin did not provide the source of the epithelium from whence the gland-tubules were derived, and we are told by the operator that the peritoneal surface of the abdominal wall presented nothing abnormal ; but I see no reason to suggest that the epithelium had *migrated* from the Muellerian system—in fact, I intend the term “*extrauterine Adenomyoma*” which I have adopted and made use of in Part II. of this work to imply an *abnegation* of the theory of migration.

VI

DECIDUAL REACTION IN A SUBSEROUS MYOMA

Decidual reaction has been demonstrated in adenomyoma by Whitridge Williams, W. S. A. Griffith, and others (see pages 362-366). The occurrence of decidual metaplasia in these tumours has, indeed, been advanced in support of the argument that the glandular nodules, and the accompanying cytogenous tissue which they contain, are derivatives of the uterine mucosa. The fallacy of this line of reasoning is demonstrated by the fact that decidual reaction is not confined to the endometrium and to tissues derived therefrom, but has been seen by Penkert in the omentum, by myself on the peritoneal surface of the gravid uterus and on the surface of the ovaries, by others on the vermiform appendix and on the peritoneum elsewhere. T. G. Stevens has shown me a section demonstrating decidual reaction in the stroma of a mucous polypus removed from the cervix of a pregnant uterus.

Hitherto no instance of a simple myoma showing this change in its tissues has come under my notice. I am therefore much indebted to Henry Russell Andrews for permission to mention the following case, and also to Gordon Ley for providing the clinical data and the histological report of the same.

A small subserous myoma was removed by Russell Andrews from the posterior surface of the uterus during the operation of Caesarean section. Andrews tells me that it did not shell out as readily as such tumours usually do ; it was adherent, so to speak,

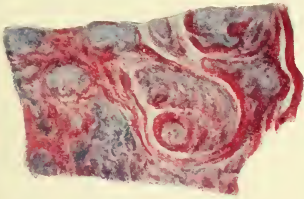


FIG. A. Microscopic section ($\times 2$). The extent of the decidual reaction is shown by the purple staining. (Hæmatoxylin and eosin.)

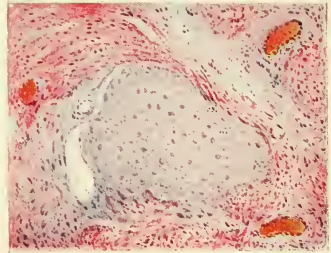


FIG. B. Area of decidual reaction ($\times 80$) surrounded by muscle-fibres which, below and to the left, shade off into fusiform and decidual cells.

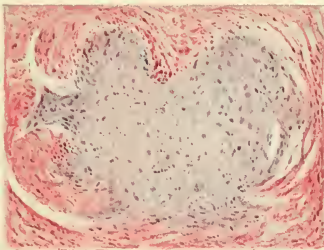


FIG. C. Area of decidual reaction ($\times 60$). In a depression at the upper margin of the 'area' are seen some fusiform cells which form a link in the transition between muscle-cells and polygonal decidual cells.

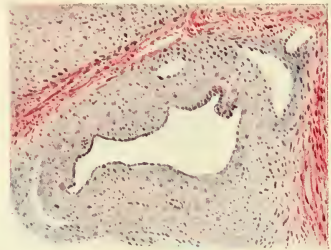
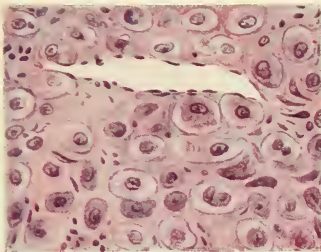
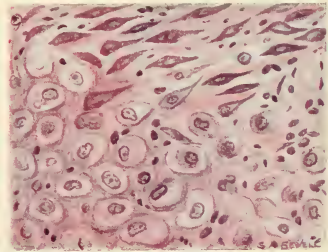


FIG. D. Area of decidual reaction ($\times 80$) showing blood-spaces lined by endothelium. To the right is seen the transition from muscle-fibres (pink) to decidua compacta (purple).



E



F

FIGS. E and F. Compact areas of decidual cells ($\times 350$). FIG. F shows the character of the fusiform cells from which the polygonal decidual cells are derived.

in its bed. The patient was aged 35 years; she was a primigravida and was affected with aortic regurgitation and partial stenosis. There was evidence of failing heart, and a few weeks before operation *ante partum* haemorrhage had occurred. The woman was admitted into the London Hospital on January 27, 1917. Gestation had reached full term, and labour had begun; the foetal head was above the brim and could not be made to engage. Caesarean section with the removal of the small myoma was carried out under spinal anaesthesia. The tumour was date-shaped and lay in the sagittal plane of the lower uterine segment, with its long axis parallel to that of the uterus. The mother and baby did well.

The specimen, which is P, 1517 $\frac{1917}{1917}$ in the index of the London Hospital Pathological Institute, is thus described by Gordon Ley:—

“The tumour was hardened in 4 per cent formalin. On examination it measures $5 \times 3 \times 3$ cm. Its external surface is extremely ragged and is covered by tags of greyish tough tissues. On section it shows a mottled grey and white appearance. The white areas are larger than the grey; they are clearly defined, irregular in shape, and consist of shiny fibrillae arranged in closely-packed strands. The grey areas are depressed, patternless, and translucent; they are softer than the white areas. Microscopic sections were stained by haemalum and eosin, and by haematoxylin and Van Gieson's reagent.

“The sections show bundles of unstriped muscle-fibres, the bundles being of large and medium size; they pass in varying directions and are seen cut longitudinally, obliquely, and transversely; the bundles are separated by strands of fibrous tissues from which a collagenous meshwork arises, the latter encircling the large individual muscle-cells of which the bundles are composed. Scattered throughout the section are nodules made up of large polygonal cells. These nodules are infiltrated by a few polymorphonuclear leucocytes and lymphocytes. Blood-spaces, lined by a single layer of endothelial cells, are present in considerable numbers in these nodules” (see Figs. B and D, Plate XXXVII.).

“The individual cells of which the nodules are composed are very regular in size and shape; they consist of a pale cytoplasm and contain a single large, rounded, usually eccentric nucleus with well-defined chromatin network and one or two nucleoli (see Figs. E and F, Plate XXXVII.), and they lie in a hyaline collagenous

matrix. Transition from the rod-shaped muscle-cell with rod-shaped nucleus and ill-defined nucleolus, through the rod-shaped cell with spindle nucleus and sharply defined nucleolus, to the spindle-shaped cell with oval nucleus (see Fig. F, Plate XXXVII.), and then to the polygonal cell with rounded nucleus, is clearly demonstrated. Fibroblasts are also seen in the nodules lying between the polygonal cells, and there is evidence which suggests a transition from fibroblasts to the polygonal cells, but this cannot be followed through the various stages with the same facility as was possible in the case of the muscle-fibres."

Ley makes no mention of the term *decidual reaction*, except in the headline of his Report, but it is evident that the large clear polygonal cells with large nuclei (Fig. F, Plate XXXVII.) form the examples of metaplasia to which he has applied the above term. After a careful study of the slides from which the accompanying Plate has been prepared I quite agree with the above report, but must admit my surprise at finding that the change affected the muscle-bundles rather than the fibrous tissue. That such is the case cannot be gainsaid after a perusal of the microscopic sections. The fusiform cells and the polygonal cells are, by Van Gieson's method, stained a uniform yellow similar to that of the muscle-bundles. So far as my knowledge extends, this example of muscle-cells undergoing decidual reaction is unique.

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