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OVARIES AND OVIDUCTS.

BY

WILLIAM GOODELL, M. D.

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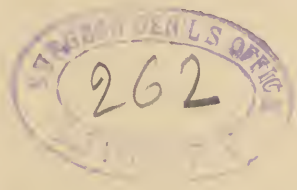


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DISEASES OF THE OVARIES AND OVIDUCTS.

By WM. GOODELL, M. D.

The ovaries are two almond-shaped glands attached to either side of the womb by a ligament of contractile tissue called the ovarian ligament, and they are enclosed between the two layers of the peritoneum known as the broad ligament. It has recently been contended that this envelopment in the broad ligament is not a complete one, but that the peritoneum is absent from the posterior surface of the ovary. This has been denied, but even if it be so, the fact does not seem thus far to have any physiological or any pathological bearing.

The ovarian nerves and blood-vessels run between the two layers of the broad ligament, the former coming chiefly from the renal plexuses of the sympathetic, the latter from the spermatic arteries. The ovaries being themselves movable bodies and attached to a movable organ, the exact position of which remains yet a moot question, their own natural situation has not yet been authoritatively determined. His.[1] from an examination of three suicides, holds that the ovary in the adult virgin hangs with its long diameter almost vertical, and with one side against the wall of the pelvis, but below the brim, the free border being behind and the attached end below. Each oviduct is looped over the ovary, rising along the front and falling over behind it. Hence the ovary lies on the fimbriæ which turn back and spread over the summit of the ovary. The ovaries are generally situated on a level with the inlet of the true pelvis, the left one being in front of the rectum, the right one surrounded by a coil of small intestines. When healthy they keep so high up as to be beyond the reach of the examining finger, and consequently they are not impinged upon during coition.

The important and special function of the ovaries—that of secreting and excreting the Graäfian follicles or ovisacs—and their monthly engorgements are the causes of many of the diseases to which they are subject. Hence it is that affections of the ovary, being due most commonly to perverted function, rarely occur before puberty.

Malformations.

Absence of the ovaries is a congenital condition very rarely met with. It is usually associated either with the absence also of the womb or

[1] *British Medical Journal*, Dec. 10, 1881, from *Archiv f. Anat. u. Entwick.*, 1881, Nos. 4 and 5.

with an imperfect development of the other portions of the sexual apparatus. The breasts will be flat, the vagina generally imperforate, the vulva small, the pubic hair absent, and sexual feeling wanting. Menstruation never takes place. Very commonly the growth of the body is arrested, and the stature is dwarfed to that of a child. Occasionally, however, there is an approach to the masculine type in the size, the figure, the voice, and in the growth of hair on the face and on the body.

An arrested development or a rudimentary condition of the ovaries is a more common malformation than the preceding one. The womb is then infantile in size, and the vulva and vagina are small and the pelvis is narrow. Puberty either fails to take place or it is postponed. When menstruation is present it is scant and appears at long intervals. General development is impaired, and the figure and mental characteristics may be those of advanced childhood. Sexual feeling is either wholly absent or very imperfect.

Diagnosis.—Whenever the ovaries are wanting, their absence cannot be positively made out by a digital examination of the parts, for even fully-formed ovaries often elude the finger. The diagnosis depends mainly on the symptoms previously given. If the ovaries are rudimentary, the finger passed high up the rectum while the woman is anæsthetized will sometimes recognize them. But the diagnosis rests usually on some manifestation of puberty, and the greater these manifestations the greater the curability.

Treatment.—For the complete absence of the ovaries all treatment is of course useless. Whenever these organs are in a rudimentary condition more can be done for the woman, but success is by no means assured. Every treatment that tones up the body is of service. The rest-cure, with its accessories of massage, general faradization, and over-feeding, promises much. Electricity has done good when one pole is applied directly over an ovary and the other pole placed either on the sacrum or on the cervix uteri. It is still more efficacious when the reophore in the form of a properly insulated sound is passed into the uterine cavity. Should the interrupted current fail to do good, the galvanic current may cautiously be tried.

From the vascular and nervous kinship between the ovaries and the womb all stimulants to the latter tend to invite blood to the former, and from this flux may come growth. It is therefore good practice to irritate the womb by tents, by applications of iodine and of silver to its cavity, and especially by the use of galvanic stems. The marriage relations sometimes quicken dormant ovaries into life, and development, followed by pregnancy, has been the result. But the remedy is a hazardous one, for if the sexual sense be not awakened, as often it will not, the union leads to much unhappiness.

Inflammation of the Ovary; Ovaritis.

Acute inflammation of the ovary rarely exists per se, but it is by no means an infrequent accompaniment of pelvic peritonitis and pelvic cellulitis, the causes of each being the same. It is then so masked by the

greater inflammation that its symptoms are lost in the general ones. Following the same course as that of pelvic inflammations, it begins with fibrinous exudation and ends either in resolution or in suppuration, or in chronic hypertrophy.

The TREATMENT of this inflammation is the same as that of pelvic inflammation—viz. rest, poultices, vaginal injections of hot water, and morphia and quinia in large doses. Sometimes the local abstraction of blood will be useful. Should pus form, it must be evacuated by the aspirator, and preferably per vaginam. After such an inflammation, and especially if caused by gonorrhœa, the ovary usually remains permanently injured, its functions being crippled by fibrous bands, adhesions, hardening of its stroma, and thickening of its investing peritoneum. If both ovaries be thus affected, sterility inevitably ensues.

Chronic Ovaritis.

By chronic ovaritis is meant either persistent congestion of the ovaries, or such tissue-changes in the stroma or in the follicles of the ovary, or in both conjointly, as are brought about from a previous attack of acute inflammation or from persistent hyperæmia. In its early stages it appears to be characterized by passive congestion, followed by infiltration of sero-sanguinolent fluid and by increase in bulk. Later on, if the congestion be not dispersed or it passes the health-limit, it becomes formative, or nutritive; the capsule thickens, the follicles enlarge, and a general hypertrophy takes place. According as the brunt of these changes falls on the stroma or on the follicles, the degeneration is termed either interstitial or follicular. When the stroma is chiefly attacked, the ovary becomes hard and rugous; when the follicles are diseased, they increase in size, and one or two of them are usually found to be distended into miniature cysts. There are indeed good reasons for the opinion that an ovarian cyst is a dropsy of many ovisacs, and is caused by ovaritis. The left ovary is the one more commonly affected—a fact accounted for by the pressure of the distended rectum and by the emptying of the left ovarian vein into the renal vein instead of into the vena cava, which is the course of the ovarian vein on the right side. It is a very common form of disease, very rarely coming from an acute attack, but starting subacutely with all the symptoms of chronicity.

CAUSATION.—Whatever induces a lasting congestion of the reproductive apparatus tends to create ovaritis—a torn cervix, a lacerated perineum, an arrest of involution after labor, dysmenorrhœa, and uterine tumors, flexions, and displacements. Barren women are very liable to this disease, and so especially are women who shirk maternity by preventive methods; for in both the menstrual congestions continue without that much-needed break which gestation and lactation bring, and in the latter the sexual congestions arising from incomplete intercourse are not relieved. So repeated erectility from self-abuse, by ending in a passive congestion of the womb and of the ovaries, will tend to produce this lesion. The prevalence of this habit in unmarried women is, I think, very much overrated, and yet I have seen from this cause several cases of ovaritis accompanied with prolapse of the ovaries. In one the ectropion

of the cervical mucosa was so marked that it leads me to think that this is the cause of the occasional inversion of the womb in virgins. My notebook shows also cases of ovaritis from such imperfect sexual relations as come from the ill-health or the advanced age of the husband, and not a few from immoderate sexual intercourse. Some of the most common causes of chronic ovaritis are emotional in character, such as long engagements, disappointments in love, single life, the reading of corrupt literature, unhappy marriages, nerve-exhaustion, and hysteria. These causes operate by producing circulatory disturbances which keep up a constant congestion of such exacting organs as the ovaries.

Symptoms.—Pain in one or in both ovarian regions, especially in the left one, is a prominent symptom. It is increased by walking or by standing, and is lessened by the recumbent posture. Starting usually from the ovary, it radiates to the small of the back or down the inner side of the thigh. It often begins from a week to ten days before the monthly period, and goes on increasing until the flow appears, when it commonly abates. Menorrhagia may usher in the disease, and may continue during the remainder of menstrual life, which then is usually prolonged. Ordinarily, however, menstruation becomes scant and irregular, postponing rather than anticipating. Sometimes amenorrhœa takes place. Sterility is usually present, and so almost always is nerve-exhaustion with all its emotional manifestations. Pressure over each ovarian region elicits pain and causes a contraction of the rectus muscle on the affected side. The finger per vaginam or per rectum will often discover behind the cervix uteri or to one side of it the very tender ovary, of the form and size of an almond. Pressure on it gives a sickening pain, very unnerving in its character. Reflex nervous symptoms are very common, especially those of hysteria. In the form of pain they show themselves in backache, spine-ache, nape-ache, and headache; in pain under the left breast, in the scalp on the top of the head, and in the stomach, bowels, womb, and coccyx. Nervous dyspepsia is common, accompanied by costiveness, nausea, vomiting, flatulent distension, and noisy eructation. Wakefulness and bad dreams are not infrequent. Other reflex neuroses may appear, such as paralysis or spasm of the sphincter muscles, the latter producing asthma, dysmenorrhœa, irritable bladder, and painful defecation. Then, again, there may be nervous disturbances, taking the form of low spirits, violent hysterical attacks, epilepsy, hystero-epilepsy, and of positive mental aberration.

Prognosis.—This disease is rarely fatal, but it is always very stubborn, and often incurable. The patient grows anæmic and she tires on the slightest exertion. Very soon nerve-exhaustion with its protean symptoms sets in. She takes to her back and becomes a sofa-ridden invalid. If the patient has contracted the habit of taking stimulants or anodynes, her chances for recovery will be greatly lessened.

Treatment.—The pelvic organs should be carefully examined, and any discoverable lesion of the womb and of its annexes be remedied. Pelvic engorgement must be met by keeping the bowels soluble, by scarification of the cervix, by large vaginal injections of water as hot as can be borne, and by vaginal suppositories of belladonna and by rectal ones of iodoform. Tenderness and hardness in either broad ligament is first treated by applications of a strong tincture of iodine both to the roof of

the vagina and to the skin overlying the ovarian regions. Flying blisters may also be placed there with benefit. Sexual intercourse should not be indulged in unless the desire for it be strong or there is a possibility of conception, for, by the prolonged rest which it gives to the ovaries, pregnancy usually brings about a cure. The patient should keep on her back during her menstrual period; but, while rest in the recumbent posture should be taken morning and afternoon, she should be encouraged to move about and exert herself in some light household work, yet not to over-fatigue herself.

As far as medicines are concerned, those should be chosen which lessen the engorgement of the reproductive organs. Thirty grains of potassium bromide and ten drops of tincture of digitalis, given in compound infusion of gentian before each meal, will tend to quench all erectility of these organs. After the patient has been kept for some time on these anaphrodisiacs, alteratives will come into play: very good ones are ammonium chloride and mercuric bichloride, which can be advantageously administered after the following formula:

℞. Hydrargyri chloridi corrosivi, gr. j–ij;
Ammonii chloridi, ʒij–iv;
Misturæ glycyrrhizæ comp. fʒvj. M.
S. One dessertspoonful in a wine-glassful of water after each meal.

The paregoric in this mixture helps to control the aches; the antimony adds its quota to the needed alterative action; and the licorice disguises the harsh taste of the ammonium chloride.

Another very excellent alterative and nervine is the chloride of gold and of sodium. It is best given in pill and after each meal in doses of from one-eighth to one-quarter of a grain.

As there is in this disease a craving after stimulants and anodynes, which often degenerates into intemperance and into the opium-habit, the physician should be very careful how he prescribes such remedies, reserving their use wholly for emergencies.

In plethoric cases marked with menorrhagia iron is hurtful, but in anæmic cases with scant menstruation it rarely fails to do good, especially when given conjointly with arsenic. An excellent combination is one part of Fowler's solution of arsenic to nine of the syrup of the ferrous iodide. Beginning with ten drops after each meal, the patient increases the dose daily by one drop until thirty drops are reached. She then continues this last dose as long as it does good or it can be borne. In stubborn cases a sea-voyage may prove of lasting benefit.

The best of all treatments, however, and by far the best, is that devised for nerve-exhaustion by S. Weir Mitchell, which goes by the name of the rest-cure. It consists of prolonged rest in bed, seclusion from friends, massage, electricity, muscular movements, and a diet consisting largely of milk. By this treatment the circulation of the blood is made equable and the ovaries and other pelvic organs are thus relieved of their turgescence. I have had wonderful cures from this treatment, and can recommend it with the utmost confidence. Bed-ridden patients have been restored to health and chronic invalids returned to society.

Once in a while, lasting tissue-changes take place in the ovaries which medication cannot reach. The question then comes up, whether the woman shall be doomed to drag out the rest of her menstrual life bur-

dened with distressing ovaralgia, with crippled locomotion, and with pelvic aches and pains and throbs, or whether the source of all these mischiefs, the ovaries themselves, shall be extirpated. This is a very important question, and the removal of these organs should not be decided upon without careful deliberation and without the conviction that the disease is otherwise incurable.

Prolapse of the Ovary.

This displacement of the ovary is almost always one of the lesions of chronic ovaritis, and as such might have been discussed under that general heading. But as it displays certain symptoms peculiar to itself, and needs a special treatment aside from the general one, it seems to me best to describe it by itself.

At every monthly period the ovaries become turgid with blood, and from their weight sink low down. They can then be often felt, and even outlined, in Douglas's pouch. When this congestive period is over they discharge their over-freight of blood and again float up out of reach. Unfortunately, however, they sometimes keep turgid—blood-logged, so to speak—and consequently become permanently displaced. Accompanying this dislocation there will generally be some uterine lesion which will stand in the relation either of cause or of effect.

Nor could it very well be otherwise, for very close is the vascular and nervous kinship between the two—so close, indeed, that turgidity in the one means erectility in the other. Hence it is not always easy to decide which lesion was primary and which is secondary. When one ovary is displaced, it is usually the left one, because the left ovary, as explained under the heading of Ovaritis, is the one more liable to disease. When both ovaries are displaced, the left one will be the lower and the more easily reached, because the left round ligament is the longer and the left side of Douglas's pouch the deeper.

Causation.—Any condition tending to a lasting congestion of the reproductive apparatus is very likely to lead to a descent of the ovaries. The causes, therefore, are the same as those of chronic ovaritis, to which subject the reader is referred.

Symptoms.—First and foremost is pain in locomotion. Since the ovary now lies between the womb and the sacrum, it is liable at every step to be pinched between them. This pain is referred to the inguinal and sacral regions, and is of a sickening and an unnerving character. It often occurs suddenly, and then runs down the corresponding thigh along the track of the genito-crural nerve. One of my patients would, while walking, be unexpectedly seized with such a pain, which would either momentarily cripple her or else last so long as to compel her to call a carriage. Her left ovary, until cured by treatment, behaved like a loose cartilage in the knee-joint, and slipped down so low as to get pinched.

A second symptom is a throbbing pain while the rectum is loaded, and an agonizing pain during defecation. This arises from the grating of the hardened feces over these tender glands. In one of my cases[1] rectal enemata or the presence of hardened feces kindled up sexual throbs of the

[1] *Lessons in Gynæcology*, by W. Goodell, M. D., ed. 1880, p. 332.

most painful and exhausting character, which thrilled through the whole body for hours at a time.

A third symptom is painful coition, for the ovaries are now so low down as to be bruised by the male organ. A fourth is gusts of pain radiating from either groin. Lastly, there is usually present a morbid state of the mind, accompanied by low spirits. I have seen suicidal tendencies evoked by dislocation of the ovaries and relieved by their replacement.

Diagnosis.—A digital examination will discover in Douglas's pouch a very tender almond-shaped body on one side of the womb. If both ovaries are dislocated, two such bodies will be found; but the left one, for reasons previously given, will be lower down and more easily defined. Pressure upon one of them produces a sickening pain, like that when the testicle is squeezed. If the pressure be increased, and be so made that one of these bodies slips abruptly away from under the finger, such a thrill of indescribable pain darts through the groin and down the side of the corresponding thigh that the woman screams out and grows pale or becomes nauseated.

A dislocated ovary is sometimes mistaken for a pedunculated fibroid tumor of the womb or for the fundus of a retroflexed womb. But the uterine growth is not sensitive to the touch, and the flexion of the womb can always be told by the sound.

Treatment.—Whenever the dislocated ovaries are congested or they display signs of chronic inflammation, the same remedies will of course be useful as those for ovaritis. In addition, pessaries are important adjuvants, and especially in those cases in which the womb has a backward displacement. In the simple, uncomplicated cases of ovarian dislocation, in which the womb is in its proper position, a pessary often does more harm than good. To be of service it must be long enough to obliterate Douglas's pouch, and the pressure on the rectum or on the sacral nerves then becomes unbearable. If, on the other hand, it be too short, the ovary slips down behind it and gets badly pinched. These requirements practically exclude the resort to Hodge's pessary or to any of its modifications, with the exception, perhaps, of Fowler's. In the long run, a thick elastic and soft ring-pessary will do the most good, by offering a broad shelf on which the ovaries will sometimes, but not always, lodge. The air-cushion pessary and Gariel's air-bag will often answer the purpose better than any other, but, being of soft rubber, they soon become fetid and soon collapse.

A very excellent way of keeping up the ovaries is the knee-chest posture devised by H. F. Campbell of Georgia. Two or three times a day, or more frequently if needful, the woman unbuttons her dress, unhooks her corset, and loosens her underclothing. She then kneels on her bed with her body bent forward until her chest is brought down to the surface of the bed, while her head is turned to one side and the lower cheek supported in the palm of the corresponding hand. Her knees should be about ten inches apart and the thighs perpendicular to the bed. The trunk of the woman's body is now supported, like a tripod, by her two knees and the upper portion of her thorax. If she now refrains from straining and breathes naturally, a reversal of gravity will be established. With the fingers of her free hand she next opens the vulva. Air will

rush in, distending the vagina, and the contents of the abdomen will at once sink toward the diaphragm. This will, of course, draw the womb and the displaced ovaries out of the pelvic basin. As it is rather awkward for a woman while in this posture to free one hand to reach the vulva, Campbell advises that previously to taking this attitude she should insert into the vagina a small glass tube open at each end and long enough to project externally. This will leave an air-way and dispense with the use of the fingers. After staying in this posture for a few minutes, the woman removes the tube and slowly turns over on her side, where she is to lie as long as she can. Such constant replacements are of great service, for they lessen the throbbing and they give the limp ligaments a chance of shrinking and of keeping the truant ovaries at home.

In this intractable disorder an abdominal brace will sometimes do good. It may not cure, but it often blunts the edge of the aches, and thereby gives much comfort. By pressing the abdominal wall upward and inward the brace forms a shelf on which the viscera rest, and thus it takes off a portion of the load from the womb and from its ovaries. By virtually narrowing the pelvic inlet it lessens the space into which the bowels tend to crowd, and to that extent protects the pelvic organs. By swinging the pelvis backward it makes the axis of the superior strait lie more obliquely to the axis of the trunk, and the sum of the visceral pressure now converges, not in the pelvic basin, but on the portion of the abdominal wall lying between the symphysis pubis and the umbilicus.

There is yet another treatment which, combined with the knee-chest posture, I deem the best of all. It is Mitchell's rest-cure, to which I have before referred. After the patient begins to improve and to fatten, as she usually does under this treatment, she is taught how to replace the ovaries by atmospheric pressure, and the result is that in my experience they finally stay up. The explanation is as follows: By this treatment the circulation of nerve-fluid and of blood is equalized, and the ovaries, relieved of their turgescence, grow lighter. Then the increased deposit of fat in the abdominal walls, in the omental apron, and around the viscera, to say nothing of the needful fat-padding in all the pelvic nooks and crannies, increases the retentive power of the abdomen. Finally, by its gravity the now fat-laden and overhanging wall of the abdomen tends to draw toward itself—that is to say, upward—the movable floor of the pelvis. The behavior is like that of a rubber ball half filled with air, in which bulging at one pole causes a corresponding cupping at the other. This explains the ascent of the womb in women who get fat after the climacteric.

In exceptional cases the hypertrophied glands keep heavy and refuse either to go up or to stay up under any treatment whatever. The only known remedy will then be their extirpation—an operation which will be discussed under its appropriate heading.

Hernia of the Ovary.

This is usually a congenital displacement, and, according to Englisch,[1] is, when double, almost always so. The ovary is then found either in

[1] *New Sydenham Soc.'s Biennial Retrospect*, 1871–72, p. 291.

the inguinal canal or outside of this canal in the corresponding labium majus. The oviduct then accompanies it. When the hernia is acquired, the ovary, with or without the oviduct, makes one of the contents of the sac of an inguinal, a crural, a ventral, or an ischiatic hernia. Of these, the inguinal is by far the most common. Thus, out of 67 cases observed in 9 years by Langlon at the Truss Society, all were inguinal with 1 doubtful exception. Of these 67, 42 were congenital, 25 acquired.

The character of the lesion is told by the peculiar tenderness and nausea following pressure, and by the swelling of the tumor just before the menstrual flux. In one case mentioned by Routh[1] pressure on the tumor produced distressing sexual excitement; but this is an unusual symptom, although I have seen it produced by the pressure of hardened feces.[2] It is not always easy to decide whether the displaced glands are ovaries or testicles; and repeated mistakes in regard to sex have thus been made.[3] So difficult, indeed, is it sometimes that the microscope can alone settle the question.

Treatment.—In a reducible hernia, taxis and an appropriate truss comprise the treatment. If irreducible, a truss with a concave pad may be used to protect the ovary from injury. If the ovary be fixed by adhesions and it give much discomfort, it should be removed by operation.

Öophorectomy; Battey's Operation.

There are certain forms of diseases of women peculiar to the menstrual period of life. The attendant lesions are found either in the reproductive organs themselves or outside of them in remote organs, but with such monthly exacerbations as show their participation in the catamenial excitement. They are always very hard to cure, and often prove to be wholly unmanageable until the climacteric has been established.

In this category may be classed fibroid tumors of the womb, chronic pelvic peritonitis and cellulitis, chronic ovaritis and ovaralgia, ovarian insanity, ovarian epilepsy, and, in short, all those phenomena or those lesions which are embraced under the term of pernicious menstruation.

Fibroid tumors of the womb are, fortunately, pretty manageable. Usually, the womb, like a generous host, hospitably entertains them; but once in a while an unwelcome one presents itself which arouses all the resentment of that organ. If, then, it stubbornly resists all treatment, it slowly but surely destroys life by the pain which it evokes and by the loss of blood it gives rise to. In such a case the woman is virtually bed-ridden from her floodings and sufferings, and she looks forward to the climacteric as her only hope. But the change of life is then always postponed for several years beyond the natural term—oftentimes so many years as to be overtaken by the death of the patient.

Then, again, there are those cases in which, despite all treatment, the ovaries remain turgid with blood, acutely neuralgic, and to the last degree sensitive. They become dislocated and lie in Douglas's pouch, or irremediable tissue-changes take place, attended by follicular or by intersti-

[1] *Trans. Royal Medical and Chir. Soc., Lancet*, Jan. 28, 1882.
[2] Goodell, *Lessons in Gynæcology*, 2d ed., chap. xxvi. p. 332.
[3] Chambers, *Trans. London Obstet. Soc.*, 1881.

tial degeneration. A woman with such a lesion is usually a helpless invalid, racked with atrocious pains, weakened by exhausting menorrhagia, and wholly unable to fulfil her duties as wife or as mother. Usually she seeks relief in anodynes and becomes a confirmed opium-eater.

There are also many distressing cases of salpingitis or of pelvic peritonitis and pelvic cellulitis which cripple a woman past all hope by monthly exacerbations. Such cases are by no means rare, and the woman, reduced to skin and bone, finally dies, because in spite of all treatment the inflammation is rekindled at every monthly period.

Further, there are cases of epilepsy which seem to come wholly from the sexual organs—cases with an ovarian aura, so to speak. The fits begin at puberty, very generally last through life, and end in impairment of the mind. Often the first convulsion is ushered in by the first menstruation, and ever after it is around ovulation as a storm-centre that future eclamptic attacks revolve. Such an epileptic is the terror of her family and a valueless member of society. Generally she dies insane or with enfeebled mind, and if she marries she is very likely to transmit her infirmities to her children, either in the same form as her own or in kind.

Finally, what insane asylum does not hold incurable women whose mental infirmities seem to depend wholly upon the act of ovulation? Some there are who, indeed, never exhibit symptoms of insanity excepting during the monthly flux.

For these menstrual affections there is a remedy which, while yet in its infancy, promises much—one first proposed and performed by R. Battey of Rome, Georgia. This able surgeon reasoned that, since these disorders are kept up by the monthly afflux of blood to the sexual apparatus, and therefore incurable during menstrual life, the only chance of immediate relief lies in the establishment of an artificial menopause. To bring about this change of life he advocated the extirpation of both the ovaries, and labeled the operation normal ovariotomy. With this name fault has been found, because it does not cover the whole ground, for often the ovaries themselves, together with the oviducts, are found diseased. Now, since it is important to distinguish this operation from that of ovariotomy proper, and since the term spaying, which technically defines the character of the operation, is obnoxious from its association with the lower animals, the terms öophorectomy, or Battey's operation, have been adopted.

In well-selected cases this operation has been followed by wonderful results; but it has been greatly abused. By it I have restored to perfect health cases of otherwise incurable fibroid tumors of the womb, cases of dysmenorrhœa and of menorrhagia, and cases of pernicious menstruation in which the sufferers were reduced to the last degree of emaciation and feebleness. Out of 5 cases of ovarian insanity I have also cured 4; the fifth, while not wholly restored, is yet very much better.

This operation has been performed both by the vaginal and the abdominal section. For some years I was a warm advocate of the vaginal method, but I have wholly given it up, because by this method of operation adherent ovaries cannot be safely dislodged, the ovaries cannot always be reached, the vaginal wound cannot be dressed antiseptically,

and because the abdominal mode is more simple and less dangerous. Only when the ovaries are dislocated and low down in Douglas's pouch would I possibly resort to the vaginal incision.

If the abdominal operation be performed, the incision should be made between the navel and the pubes in the median line, and not over each ovary, as advised by some authors. One great caution must, however, be observed, and that is not to wound the intestines. In ovariotomy the cyst is in front of the intestines, and there is very little danger of injuring the latter. But in cases of öophorectomy, no tumor being present, the bowels lie in contact with the wall of the abdomen, and are very likely to be wounded by the knife when the peritoneum is incised. The incision should be long enough to admit two fingers. These, being passed behind the womb, are conducted to the ovary by gliding along the oviduct as a guide. Each ovary, together with its oviduct, is in turn brought up to the opening. It is then seized by a fenestrated polypus-forceps and its stalk transfixed, tied on either side with fine silk, cut off, and dropped back into the abdominal cavity. Should the stalk be so short that ovarian tissue is left behind in the button of the stump, it should be destroyed by Paquelin's cautery, for it is astonishing how small an amount of this tissue will keep up not only menstruation, but even menorrhagia. On the other hand, it will not answer merely to ligate the pedicles without removing the ovaries. This has been tried, and not only did menstruation continue, but in one instance pregnancy took place.[1]

The dressing is precisely the same as in ovariotomy, and, like it, the operation should be performed with every detail of antiseptic surgery.

In the vaginal operation the vagina first should be thoroughly cleansed with a solution of carbolic acid, and the patient placed on her back and not on her side. I am convinced from experience that the usual left-lateral position is a dangerous one, for as soon as the peritoneum is opened the air rushes out and in during every inspiration and expiration —an untoward circumstance which cannot happen in the dorsal position. A duckbill speculum is introduced, and the perineum pulled downward. The cervix uteri is transfixed by a strong thread, by which the womb is drawn downward and forward. The post-cervical mucous membrane is next caught up by a uterine tenaculum and snipped open for about an inch. The index finger of the left hand is then passed in, and each ovary brought down to the incision by the finger-tip hooked into the sling made by the oviduct. The ovary is seized by a fenestrated forceps and brought into the vagina, where its stalk is transfixed by passing a needle armed with a double thread between the ovarian ligament and the oviduct, and each half is securely tied. The ovary and the fimbriated end of the oviduct are then removed, the ligatures cut off at the knot, and the stumps returned into the pelvic cavity. To close the vaginal opening one or two stitches will be needed, and finally the wound is covered with iodoform and the vagina gently packed with pads of carbolated or salicylated cotton.

It is a fact worthy of note that during the week following the ablation of the uterine appendages a sanguineous discharge from the womb usually takes place. This is in no wise a menstruation, but a metrostaxis

[1] Murphy, *British Medical Journal*, April 18, 1885, p. 787.

set up by the irritation of the ovarian nerves, caused by the means adopted to secure the pedicles. Candor, however, compels me to say that for some inexplicable reason the removal of the uterine appendages —viz. ovaries and oviducts—does not always bring about the change of life. These cases are exceptional, and they are supposed to be due to either the presence of a third ovary or to some small portion of ovarian stroma left behind.

This operation in no wise unsexes a woman or changes her appearance or character. It simply brings on the change of life with its attendant phenomena. Her instincts and affections remain the same, her sexual organs continue excitable, her breasts do not wither up, and she is no less a mother or a wife.[1]

Extra-Ovarian Cysts.

There is a class of tumors which, while not ovarian, lie so near to the ovary as often to involve it, and usually need precisely the same treatment as cysts of that organ. In their extirpation the ovary is almost always also involved. This close anatomical relationship makes it needful to describe them in conjunction with ovarian tumors. They comprise Cysts of the Parovarium, Cysts of the Oviducts, or Fallopian Dropsy, and Cysts of the Terminal Vesicle of the Oviduct, often called the Hydatid or Vesicle of Morgagni.

Cysts of the Parovarium.

These are formed from the dropsical distension of one of the tubules of the parovarium, or organ of Rosenmüller, which lies between the folds of the broad ligament and between the ovary and the oviduct. Usually, one tubule alone is affected, and the cyst is then uniocular; but exceptional cases have been met with in which several of the tubules have become dilated, and the cyst is then biocular or even multiocular.[2] These cysts are often called cysts of the broad ligament.

By examining cysts in their early stage Albert Doran has demonstrated that "the vertical tubes of the parovarium are lined with epithelium, sometimes ciliated, but oftener cubical, the original, primitive form of the tubes of the Wolffian body. From these tubes and from the hilum of the ovary, full of Wolffian relics, spring the multiocular papillary cysts which give so much trouble to the operator. At the outer end of the horizontal tube of the parovarium is a cystic dilatation which is lined with a structure resembling endothelium. Apart from the parovarium, between the folds of the broad ligament, minute cysts are frequent. It is from these and from the terminal cyst of the parovarium that the simple unilocular so-called parovarian cyst arises. The terminal cyst of the Fallopian tube never attains a large size, and no true cysts of the broad ligament appear, when young and minute, to arise from that tube."[3]

[1] *Lessons in Gynæcology*, by Wm. Goodell, M. D., chap. xxvi.

[2] "Bursting Cysts of the Abdomen," by Wm. Goodell, *Trans. American Gynæc. Soc.*, 1881, p. 231.

[3] *British Med. Journal*, Oct. 21, 1882, p. 792.

These cysts are more commonly found in young women. From the thinness of their walls and the limpid character of their fluid, they yield very marked waves of fluctuation which are equally distinct at every point. They can usually be distinguished from ovarian cysts either by a lack of that tenseness so characteristic of the latter or by varying conditions of tenseness and flaccidity, as if the fluid were sometimes absorbed more quickly than at other times. They also grow more slowly than the ovarian cyst, and do not exert the same profound constitutional impression. The facies ovariana is absent, and the health of the woman may in no wise be disturbed. They, indeed, in the majority of cases, seem to do no harm, and are merely annoying from their bulk. The fluid they contain is with rare exceptions as limpid and clear as spring-water, but with refractive powers so high as to magnify the fibres of the wooden pail into which it has been drawn off.

Owing to their very thin walls and delicate structure these cysts on very slight provocation are liable to burst. On account of the blandness of the contained fluid this accident is rarely followed by collapse or by peritonitis. The rent heals up and the cyst usually refills; but in a large proportion of cases it does not, and the woman remains permanently healed.[1] Sometimes they are pedunculated, but often they lie between the two folds of the broad ligament, having no proper stalk.

Cysts of the broad ligament must not be confounded with those ovarian cysts which, instead of growing free in the peritoneal cavity, develop between the two layers of the peritoneum—intra-ligamentous ovarian cysts, as Garrigues very aptly calls them in his paper on the "Diagnosis of Ovarian Cysts."[2] In this excellent paper, from which I have gleaned much, he says that sometimes the anatomical relations are so lost that nothing short of a microscopic examination of the outer epithelium can determine the character of the cyst. Thus, "a tumor covered with columnar epithelium is ovarian, and cannot be anything else; while the cyst of the broad ligament, being covered with peritoneum, has flat peritoneal endothelium. In cases of intra-ligamentous development of an ovarian cyst the lower portion is covered by peritoneum, but the upper part has the columnar epithelium characteristic of the ovary." There are, however, certain macroscopic characteristics which will generally tell the nature of the cyst. For instance: usually by a careful examination the corresponding ovary will be found either stretched out and spread out in the wall of the sac, or, what in my experience is more common, elongated and forming a part of the stalk. These cysts are in the vast majority of cases monocysts, while unilocular ovarian cysts are very rarely if ever met with. Their walls are thin, of a conjunctival blue, and fretted with a delicate network of blood-vessels. The oviduct is usually imbedded in the cyst, and by transmitted light its fimbriæ can be traced out in the cyst-walls in long fronds as delicate as those of dried and pressed sea-weed. Then, again, the peritoneal coat is readily stripped off. On the other hand, in an ovarian tumor the oviduct is not ordinarily incorporated in the cyst-wall; in fact, a meso-salpinx usually exists; and, further, the peritoneal coat, being nailed down to the cyst-wall proper by the cicatrices of ovulation, is not capable of being stripped off.

[1] "Bursting Cysts of the Abdomen," by Wm. Goodell, *Trans. American Gynæcological Society*, 1881, p. 226.

[2] *Am. Journ. of Obstetrics*, April, 1882, p. 394.

Treatment.—Since these cysts do not ordinarily affect the general health or grow to a very large size, they should, as a rule, be let alone. Whenever grounds for interference arise the cyst should be aspirated, for sometimes after being wholly emptied it does not refill. Should, however, the fluid return, the cyst must be extirpated in precisely the same way as an ovarian tumor. When it is without a pedicle it will have to be carefully enucleated from between the folds of the broad ligament, which then cover it. If this cannot be done, all of the cyst possible should be removed, the edges stitched to the abdominal wound, and a drainage-tube put in. This is the advice ordinarily given, but I have not yet met with a cyst of this variety which could not be removed. Were such a one to occur in my practice I should be tempted to remove all of the cyst possible, and to close up the adherent portion in the cavity of the abdomen without resorting to a drainage-tube. The fluid secreted by a parovarian cyst is so bland that I believe no mischief would arise. The late Washington L. Atlee was accustomed to make merely a large circular opening in the cyst, without attempting to remove it.

Cysts of the Oviducts, or Fallopian Dropsy.

These tumors may contain either fluid or pus. In the former case the cyst is called hydro-salpinx; in the latter, pyo-salpinx. They are caused by salpingitis, or inflammation of the oviduct, which exists rarely per se, unless of gonorrhœal origin, but is one of the sequels of pelvic peritonitis. The distension of the tube is due to the occlusion of each of its ends. Thus by pelvic inflammation the fimbriæ become glued to the ovary, sealing up the ovarian end, while an endometritis closes the uterine opening. In addition to the dropsy of the tube, I have repeatedly met with small cysts, or bladder-like bodies outside of the tube proper, very analogous to those found on the umbilical cord.

This affection is by no means an uncommon one, every age being liable to it, and it is often the unrecognized cause of ill-health. Since Tait first called the attention of the profession to the frequency of the disease and the means for its cure, many cases have been reported in which obscure pelvic symptoms were cured by the removal of the ovaries and of the oviducts—the uterine appendages, as they are called.

Diagnosis.—This is difficult, because the symptoms are those of pelvic peritonitis or of pelvic cellulitis, the disease of the oviduct being usually associated with that of the broad ligament. In some cases the womb will be found movable, with a sausage-like tumor behind it; the diagnosis is then easy. Usually, the symptoms are negative, and the diagnosis is based upon constant groin-pains and recurring attacks of pelvic inflammation.

Treatment.—Like hydrocele of Nuck's canal, hydro-salpinx occasionally heals spontaneously, but more frequently it will need aspiration, together with injections of iodine or of carbolic acid. When pus is present, absorption probably never takes place, and an operation will be needed. If the symptoms are grave enough to warrant an exploratory incision, and dropsy of the tubes be discovered, both the tube and its ovary should be extirpated, for in the great majority of cases the cor-

responding ovary will have undergone follicular or interstitial degeneration. Unless there are very good reasons for adopting a different course, both ovaries and tubes should be removed, because the sound ovary, together with its tube, is liable to become diseased. The incision should always be abdominal, and not larger than to admit two fingers. The broad ligament is transfixed between the tube and the ovarian ligament by a double ligature and tied on either side. The operation is, in fact, analogous to that of öophorectomy. When the tubes contain pus, they are liable to become adherent to the sigmoid flexure, to the rectum, or to the small intestines, making their removal very difficult—sometimes, indeed, impossible. The separation of such adhesions requires the greatest care and delicacy.

Cysts of the Terminal Vesicle of the Oviduct.

A little bladder-like body, not larger than a pea, is often found hanging by a thread-like stalk from one of the fimbriæ of the oviduct. It is a relic of fœtal life, being probably the remains of the Wolffian body, and sometimes goes by the name of the hydatid or vesicle of Morgagni. The walls are very thin and covered by peritoneum. What rôle these vesicles play in the economy is uncertain, but they have been found to undergo cystic degeneration. They rarely attain to a size larger than that of an orange, and then either remain stationary or else burst. I have met with several examples of cysts which, after reaching the above size, did not grow any larger. I have also met with one case in which, after attaining the bulk of a small apple, the cyst burst, and immediately refilled, to burst again and again at intervals of from four to six weeks.[1] The collapse of the sac was attended each time by colicky pains, but of no great severity.

Other small cysts I have met with which either burst under the pressure of the examining finger or were designedly burst by bimanual pressure. These, I am disposed to think, were cysts of the terminal vesicle of the oviduct. These cysts are of but little surgical importance, as they rarely need operative interference. If such should arise, they are to be treated by aspiration, and if this fails by extirpation.

Solid Tumors of the Round Ligament.

These are occasionally met with, and usually on the right side. They belong to the connective-tissue group, being either myoma, fibroma, or sarcoma. They form at any point of the round ligament, and may therefore be either intra-peritoneal, intra-canalicular—that is, in the inguinal canal—or extra-peritoneal. The symptoms are those arising from pressure, and are not at all diagnostic. The only treatment of these tumors is removal, but, as their growth is very slow, they are not to be touched unless the symptoms become exacting.[2]

[1] "Bursting Cysts of the Abdominal Cavity," by Wm. Goodell, *Trans. Amer. Gynæcol. Soc.*, 1881, p. 228.

[2] *Medical Times and Gazette*, Dec. 1, 1883.

OVARIAN TUMORS.

The morbid growths of the ovary are conveniently divided into the solid and the cystic.

The solid ones are either benign, under the form of fibroma, or malignant, being then either carcinoma or sarcoma.

Fibroid Tumor of the Ovary.

Fibroid degeneration of the ovary is so rare a form of disease as to be denied by excellent authorities, who contend that all the cases reported under that term were pedunculated uterine fibroids, which had so grown around and so involved the corresponding ovary as to be mistaken for an ovarian fibroid. Yet while such mistakes have undoubtedly been made, there can be no question that ovarian fibroid does occasionally present itself as a rare form of disease.[1] Out of 155 cases of ovariotomy thus far performed by myself, I have met with 4 undoubted cases of ovarian fibroid. The tumors weighed respectively 2, 3, 4, and 15 pounds, and in each, with the exception of the first, abdominal dropsy was the prominent symptom. All but one of these cases promptly recovered.

According to Francis Delafield,[2] "The structure of a fibroid of the ovary resembles that of the ordinary fibroid tumors of the uterus. That is, they are composed of connective tissue and smooth muscular fibre. The tumor, therefore, is a myo-fibroma. There has been some question whether ovarian tumors ever contain smooth muscle, but the best authorities now admit that it does sometimes exist in such tumors."

Occasionally these tumors arise not from a general hypertrophy of the whole ovary, but from a nodule or a tumor growing in and from the stroma of the ovary. Solid ovarian fibroids are of slow growth and rarely attain a large size. When, however, they are of the geode variety, with numerous cystic cavities, they grow rapidly and may reach enormous proportions.

Diagnosis.—The only other abdominal tumor for which it is very likely to be mistaken is a pedunculated fibroid tumor on the peritoneal surface of the womb, and with our present knowledge it seems impossible to tell them apart.

When they float about in ascitic fluid they often give the sign of ballottement in a very perfect manner. From carcinoma of the ovary they can generally be told by their smooth surface.

Prognosis.—Fibroid tumors of the ovary grow so slowly that, like pedunculated fibroid tumors of the womb, they ordinarily do not attain a very bulky size. When the climacteric is reached they tend, like the latter, to stop growing and to undergo a calcareous degeneration. More often, however, they cause by their presence a dropsical effusion of the abdominal cavity, which has to be repeatedly drawn off; and it is for this reason that they usually have to be extirpated. They are removed precisely in the same way as an ovarian cyst, and the prognosis is equally

[1] *Brit. Med. Journ.*, March 18, 1882, p. 384.

[2] *Boston Med. and Surg. Journ.*, Nov. 17, 1881, p. 461.

good, but they are liable to have short and broad pedicles which need to be tied very carefully in sections.

Malignant Diseases of the Ovary.

These affections are either primary or secondary. When secondary, they follow analogous diseases of the womb or of the pelvic structures. When primary, they appear under different forms, as in other portions of the body, being either encephaloid, scirrhous, melanotic, or papillary. Colloid cancer of the ovary may be practically excluded, because it is of extreme rareness. The term colloid when applied to ovarian cysts refers more to the gluey consistency of the contained fluid than to the question of malignancy. In my experience the most common form is that of papilloma, which, however, like villous growths elsewhere, is not always malignant. I have removed papillary cysts and villous growths of the ovary, yet the subsequent history of the cases proved that the tumors were benign. The only macroscopic distinction between the benign and the malignant form which I have hitherto attempted to make is, that in the malignant form papillary growths will be found in patches upon adjacent structures, or else the womb and the broad ligaments are also involved in one cauliflower-like tumor. But Tait observes that he has had two cases of ovariotomy in which he left large masses of papilloma, fixing the womb, yet in each case these masses wholly disappeared, and the patients are both in perfect health.[1]

There is, however, no question that malignancy lurks in many ovarian cystomata which present to the naked eye an innocent appearance.

The patient recovers promptly from the operation for their removal, but dies a few months later from cancer of the peritoneum or of other organs. Every ovariotomist has met with such examples. In one of my own cases, in which not the slightest sign of malignancy was apparent, the patient wholly recovered from the operation. Shortly after her convalescence an effusion took place in the right pleural cavity. The chest was tapped three times before her death, which was due to cancer of the liver and of the broad ligament at the site of the ablated ovary. In my first case of ovariotomy, one in which the clamp was used, menstruation took place regularly for several months from the cicatrix, which within a year became affected with cancer.

Both ovaries are usually involved in cysto-carcinoma, and this fact should be borne in mind in making a diagnosis. From the marvellous changes often produced progressively in the epithelial linings of ovarian cysts, by which they are transformed into tufts of villous cancer, Tait inclines to the opinion that their growth is associated with a tendency toward malignancy. He believes that tapping hastens on this degeneration, and that after an accidental rupture of such a cyst the peritoneum will be found studded with patches of papillary cancer. Hence he argues that ovarian cysts should never be tapped, and that they should be removed in the earlier stages of their existence, before these malignant transformations have taken place.[2]

Diagnosis.—Since, as has been shown, this cannot always be made

[1] *Diseases of the Ovaries*, 4th Am. ed., p. 147.

[2] *Op. cit.*, p. 148.

out, even by the eye, after the removal of the cysts, it follows that in a large proportion of cases the malignant character of the degeneration cannot be recognized. There are, however, certain symptoms pointing to malignancy which will often throw much light. These, in the order of their frequency, are—

(*a*) The presence of ascitic fluid or of œdema of the lower extremities when the tumor is too small to produce such pressure symptoms.
(*b*) General cachexia, rapid emaciation, and grave constitutional disturbance out of all proportion to the size of the tumor.
(*c*) The hardness and solidity of the tumor, together with its nodulous and irregular surface.
(*d*) The concurrent development of two ovarian growths.
(*e*) The retraction and burying of the cervix in the vaginal vault.
(*f*) Pain in stabs, starting from the groin and running down the inside of the thigh. But pain is not a trustworthy symptom, as it is often absent, especially in cysto-carcinoma, and may be caused by benign growths as well.

TREATMENT.—Whenever no doubt exists as to the malignancy of an ovarian growth, an operation looking to its removal should not be urged by the physician. On the other hand, since a positive diagnosis on this point is rarely attained, and since cancer of the ovary tends for a long time to remain localized, whenever a suspicion of malignancy exists ovariotomy should be performed early, before adhesions have been contracted with neighboring structures. In such a case I should incline to burn off the pedicle in preference to using the ligature.

In those cases in which, on account of adhesions, no operation is justifiable, palliative treatment can alone be resorted to. This comprises the removal of the ascitic fluid or the contents of the cyst by the aspirator whenever the pressure becomes uncomfortable. Symptoms should be treated, and, that of pain being the most urgent, opium will be needed up to the last in increasing doses.

Dermoid Cyst, or Piliferous Cyst of the Ovary.

A dermoid cyst is a congenital tumor having a wall composed of elements like true skin, with its appendages of hairs, sebaceous glands, etc., and contains teeth, hair, bone, cartilage, muscle, and a cheesy material very like vernix caseosa. These cysts are solitary, two never being found in the same person, and, further, they are always unilocular. They are either external or internal—that is, they affect either the surface of the body or else the cavities of the body, as "under the tongue, in the pharynx, œsophagus, cranial cavity, peritoneal cavity, lung, ovary, testis, bladder, and kidney."[1] No tumors are more curious, and none are more puzzling to explain. The theories accounting for their origin are very remarkable, and are as follows: Excess of formative nisus. Parthenogenesis, or virgin birth; that is to say, imperfect imitation of transmitted fertility—a property peculiar to many insects, by which, without any renewal of fertilization, successive generations of procreating individuals start from a single ovum. Inclusion of abnormal structures,

[1] Elsner, *Dublin Journal Medical Sciences*, May, 1882, p. 380.

where there is a dipping in of the epiblast to meet the hypoblast during fœtal life, and the pinching off of the same. Fœtus in fœtu—viz. the inclusion of an imperfectly developed ovum within another which matures perfectly. Hypererehesis; which means that "the ovum has in it the origin-buds of certain tissues, which under exceptional hypererehetic action may go on to the rudimental formation of these tissues without a fusion with the male germ."[1] According to Elsner, who has written last on this subject, and to whom I am indebted for much information, "dermoids occur externally and internally in places where the epiblast dips down to meet the hypoblast, and where by processes of grooved involution new bodies are formed, such being, first in order, the testicle and ovary, and that they are therefore all (without exception) embryonal in their first structure."

Symptoms.—These congenital tumors begin early in life, and usually remain dormant until puberty. Then the periodic congestions of menstruation usually stimulate them into growth. Sometimes they need the increased vascularization of pregnancy. They are more liable than ovarian cysts to inflammation and suppuration, but they grow much more slowly, and very rarely reach the large size of the latter. They are also very liable to contract adhesions to every structure they touch, making their extirpation very difficult and sometimes impossible. Often they create pain out of all proportion to their size. Occasionally, they break and empty their contents through fistulous communications with the intestines, bladder, or the abdominal wall. But collapse of the usually thick walls of the cyst does not take place, and a cure results far less frequently than in pelvic abscesses, which empty themselves through analogous channels. The cyst ordinarily does not lessen in size; suppuration goes on with hectic fever and exhaustion, which finally carry off the patient.

Diagnosis.—Quiescent or slow-growing pelvic tumors, semi-solid to the feel, and first discovered at the age of puberty, are usually dermoid cysts. Their small size is also an aid to diagnosis, for they very rarely reach the bulk of the adult head. On several occasions I have found them in Douglas's pouch, fig-shaped and flattened in their antero-posterior diameter. From its attachments to neighboring structures a dermoid cyst is very liable to be mistaken for the cyst of an extra-uterine fœtation. But the exclusion of the history of pregnancy and the slow growth of a dermoid cyst, unless suppuration has taken place, ought to distinguish the one from the other.

Treatment.—While quiescent the cyst should not be touched, as it is very vulnerable and liable to resent the slightest injury, even from the slender trocar of the aspirator. If suppuration takes place and the tumor points to the surface, it should be treated, like any other abscess, by a free incision, by the evacuation of its contents, by the introduction of a drainage-tube, and by the injection of antiseptic solutions. Small cysts lying in Douglas's pouch can sometimes be cured by aspiration; at least I have twice succeeded in obliterating them in this way. The operation was, however, followed by suppuration of the cyst, the abscess bursting into the vagina. If after an exploratory incision an abdominal cyst turns out to be dermoid, it should be extirpated. But if extensive adhesions

[1] *Diseases of Ovaries*, by L. Tait, 4th ed., p. 177.

preclude such an operation, the cyst should be opened, evacuated, and thoroughly cleansed. The edges of the opening should then be stitched to those of the abdominal wound and a drainage-tube put in. The after-treatment of such a case will be analogous to that of an ovarian cyst under like conditions, to which the reader is referred.

Cystic Tumors of the Ovary.

These represent by far the most frequent variety of ovarian tumors, and as such demand our best attention. They consist, in probably the majority of cases, in a dropsical enlargement of one ovisac or of more—viz. in a follicular dropsy. Indeed, as Cazeaux has aptly said, the ovisacs, or Graäfian follicles, are ovarian cysts in miniature. These cysts are divided into three classes, which depend wholly upon the number of ovisacs involved. Thus, a single, or barren, cyst, containing merely fluid, is called a monocyst or unilocular cyst. Such a cyst would be due to the dropsical enlargement of but one ovisac. It is extremely rare—so much so that its existence is denied. The probability is that a one-chambered sac does not begin as such, but it becomes so through the breaking of the walls of other contained cysts. A multiple cyst is caused by the simultaneous growth of two or more ovisacs, one of which usually takes the lead in growth and keeps the others dwarfed. This form of cyst is by far the most common. It grows with great rapidity, and may reach a weight of over one hundred pounds. I have successfully removed one weighing one hundred and twelve pounds. A proliferous cyst is a mother-cyst packed with innumerable child-cysts of varying size. These endogenous cysts multiply by exogenous and endogenous growth. The proliferous cyst rarely attains to the size of the multiple cyst, but surgically it is a solid tumor, because it cannot be emptied by tapping, and therefore often needs a long incision for its removal. It also usually possesses a very thin wall, which is liable to be torn during the needful manipulation for its removal. Racemose cysts are occasionally met with. They consist of a number of isolated cysts of varying size attached to one common stalk like a bunch of grapes. I have met with two such examples. Tait thinks that they are "produced by the retention of the ova in the Graäfian follicles, and the distension of their cavities by a continuous secretion of the liquor folliculi."

The pedicle or stalk by which an ovarian cyst is attached to the womb consists of the corresponding broad ligament, oviduct, ovarian ligament, and vessels. The pedicle is sometimes long and slender, at other times short and broad. There is one form of ovarian cyst which has no proper pedicle. It grows between the two layers of the broad ligament, and tends to develop downward into Douglas's pouch. It is called the intra-ligamentous cyst, and needs careful and tedious enucleation for its removal. Sometimes, indeed, extirpation is out of the question, and the cyst has to be treated by the drainage-tube, as will hereafter be shown.

The contents of ovarian cysts vary very greatly in color and in consistency. In monocysts the fluid is often limpid and colorless. In multiple cysts the contents are usually syrupy, thick, and turbid. Sometimes the

color is quite dark, as much so as weak coffee. The surface of the fluid, after standing, will be covered with a pellicle of cholesterin crystals, which sparkle in the sunlight. In proliferous cysts the contents are usually viscid, sometimes as much so as jelly, and to this the term colloid is applied. Foulis, who is an authority on this subject, states that he has "never found that an ovarian fluid, however long kept, ever deposited a precipitate spontaneously. Whereas very frequently in the case of an ascitic fluid such a spontaneous precipitate appeared within a period varying from a few hours to a few days."[1] Again he observes: "After ten years of observation made on fluids withdrawn by the aspirator, I found that ovarian fluids never throw down a precipitate of a fibrinous character. An ovarian fluid was always a pure cellular secretion. An ascitic fluid was always the result of obstruction to the circulation or of inflammatory action in the peritoneum, and ascitic fluids allowed to stand for a short time nearly always showed a precipitate with the character of felted material under the microscope. If they tapped the patient and subjected the fluid to this test, two or three days would suffice to tell in cases in which there was doubt. The deposit in ovarian fluids showed cellular, not fibrinous, elements under the microscope."[2]

Chemically, the contents are mucous and albuminous, the albumen being readily detected by the tests of heat and nitric acid. Microscopically, ovarian fluid is found to contain fat-globules, epithelial, granular, and pus-cells, crystals of cholesterin, blood-corpuscles, and compound granular cells, also called the inflammatory globules of Gluge.

Whether ovarian fluid contains a cell or corpuscle peculiar to itself is yet a moot question. Drysdale contends that it has a characteristic cell. He describes it as "an albuminoid body containing little fatty particles which give it a granular appearance. It resembles in some particulars many other granular cells, but can be distinguished from all other cells found in the abdominal cavity. . . . . The principal test I employ is acetic acid. If the cell is ovarian, the acid changes it but little, perhaps rendering it only a little more transparent. But if it be a white blood-cell, a lymph-corpuscle, or any of those granular cells which resemble them, it will nearly always take on a different appearance, the cells almost vanishing perhaps, and multiple (2–5) nuclei appearing, as in the pus-cell. Then, if the cell be suspected to be fatty, degenerated, or Gluge's cell, ether may be added, by which the fatty materials will be dissolved and disappear. If no fatty degeneration be present, it is sufficient to add acetic acid."[3] Garrigues, on the other hand, contends that the ovarian fluid does not contain a characteristic cell.[4]

If I am not mistaken, the opinion of the best microscopists of Philadelphia is that the Drysdale cell, while not characteristic of ovarian fluids, is not found in any other fluid in such large numbers, and to that extent it is of diagnostic value.

Causation.—In probably the very great majority of cases an ovarian cyst is a dropsy of several ovisacs, but the cause of such growths has never yet been ascertained. In the majority of cases it seems to depend upon some sexual disturbance.

Very recently the relation of the sexual condition to disease has been

[1] *Edinburgh Medical Journal*, July, 1885, p. 76.
[2] *Ibid.*, June, 1885, p. 1131.
[3] *Trans. Amer. Gynæcol. Soc.*, vol. i. p. 195.
[4] *Ibid.*, vol. vi. p. 54.

made the subject of scientific inquiry. From a careful examination of the registrar's tables for France, M. Bertillon shows that marriage, by giving a comparative immunity from diseases of the sexual organs, prolongs life in both sexes. This statement is confirmed by the statistics of ovarian tumor. Of Lee's 136 cases, 88 were married, 37 were unmarried, and 11 were widows. Of Sir Spencer Wells's first 500 cases, 260 were married, 221 were unmarried, and 19 were widows. Out of 155 completed cases of ovariotomy performed by myself, 91 were married, 48 were single, 16 were widows. Of the married, 24 were sterile, 10 had one child, and 26 had but two children, and several confessed to using preventive measures. Out of a total of 791 cases of ovarian tumor, there are, then, 352 without husbands to 439 with husbands. Now, when one considers how small the proportion of single women and of widows is to married women whose husbands are living, the significance of these figures goes to show that childbearing women, and especially the prolific ones, are less liable to cystic degeneration of the ovaries, and that, unless the cycle of reproduction is completed in a woman, she is plainly violating some law of her being.

Symptoms.—There are no symptoms pathognomonic of this affection, for they are mainly those of pressure, and therefore belong in common to all fluid collections in the abdominal cavity. But in proportion as the abdomen swells there is a marked emaciation of the extremities. The limbs waste away, the face becomes pinched, the eyes are hollow and staring, deep wrinkles and furrows appear on the forehead and around the mouth, and the nostrils are wide open. This facial expression is termed the facies ovariana. Sometimes, when both ovaries are simultaneously affected, hair will grow on the chin and on the upper lip.

The Natural History.—The natural course of an ovarian cyst is to grow rapidly, and in about two years from the time of its discovery to destroy life by exhaustion through the embarrassing pressure which it makes upon the organs of respiration, circulation, and nutrition. Malignant cysts grow more rapidly than the benign, while the latter will, on the other hand, occasionally remain for years in a state of quiescence. I have kept stationary cysts under observation for ten years, and others have been reported which lasted twenty years without change.

As a cyst develops it is very likely to contract adhesions to the organs with which it lies in contact. The most common adhesion is that of the omentum. Next to this is adhesion to the abdominal walls. Then will happen more rarely adhesions to the bowels, womb, bladder, pelvis, liver, and stomach. A loop of intestine will sometimes be found fastened to the front wall of the cyst, but usually the bowels lie packed behind the tumor.

Rupture of the cyst sometimes takes place, either spontaneously, through over-distension, or through violence, as a kick, a rude fall, or from being run over by a carriage. This accident, if the fluid happens to be bland, may be followed by a cure; but more often a violent peritonitis sets in, which carries the patient off in a few hours. From a study of 257 cases, Aronson[1] rates the fatality at 41 per cent.; but without question the very great majority of cases of bursting cysts of the abdomen in which this accident was followed by a cure were cysts of the parovarium, which being

[1] *American Journal of Obstetrics*, Nov., 1883, p. 1210.

thin-walled are likely to burst, and which contain a bland, unirritating fluid. Bursting of the sac can be recognized by more or by less collapse and pain, by the disappearance of the cyst, and by the lessened size of the abdomen. If the patient does not at once succumb, excessive diuresis usually occurs.

It happens occasionally that the inner cyst-wall inflames, either spontaneously or in consequence of being tapped or from other injury. Suppuration then takes place, the contained fluid becomes fetid, and offensive gases are generated which give a tympanitic sound on percussion. There will be creeping chills, a red tongue, night-sweats, a frequent pulse, a general rise in the temperature with evening exacerbations: in one word, all the well-known symptoms of blood-poisoning will be present in a greater or less degree. Unless the cyst be at once removed the woman will speedily die.

Ulceration of the cyst, with perforation of its wall, may also occur. The decomposing contents will then be discharged, either into the peritoneal cavity or into any viscus to which the cyst may have contracted adhesions. In this way the purulent contents of an ovarian cyst have been discharged through the bowels, the bladder, the vagina, and even into the womb through the oviducts.

Hemorrhage within the sac is an occasional accident. When it takes place the tumor rapidly enlarges, great abdominal pain is caused by this sudden stretching, the complexion grows pale, the features become pinched; there will be collapse and all the symptoms of internal hemorrhage. If the bleeding does not stop, the patient will die in a few hours. On the other hand, if she survives the immediate danger, she is liable to succumb later to septicæmia, which arises from the decomposition of the now bloody fluid. The immediate removal of the cyst gives the woman, then, her sole chance of life.

Twisting of the pedicle of an ovarian tumor by axial rotation is another serious complication, which leads to its strangulation and gangrene, with consequent fatal peritonitis. The chief factors of this accident are, probably, the filling and emptying of the bladder and rectum, which may rotate an unadherent cyst with a long stalk. The symptoms of axial rotation, as carefully noted by Tait[1] and Aronson,[2] are sudden accession of severe abdominal pain and tenderness, a rapid increase in size, and incessant vomiting, the matter thrown up soon becoming green. The pulse rises, but the temperature is not always affected, and rigors are absent. Such a train of symptoms should lead at once to the abdominal section.

Diagnosis.—The diagnosis of ovarian cysts is often beset with so many difficulties that very humiliating blunders have been made by the best surgeons of the day. Lizars of Edinburgh performed laparotomy on a woman in order to remove a suspected ovarian cyst, and found nothing but fat. Others have done the same thing, and to their dismay have discovered merely an accumulation of wind in the intestines. The great Dieffenbach once opened the belly of a woman for supposed extra-uterine pregnancy, and found neither fat nor wind—not even, indeed, a trace of a tumor. Once an enormously distended bag of waters

[1] *London Obstet. Trans.*, vol. xxii. p. 97.
[2] *American Journal of Obstet.*, Nov., 1883, p. 1211.

broke just as a deservedly eminent British surgeon had rolled up his sleeves and was about to wheel his patient into an amphitheatre crowded with spectators to witness an ovariotomy. A surgeon of whom Great Britain can well be proud once drove his trocar into the shoulder of a fœtus under the idea that he was tapping one of these cysts. These facts show the importance of knowing how to make an examination for a suspected ovarian cyst, and how to distinguish such a cyst from other tumors and other fluid collections in the abdominal cavity.

The usual history of an ovarian cyst is—a tumor first discovered in one groin, rapidly enlarging, without tenderness or soreness, giving no inconvenience save from its bulk. The general health remains good until the tumor begins to distend the abdomen; then emaciation takes place, the strength becomes impaired, and the features begin to assume that pinched expression described on a preceding page as the facies ovariana. By inspection and palpation there will be found an elastic but somewhat irregular tumor, yielding the sense of fluctuation. By percussion a dull sound will be elicited at every point, except in the flanks, which are more or less resonant. If the contents of the tumor are colloid or the tumor is thick-walled or very tense, the sense of fluctuation may be either obscure or wanting. Sometimes a feeling like that of fluctuation is conveyed by a fat-laden wall of the abdomen. To muffle this fat-thrill the ulnar edge of the hand of an assistant is laid along the linea alba while the surgeon percusses the abdomen. The pressure thus exerted acts precisely like the damper-wedge of the piano-tuner, which muffles the sound of one string while its fellow is being tuned. By these means fluctuation can be detected and the diagnosis of a collection of fluid unhesitatingly made out.

By the amount of solid and fluid portions of a cyst correct diagnosis can often be made out, whether it is simple or multiple, compound or proliferous; but this is a matter of comparatively little practical importance, because when once a growing tumor has been ascertained to be ovarian, its removal must follow as a matter of course.

There are, however, certain enlargements or tumors of the abdomen which are very liable to be mistaken for an ovarian cyst, and to these, in the order of their frequency, we shall call attention.

Ascites.—When the fluid is not encysted, but free, as in ascites, it is at liberty to go to the most dependent portions of the body. Hence changes in the posture of the woman will make corresponding changes in the level of the fluid. These level-changes are made evident by percussion. When the woman lies on her back the intestines float up to the surface, and the fluid gravitates to the flanks, making them bulge. In other words, percussion in the dorsal position elicits a clear note in the umbilical region and a dull note in each flank. In this posture the front surface of the abdomen is symmetrical and somewhat flattened. But when the woman sits up the belly becomes convex. Further, ascitic fluid is displaceable by pressure on the abdomen. But even these signs are not always trustworthy, because the intestines, glued down by adhesions, may not float up, and there will be dulness over the front of the abdomen, or a distended colon may make each flank resonant. For instance, I have known a papillary cancer of the omentum attended with dropsy of the abdominal cavity to give such signs of ovarian cyst as dulness in front and resonance

in the flanks. When the fluid is ascitic the floating or false ribs are not pushed outward. The womb is usually low down and movable; there will also be more or less of bulging in Douglas's pouch.

On the other hand, in an ovarian cyst the womb is usually not very movable, and it is displaced to one side, generally behind the cyst. While the woman lies on her back the front surface of the abdomen is convex and unchanged in form. The floating ribs bulge out, making the chest conical. There will also be dulness in the front wall over the tumor, but usually more or less resonance in the flanks and over the region of the stomach: this clearness on percussion has been aptly termed coronal resonance. These areas of dulness and of resonance remain constant whatever the posture of the woman. Yet in suppurating cysts or after a careless tapping, or in cysts communicating with the intestine, the sac may contain gas, which will give a tympanitic sound over all the elevated portions of the abdominal surface.

It must, however, be borne in mind that ascites may exist concurrently with an ovarian cyst, and especially if the tumor be malignant in character. This can usually be detected by deep palpation, when the cyst will be reached and recognized by the fingers; or by pressing lightly, and then more firmly during percussion, an upper and a lower stratum of fluctuation will be detected.

Pregnancy.—The question of pregnancy is a very serious one, for it is sometimes a most difficult one to decide, especially when dropsy of the amnion (hydramnios) exists. In making a diagnosis nothing must be taken for granted, not even the woman's statement. She may be mistaken, or, indeed, she may be wilfully deceiving in the hope of having a cheap abortion induced by the examination. She may be pregnant and yet menstruate. On the other hand, an ovarian tumor will sometimes arrest menstruation. A healthy, ruddy complexion coexistent with abdominal enlargement should always excite a suspicion of pregnancy. There is sometimes a jaded look in pregnancy—the facies uterina—but never the facies ovariana.

The various signs of pregnancy should be searched for, especially ballottement and the fœtal heart-sounds. The cervical region should be most carefully examined per vaginam. A good broad rule to remember is, that when the womb is gravid the cervix is as soft as one's lips; when it is empty the cervix is as hard as the tip of one's nose. In all doubtful cases any operation should be postponed until time has revealed the true condition of things. Of course the introduction of the sound will settle the question of pregnancy, but this procedure is not to be thought of when any doubt exists, and it is therefore useless as a diagnostic agent. An ovarian tumor may coexist with pregnancy, and may have to be tapped or be extirpated before the delivery of the woman. The history of the case, the unusual size of the abdomen, the sulcus between the two tumors, will generally reveal the condition.

Fibroid Tumors of the Womb.—These tumors often reach a very large size, and if of the soft variety give an obscure sense of fluctuation which so closely resembles that of a colloid ovarian cyst or of a tense thick-walled cyst as to make the differential diagnosis very puzzling. The hard myoma gives no sense of fluctuation, but, on the other hand, if pedunculated it can be very readily taken for a solid ovarian tumor. A

fibroid tumor of the womb can very generally be told by the history of menorrhagia, by its slow growth, by the uterine souffles and colics, by the effacement of the cervix, and by the tumor being felt to be continuous with the cervix and inseparable from the womb. Then, again, women burdened with a fibroid tumor so far from losing flesh usually become more fat, and their complexion, like that of many pregnant women, is mottled with patches of brown pigment. Further, the uterine cavity is usually much longer than natural, and when the tumor is moved from side to side the motion is communicated to the sound passed within the cavity. But every rule has its exceptions, for when an ovarian cyst has a close attachment to the womb the latter may become elongated and also follow the movements communicated to the tumor.

The positive diagnosis between an ovarian cyst and a fibro-cystic tumor of the womb is impossible, but, fortunately, the latter disease is exceedingly rare. The existence of the latter may be inferred if the woman's face has a jaded appearance and is disfigured by brown patches—the facies uterina—if the growth of the tumor has been very slow, and if the womb is implicated with it. After tapping there will be a partial collapse of the tumor, and the fluid withdrawn is usually bloody and it coagulates on being cooled. After an exploratory incision the tumor presents to the eye a dark-blue and vascular capsule covered with interlacing fibrous bands.

Renal Cysts.—Cysts of the kidney are very commonly mistaken for ovarian cysts. I have made this mistake, and it was not until after breaking up adhesions and emptying the cyst that I discovered the character of the tumor. It was successfully removed. Renal cysts start from below the floating ribs and extend downward and forward, while an ovarian cyst begins from below and grows upward. The former, being generally caused by impaction of a calculus in the ureter, are usually associated with urinary disturbances. They also push the intestines before them, which give a resonant sound on percussion, while the contrary holds good with an ovarian cyst. Since the transverse colon lies between the cyst and the liver, the line of resonance caused by it will show that the cyst is not hepatic. The fluid withdrawn from a renal cyst contains urea and the other constituents of urine, but the urinous odor will be either very faint, or, as in my case, wholly absent. It may as well be stated here that when renal cysts present great difficulties in the way of their removal, they had better be treated by a large drainage-tube.

A floating kidney may be mistaken for a small ovarian tumor. But the latter has a pelvic attachment and can readily be pushed down into the basin, while the former is kept from being pushed very low downward by an upper attachment. Again, the floating kidney usually keeps its peculiar shape, and it is frequently lost by slipping from under the fingers into its natural bed in the flank.

Spina Bifida.—Strange as it may seem, this spinal cyst, when internal on account of a deficiency in the anterior parietes of the lower vertebræ, has been mistaken for an ovarian or a parovarian cyst. I am cognizant of two such errors of diagnosis made by two distinguished gynecologists. In each the sac was emptied by the aspirator, and the patient perished shortly afterward with the same kind of cerebral symptoms which follow the sudden withdrawal of the fluid from the cavity of an external spina bifida.

Phantom Tumors.—In the diagnosis of an ovarian cyst one must be on guard not to mistake for it a phantom tumor. In this imaginary kind of tumor, which hysterical women have the knack of creating, the whole belly will be uniformly distended to the size of the gravid womb at term. This is caused partly by flatus and fat, and partly by the arching forward of the spinal column, with the recti muscles drawn so tense that they cannot be indented. I have frequently had patients with this kind of abdominal enlargement sent to me from a distance, under the impression that it was due to some kind of tumor. But the diagnosis is easily made from the uniform resonance all over the belly; if, moreover, the patient's attention be engaged by conversation, the rigidity of the recti muscles disappears, the abdomen becomes flaccid, and the hand can be made to sink in so as to feel the spine. In very nervous women it may be needful to administer an anæsthetic, when all the tokens of a tumor will promptly disappear.

Obesity.—A large accumulation of fat on the abdominal wall and in the omentum has frequently given rise to the suspicion of the existence of an ovarian cyst. This condition occurs, usually, at the climacteric, and on percussion the vibratile thrill of the fat-laden wall of the abdomen conveys a very misleading impression of fluctuation. Further, to add to the difficulty, if the layer of fat be a very thick one, the abdomen, instead of being resonant on percussion, yields a dull note. But in obesity the fat is not limited to the abdomen, for the breasts, face, and limbs partake of the general enlargement. The abdominal wall hangs in folds when the sitting posture is assumed, and the umbilicus is indented and not protuberant. My own method of making the diagnosis is to grasp the abdominal wall with both hands and ascertain the amount of fat. When this amount is excluded, there will not be found room enough behind it for a tumor of any size, and the enlargement will thus be satisfactorily accounted for.

A dilated stomach, cystic tumors of the omentum, and encysted abscesses of the peritoneal cavity, and, indeed, of the abdominal wall, have been mistaken for ovarian tumors; but these are very exceptional cases. In all doubtful cases an exploratory incision should be resorted to.

Surgical Treatment of Ovarian Cysts.—In the consideration of this subject it may be divided into the palliative treatment and the radical treatment.

Palliative Treatment.—Tapping either by the trocar or by the aspirator comprises the only palliative treatment of ovarian cysts; yet, as a broad rule with but few exceptions, an ovarian cyst should not be tapped. The objections to this operation are—that, slight as it may seem, it is by no means devoid of danger. Even when the smallest hollow needle of the aspirator has been used inflammation of the cyst may follow, which will compel the immediate resort to ovariotomy and very greatly compromise the success of this radical operation.[1] This has repeatedly happened—once in one of my own cases, in which, however, the removal of the cyst saved my patient's life. Further, the fluid of a polycyst is usually acrid—so much so sometimes as to irritate the hands of the operator—and the escape of a few drops into the cavity of the peritoneum may set

[1] *American Journal of Obstetrics*, Nov., 1883, pp. 1169 and 1189; also *Transactions American Gynæcological Society*, vol. ii., 1877, p. 270.

up a violent and rapidly fatal peritonitis. Then, again, a fatal hemorrhage may take place from some wounded vessel, either in the cyst-wall, or in the adherent omentum, or in the vascular pedicle which may lie spread out in front of the cyst-wall, or, indeed in the abdominal wall itself, for the vessels here are often varicose from impeded circulation. In the fourth place, adhesions are very likely to form after tapping. Fifthly, innumerable child-cysts, which were very small before the tapping, being now relieved from pressure are liable to take on rapid growth and make the tumor more solid; and the more solid the cyst the longer the incision needed for its removal. Sixthly, in polycysts not only are the dangers attending the operation enhanced, but the cyst rapidly refills, and the woman becomes exhausted by the drain on her system. At the very best, 2 per cent. of cases of tapping in polycysts are fatal, even when performed by the most skilled specialists. Seventhly, a cyst once tapped rapidly refills, and soon needs repetitions of the operation. This drain on the system quickly tells upon the woman, and she is sometimes left too weak to have the radical operation performed. The first tapping, indeed, greatly hastens on this crisis, and it should therefore be put off as long as possible. Eighthly, a cyst emptied by tapping tends to rotate on its axis, and torsion of the pedicle may result, ending in gangrene and peritonitis. Ninthly, repeated tappings tend to convert benign papillary growths into malignant. Finally, Lawson Tait[1] draws attention to the fact that "repeated tappings deprive the blood of some element or elements included in the infinite variety of albuminous substances found in ovarian cysts, the deficiency of which predisposes to coagulation of blood." Hence after the removal of the cyst deaths have been "due to the formation of a firm white clot which started from the point of ligature of the pedicle, and slowly traversed the venous system until it reached the heart, death ensuing in from thirty to forty hours after the operation. The symptoms which precede death are swelling of the legs, rapid rise of the pulse, and its disappearance from the extremities some time before death, and breathlessness, ending in suffocation and slight delirium." He has met with several such cases of venous thrombosis starting from the pedicle, and they all occurred in patients who had been previously tapped. There are, however, cases in which tapping cannot be dispensed with; for instance—

1. Many women with ovarian tumors, having heard of cases of abdominal effusion or of cyst in which tapping was followed by a cure, will not submit to the radical operation until repeated tappings have proved to them the futility of the trocar.

2. Cysts of the parovarium and of the broad ligament being often cured by the use of the trocar, it is proper to try the effect of one tapping in slow-growing, unilocular, thinned-walled, and flaccid cysts, which thus exhibit the chief characteristics of these extra-ovarian cysts.

3. When an ovarian cyst develops during the later months of pregnancy, it will often be best to resort to tapping in order to relieve the woman from the pressure of two growing organs and enable her to go to full term. Sometimes labor is made impossible by the presence of a cyst, which will then have to be emptied.

4. In very large tumors which by pressure interfere with the functions of the kidneys, heart, and lungs, thereby causing albuminuria, œdema, or

[1] *Midland Medical Society, Lancet*, Feb. 18, 1882.

dyspnœa, tapping is a useful prelude to ovariotomy. By the relief from pressure afforded to these organs not only will the liability to shock be lessened, but also to hemorrhage, for vessels previously varicose will now contract to their natural calibre.

5. In cases of doubtful diagnosis or in those in which from malignancy, from formidable adhesions, or from other circumstances the radical operation is deemed impracticable, tapping in the first case may clear up the diagnosis, and in the latter ones will prolong the patient's life. But it must always be borne in mind that in a few weeks the fluid will reaccumulate, and the operation will have to be repeated, rapidly exhausting the patient by the drain on her system. It is well, therefore, to put off the first tapping as long as possible.

Tapping may be performed through the abdominal wall, through the vagina, or through the rectum, but, for reasons which will presently be given, the first mode is decidedly the best.

Tapping through the Abdominal Wall.—For this operation either the aspirator may be used or else Wells's trocar with a long rubber tube attachment. Of the two, I much prefer the former. In aspiration, after the bladder has been emptied, the woman lies on her back close to the side of the bedstead with her abdomen exposed. The preferable site of puncture is in the linea alba midway between the navel and the symphysis pubis; that is to say, at a point where the tissues, being tendinous, are most free from blood-vessels, and where the omentum is most out of the way. But if at this point the tumor feels solid, or an underlying knuckle of intestine is discovered by percussion, or the vessels look varicose, any other place in the abdominal wall may be selected where fluctuation is most manifest, provided it lies below the level of the navel. The reason for choosing a low site for the puncture is, that if the hollow needle be plunged in at any point above the navel it will slip out of the cyst as the latter collapses and before it is wholly emptied. The skin is now thoroughly cleansed with soap and water and washed with a 5 per cent. solution of carbolic acid. The painful part of the operation being the penetration of the skin, the selected place for puncture should either be frozen with the ether spray or be benumbed by a lump of ice dipped into some table-salt. After the aspirator-jar has been exhausted of air the hollow needle or canula, armed with its stilette, is lubricated with carbolated oil or vaseline, and rapidly plunged deeply into the cyst. Should the cyst not wholly collapse, the canula has probably become obstructed, and it should be cleared out by one of the blunt stilettes which are made of different sizes to fit the different canulas. Sometimes the flaccid walls of the sac as it becomes empty are sucked up into the end of the canula, and the flow of fluid is suddenly arrested. This accident is recognized by a peculiar valve-like vibration communicated to the instrument, and is overcome by raising up the end of the canula or by directing it to another part of the cyst. Should, on the other hand, other cysts present themselves, they can be emptied without withdrawing the canula by reintroducing the stilette, and by directing its point to each cyst in succession. When the fluid ceases to flow the fore finger and thumb firmly compress the fold of the abdominal wall behind the canula as it is withdrawn, so as to avoid the entrance of air, and the small puncture is covered by a piece of adhesive plaster. A pad of cotton wool is now laid over the

scaphoid abdomen and a flannel binder applied. These afford a grateful feeling of support and take away that sense of goneness which is likely to occur. To avoid all risks of inflammation the patient must keep her bed for three or four days and eat sparingly.

When Wells's or any other large trocar is used, the operation should be performed under the spray and with every antiseptic precaution. The skin should be previously incised with a lancet, and, lest air should be sucked up into the sac, the free end of the rubber tubing should touch the bottom of the bucket, so as to be always immersed in the escaping fluid. This rubber tubing acts as a syphon with great suction power, and the cyst is more rapidly emptied by Wells's trocar than by the aspirator. Yet I cannot help believing that the latter by its small size is by far the safer instrument, and I always use it when a simple tapping is aimed at. Should any stubborn bleeding follow the removal of the canula, a hare-lip pin may be passed across the wound deeply enough to get below the wounded vessel, and compression made by a turn or two of silk ligature around the pin. The same means are to be adopted to stop the oozing of fluid which sometimes takes place when a cyst with colloid contents cannot be wholly emptied by the trocar. For it is highly prudent under such circumstances to stop the oozing, as some of the fluid is sure to get into the cavity of the peritoneum, with very generally fatal effects. In such a case the pin ought to include the lips of the wound in the cyst. To avoid as much as possible the escape of irritating ovarian fluid into the cavity of the abdomen, the cyst when tapped should always, if possible, be wholly emptied. This is a rule without an exception. It is therefore very bad practice to remove even with the hypodermic syringe a few drops of the fluid for microscopic examination. Several cases of death from this cause have been reported.[1] I lay stress on this point because in my *Lessons in Gynæcology* I advocate the practice.

Tapping through the Vagina.—This operation is sometimes a very tempting one to perform when one of the cysts of a polycyst is pressing downward behind the bladder and causing dysuria. But it is by no means so safe as the supra-pubic mode of tapping. The reasons for this are—(*a*) The vessels are larger and lie closer together in the lower wall of the cyst near the stalk; (*b*) in a polycyst the larger cysts, growing where they have most room, usually develop in the abdominal cavity, while the more solid portion remains below in the pelvic region; (*c*) other organs, such as the bladder, womb, and rectum, are liable to become dislocated and lie in the track of the trocar; (*d*) the roof of the vagina responds to every respiratory movement of the diaphragm, and a cyst low down is not, from pelvic adhesions, so likely to collapse when tapped as one higher up: hence the cyst is liable to act as a pair of bellows, sucking in air and forcing it out. This inevitably causes suppurative inflammation with all its attendant evils. For these reasons this mode of tapping is never resorted to, except in cases of pelvic adhesion or in those in which the cyst starts from the lower side of the broad ligament and grows downward. Even then it is done only to relieve the distress caused by the double pressure upon bladder and rectum. In such cases the aspirator should be used, as it lessens all the risks. Should suppurative inflammation set in, the sac must be again emptied, the wound kept open by a

[1] *American Journal of Obstetrics*, April, 1876, p. 146.

drainage-tube, and the cavity thoroughly cleansed by daily injections of antiseptic fluids.

Tapping through the rectum has long ago been abandoned by the profession, as it ought to be, except in some very rare cases of atresia vaginæ. It was at one time supposed to possess advantages over the vaginal method, because the subsequent offensive discharges could be retained at will like the other contents of the bowel. But the cavity of the sac always became distended with fecal gas, and fatal septicæmia was pretty sure to set in.

Radical Treatment.—Tapping, followed by the injection of iodine into these cysts, has sometimes been rewarded with a cure, and at one time this mode of treatment had very warm advocates. After the cyst is wholly emptied by aspiration the action of the instrument is reversed, and from two to ten ounces of the officinal tincture of iodine are thrown in. The tincture is used of full strength, because the residual fluid in the cyst will be enough to dilute it. The cyst-wall is next kneaded, and the patient made to turn from side to side and from back to chest, so that the tincture may come in contact with every portion of the secreting surface of the cyst. The fluid is then pumped out, but all cannot be brought away; enough usually remains behind to produce some slight constitutional disturbance. While the canula is being withdrawn, in order to prevent the escape of any of the irritating injection into the abdominal cavity the thumb and fore finger are made to grasp the fold of abdominal wall at the puncture-site and to press it firmly down on to the collapsed cyst-wall. Good and lasting cures have followed such a treatment; but since they can happen only in monocysts, which are almost always par-ovarian, and not ovarian, it is probable that the mere emptying of the cyst would have done as much. In polycysts such a treatment is not to be thought of, for it would be attended with far more hazard than even the operation of ovariotomy. At the present day injections of iodine are practised only by physicians who do not operate; ovariotomists never resort to them.

Tapping, followed by enlarging the wound in the cyst, stitching its edges to those of the abdominal wound, and permanently keeping it open by tents or by a large drainage-tube, has frequently been attended with success. But since extensive and prolonged suppuration must inevitably ensue, this operation has proved to be a far more dangerous one than that of ovariotomy. It should, therefore, not be resorted to excepting in cases of cysts which are too adherent to be removed. The after-treatment consists in treating the case precisely as if it were an abscess. The cyst is kept empty by draining, and sweet by such deodorizing agents as solutions of iodine, carbolic acid, potassium permanganate, and the liquor sodæ chloratæ. Early this year I had one such case, a patient of C. A. Currie, in which the cyst was wholly adherent to all the pelvic organs and structures, and had besides a communication with the bladder. Not daring, under such circumstances, to remove it, I treated it successfully by incision, drainage, and disinfecting injections; but it was a long time before the drainage-tube could be removed and the woman be released from her bed. Cases, indeed, have occurred in which six months elapsed before the drainage-tube could be taken out and the woman pronounced well.

Another exception in favor of this operation may be made in the case of small cysts growing downward and bulging out the hind wall of the

vagina. It may then be advisable to follow Noeggerath's plan. He snips open the vagina transversely behind the cervix to the length of one inch, and makes a corresponding incision in the cyst-wall. The edges of the two incisions are then stitched together and a drainage-tube put in. Thus, the cyst is left with a free and permanent opening into the vagina, through which such antiseptic solutions as have been noted above are thrown up. In time the collapsed cyst-walls adhere to one another and cease to secrete.

Electrolysis has of late also been lauded as a sure and harmless remedy for these cysts. But a careful examination of the subject made by Mundé shows that this agent has been greatly overrated as a specific, and that it "can in no wise supplant ovariotomy."[1]

Rupture of ovarian cysts has occasionally taken place, either through over-distension or through such violence as a rude fall or an upset from a carriage. This accident, if the tumor were a monocyst or if the fluid happened to be bland, sometimes ended in a lasting cure. The hint was not thrown away, and several surgeons cut circular openings into the cyst to establish a permanent communication with it and the abdominal cavity. But this practice was soon given up, because it was found that the intrusion of ovarian fluid into the serous cavity usually set up a violent and rapidly fatal peritonitis. For such an accident, when followed by inflammation, there is but one remedy—the immediate removal of the cyst by ovariotomy. Desperate as this remedy seems, it has repeatedly been followed by success. The only cyst in which it might be held warrantable to establish a communication with the abdominal cavity is that of a cyst of the parovarium recurring after repeated tappings, and so bound down by adhesions or so covered by the broad ligament as to be irremovable. The fluid it contains is so limpid and bland as not ordinarily to inflame the peritoneum.

Ovariotomy.—The term ovariotomy comes from *ὠάριον*, ovary, and *τομή*, an incision. It is a barbarous compound of Latin and Greek, which is forced into meaning the operation for the extirpation of an ovary on account of some disease of its own structures which causes it to increase in bulk. A fibroid or a sarcomatous degeneration of this organ, as has been shown, will sometimes happen, but cystic degeneration is by far the most common form of disease to which the ovary is liable. When both ovaries are enlarged and removed the operation is called double ovariotomy. The terms ovariotomy and öophorectomy (*ὠόφορον* and *ἐκτέμνω*, to cut out the ovary) really mean the same thing, the latter word, indeed, being the more appropriate. But by modern usage the former is limited to the operation for the removal of an ovary greatly enlarged by some intrinsic disorder. By öophorectomy is now meant the operation for the removal of both ovaries for the purpose of bringing on the menopause, and thus curing diseases kept up or caused by the functional existence of those organs, while they themselves may or may not be diseased.

Before the eighteenth century the operation of ovariotomy as a radical cure had been suggested by a number of physicians, but had never been put into practice. Later, John Hunter and John Bell both advocated the operation, but neither ventured to perform it. This honor was

[1] *Transactions American Gynæcological Society*, vol. ii. p. 435.

reserved for Ephraim McDowell, a Virginian practising in Kentucky, who had attended Bell's course of lectures delivered in Edinburgh in 1794, and had imbibed the opinions of his teacher. He returned to Kentucky in 1795, and began at once to practise his profession, but it was not until 1809 that he first met with the opportunity for performing ovariotomy. The operation was successful, his patient having lived thirty-two years longer and having died at the end of her seventy-eighth year. Before his own death, which occurred June 25, 1830, in the fifty-ninth year of his age, McDowell had performed 13 ovariotomies, with 8 recoveries.

In spite of McDowell's success, and in spite of a large and growing percentage of recoveries reported by Atlee, Clay, and Spencer Wells, this operation was condemned so violently by the profession that its advocates were fairly ostracised, and fifteen years have hardly elapsed since it has been put upon as firm a basis as any other capital operation in surgery. "In 1843, Dieffenbach, the boldest of all surgeons then living, wrote that ovariotomy was murder, and that every one who performed it should be put into the dock. Now," writes Nussbaum, "we save lives with it by the hundred, and the omission of its performance in a proper case would in these days be looked upon as culpable negligence."[1]

The most common causes of death after ovariotomy are septicæmia or septic peritonitis, traumatic or frank peritonitis, shock, exhaustion, and hemorrhage; and it is against these foes that the operator must from the first aim all his efforts. In no other operation does the issue depend so largely on the experience of the surgeon. Every ovariotomist finds that his success grows with the number of his cases. Of 1000 successive ovariotomies, Wells lost 34 out of the first group of 100 cases, and but 11 out of the last group of 100. Out of his first 50 ovariotomies, Lawson Tait had 19 deaths.[2] The mortality of his last 313 cases was as low as 4.76 per cent.[3] Keith, who began with a mortality of about 20 per cent., lately had a series of 100 cases with 97 recoveries; 70 of these were successive. Schroeder had in the first 100 of his Berlin cases 17 deaths; in the second 100, 18; and in his third 100, 8 deaths.[4] Of my own first cases, I lost about 1 in every 3. Out of my last 22 cases there was but 1 death, and that occurred in a lady operated on at her home, too distant for me to see her again. In July, 1884, Peruzzi collected statistics up to date of Italian ovariotomists. Out of the first series of 100 cases, they lost 61. In the second 100 there were 36 deaths, but in the third series only 26 died.[5]

The statistics of the leading ovariotomists up to January, 1883, are as follows:[6]

	Cases.	Recovered.	Died.	Mortality, per cent.
Clay	93	64	29	31.11
Sir Spencer Wells	1088	847	241	22.15
Keith	381	340	41	10.76
Knowsley Thornton	328	293	35	10.67
Lawson Tait	226	199	27	11.94

[1] *British Medical Journal*, Oct. 26, 1878, p. 617.
[2] *Medical Record*, Jan. 3, 1885, No. 2, and *British Medical Journal*, April 15, 1882, p. 544.
[3] *Medical Record*, Jan. 3, 1885, p. 2, and *American Journal of Obstetrics*, July, 1882, p. 547.
[4] *Maryland Medical Journal*, July 1, 1882, p. 110.
[5] *British Medical Journal*, Sept. 16, 1882, p. 528.
[6] *Medical News*, Jan. 27, 1883, p. 117.

The statistics of general hospitals are by no means so good. In the Vienna General Hospital during the year 1881 "ovariotomy was performed 64 times, with 38 complete recoveries, 25 deaths, and 1 woman was discharged with marasmus."[1] Taking the profession at large, out of 5153 cases of ovariotomy collected by Baum, there was a mortality of 29.13 per cent.[2] Out of 2023 cases collected by Younkin, the mortality was 27 per cent.[3] By operative skill, by cleanliness, by wise hygienic measures, and probably by the use of antiseptic precautions, the fatality may be said to have been reduced by skilled specialists to about 10 per cent.; which, considering the size of the wound, the importance of the parts involved, and the delicacy of the exposed structures, is a remarkably low average. The average is indeed better than that of amputations. Before 1869, Sir James Y. Simpson stated that the average mortality of amputations of the extremities was 39.1 per cent. In the Glasgow Royal Infirmary the average mortality has been 25.5 per cent.—viz. of thigh cases there were 380 cases, with 113 deaths = 29.7 per cent.; of the leg, 182 cases, with 54 deaths = 29.6 per cent.; of arm cases, 167, with 33 deaths = 19.7 per cent.; of forearm cases, 93, with 12 deaths: mortality = 12.9 per cent.[4]

This brings up the question of simple or of aseptic ovariotomy—a very important question and one not yet fully settled. The objections to Listerism are—that it is very troublesome; that it is liable to poison the patient fatally, as well as to injure the health of the operator; that it is useless, indeed merely a surgical craze; and that it is not the carbolic acid which does good, but the cleanliness enforced by this system. But there is no doubt that since the introduction of antiseptic surgery the mortality has been much lessened in every land. For instance, "in Germany, where the success of ovariotomy has not been so good as in other countries, the mortality by means of the antiseptic treatment has been reduced from 90 to 20 per cent."[5] From an analysis of all the cases of ovariotomies performed by American surgeons, "the percentage of recoveries is overwhelmingly in favor of Listerism."[6] During the year 1881 in the Samaritan Hospital two of the surgeons used the carbolated spray of a strength of 1 in 40, and followed out every detail of antiseptic surgery. They had a mortality of 7 per cent. A third surgeon of that institution, after gradually lessening the strength of the spray until water was alone used, finally gave even it up altogether. He, however, for purposes of cleanliness always covered the instruments in the tray with water. The mortality of his operations showed the high rate of 30 per cent. The house committee, a body of laymen, thereupon "expressed a strong opinion against the performance of ovariotomy for the future without full antiseptic precautions."[7]

On the other hand, Tait of Birmingham and Keith of Edinburgh, with a recent mortality each of only 3 per cent., have abandoned the spray. The latter claims now "to get as good results without it, and better results than any one has yet got with it."[8] My own practice is to adhere

[1] *Medical News*, Dec. 30, 1882, p. 745. [2] *Agnew's Surgery*, vol. ii. p. 811.
[3] *The New York Medical Record*, Nov. 11, 1882, p. 560. [4] *Lancet*, Sept., 1882.
[5] *Agnew's Surgery*, vol. ii. p. 800.
[6] H. C. Bigelow, *American Journal of Obstetrics*, July, 1882, p. 651.
[7] *British Medical Journal*, May 20, 1882, p. 747. [8] *Brit. Med. Journ.*, May 27, p. 796.

to the spray and to every detail of antiseptic surgery; and I fully agree with Bigelow that "it would be a grave error to abandon a practice which has achieved brilliant results until something shall be brought forth which shall be as thoroughly protective, and in the use of which there may be no possible dangers. Time alone can demonstrate satisfactorily the relative values of Listerism and of perfect cleanliness without Listerism. The results of a large number of cases in which cleanliness and attention to detail have alone been used are the only criteria upon which we can strike a judicial balance."[1]

Contraindications for Ovariotomy.—An operation should be declined in far-advanced tuberculosis, in cancer of the ovary or of any other part of the body, in grave structural lesions of any of the vital organs, in ascites if caused by disease of the heart, the liver, or the kidney, in gastric ulcer, or in any serious disease of the alimentary canal. Extensive adhesions should not count as a contraindication, nor should age, since young girls and very old women have been successfully operated on. Albuminuria is often due to the pressure of the tumor on the kidneys, and, unless it existed before the appearance of the tumor or is positively known to be caused by Bright's disease, should not preclude the operation. Extreme debility dependent upon the ovarian disease makes the prognosis grave, but it should not prevent a resort to ovariotomy. I have indeed had several recoveries when the patient was so reduced in strength as to make it a very anxious and difficult task to keep her from dying on the table.

Indications for Ovariotomy.—This operation should not, as a rule, be performed when the cyst has first been discovered, but when it has grown so large as to distend the belly, and when the woman has become thin and her health has begun to fail. The reasons for waiting are—that the woman will have lived longer should the operation turn out to be a fatal one; that, the abdominal wall having become thinner both by being overstretched and by the absorption of fat, the incision will be proportionately shorter and shallower; that, the patient being now less full-blooded, both hemorrhage and inflammation will not be so likely to occur; that the bowels are crowded away from the line of incision; and that the pressure and rubbing to which the peritoneum has been for some time subjected will make it less vulnerable, and therefore less likely to take on inflammatory action. When, however, a woman broods over her condition and is anxious to have the tumor removed, the operation should be performed much earlier, especially if the surgeon be experienced.

Again, when an ovarian cyst is complicated with pregnancy it is best to perform the operation in the first half of the period of gestation; for in the last half the broad ligaments receive a large supply of blood, and all the pelvic vessels become varicose. Pregnancy is indeed no bar to the operation, the prognosis being favorable both to the mother and to the child. Schroeder and Olshausen performed 21 ovariotomies in pregnant women, with only 2 deaths.[2]

When septic peritonitis sets in; when the contents of the sac become purulent, as they sometimes do either spontaneously or after an unprotected tapping; when the cyst bursts and serious symptoms arise; when torsion of the pedicle occurs or when a free hemorrhage into the sac takes

[1] *Am. Journ. of Obstetrics*, July, 1882, p. 651. [2] *Brit. Med. Journ.*, Dec., 1880, p. 1027.

place,—the radical operation should unhesitatingly be performed, and that without any delay.

Preparation of the Patient for the Operation.—The operation having been decided upon, every precaution must be taken to ensure a favorable result. The patient should avoid all exposure to contagious or to zymotic diseases, and she should be put in the very best condition of health possible under the circumstances. If the kidneys be inactive and the urine highly concentrated, depositing mixed urates in abundance, it will be well for the patient to make use of warm baths and to take saline cathartics in quantities sufficient to secure a daily action of the bowels. The alkaline carbonates, largely diluted, will also prove beneficial, and so will also the effervescent citrate of lithia. Sometimes, and especially when anasarca and œdema of the legs occur, it will be advisable to relieve the pressure-congestion of the kidneys by a preliminary tapping. Other organs will also be relieved, and valuable time for the action of medicines is often gained by emptying the cyst. Tonics, iron in the form of Basham's mixture, a generous diet, and fresh air may be needed. A trip to the seashore or to the country will often do much good in preparing a broken-down patient for the operation. If the patient comes from a malarial district, from twenty to thirty grains of quinia should be given during the twenty-four hours for two or three days before the operation, and ten grains a few hours before the time of the operation. If this be not done, a severe explosion of malarial fever after the operation may put the patient's life in jeopardy.

An operation of election should not be undertaken during a monthly period. It should be performed either about ten days before one or about a week after one. The very best time is midway between two fluxes. When, however, through some lesion or some accident, immediate relief is demanded, no regard whatever should be paid to the factor of menstruation. Some surgeons operate, indeed, in any case whether the woman is menstruating or not, and profess to find no difference in the result.[1]

For several days before the operation the bowels should be kept open, and the diet should consist largely of milk, eggs, rice, and of wholesome and easily-digested food. On the day preceding that of the operation the upper portion of the pubic hair should be cut off and the abdomen, if hairy, shaved. In the evening the patient takes a warm soap-bath, and is washed perfectly clean by her nurse, who must be an experienced woman, able to pass the catheter and take the temperature. She then puts on clean clothing and goes to bed, where she stays until the hour fixed upon for the operation. To ensure sleep, I am in the habit of giving at bedtime thirty grains of potassium bromide, combined sometimes with opium. Early next morning a dose of castor oil is administered, and it is much more easily swallowed if disguised in some vehicle and brought to the patient without any previous warning. When oil cannot be taken, I give, at bedtime of the previous evening and in one dose, two compound cathartic and two Lady Webster pills. To avoid ether-vomiting, breakfast should consist merely of one piece of dry toast and a cup of tea, or of a cup of beef-tea or of a goblet of milk, and afterward she must eat nothing more. To calm the nerves another thirty-grain dose of

[1] T. Savage, *Brit. Med. Journ.*, April 14, 1883, p. 712.

potassium bromide may be given, with or without opium as the case may be, and especially if the woman be at all agitated.

A very good time for operating is from noon to two o'clock in the afternoon, for by that time the oil will have acted and the light breakfast will have been digested. Some surgeons operate as early as nine and ten o'clock in the morning, in which case the cathartic will have to be administered in the afternoon of the previous day. At the hour fixed upon for the operation the woman puts on a flannel sacque, warm stockings, and drawers, and her nurse then passes the catheter.

The bedstead on which the woman is to lie after the operation should have a horse-hair mattress, and should be wide enough to permit her attendants to move her on a draw-sheet from one side of it to the other. I formerly placed my patients on narrow single bedsteads, so that they could be reached and be waited upon equally well from either side; but I found that an unchangeable position on the back soon became intolerably irksome. Next, indeed, to the thirst following the operation, my patients complain mostly of the supine posture which they are compelled to assume.

The room in which the operation is to take place ought to be a separate one, so that the lady can be etherized in her sleeping-room, and may not be unnerved by witnessing the needful preparations. Several days beforehand the carpet of the operating-room should be taken up and the curtains taken down. Every useless piece of furniture should be removed, the closets and bureau-drawers emptied, and the whole room thoroughly cleansed and ventilated. Several hours before the time of the operation this room ought to be heated to a temperature of 75°, and the air disinfected and made moist by a solution of carbolic acid kept boiling in a dish on the stove or over an alcohol lamp. Let me here say that, if possible, this operation should not be performed within the walls of a crowded general hospital nor in unhealthy localities, but, as statistics well show, in private houses or, far preferably, in small special hospitals.

Articles Needed for the Operation.—The following articles should be provided by some member of the patient's family. Following the example of the late Washington L. Atlee, I have a printed list of them, which is sent to the family physician some days before the operation:

One yard of rubber plaster; two rolls of raw cotton, made aseptic by being baked in the range-oven just before the operation; two yards and a half of fine white flannel, for two binders; six one-grain rectal suppositories of the watery extract of opium; two pounds of the best ether; two gallons of a 5 per cent. solution of the best carbolic acid, made at least two days beforehand; four ounces of Monsel's solution of iron; twelve ounces of undiluted alcohol for the spray-producer; some old whiskey, with cup, spoon, and sugar; a nail-brush, basin, and soap; a pin-cushion, with large pins; two kitchen tables, or two dressing-tables; one small stand for the spray-producer; one small table for the basins and sponges; one chair without a back for a bucket of hot water; two new tin basins and one tin cup; a new bucket and a jug of hot water; a kettle of boiling water, ready on the range; a small tub and an empty bucket; six bottles filled with hot water and tightly corked; an empty wine-bottle for the aspirator; a rubber ice-cap or two pig's bladders for holding ice; a rubber-cloth one yard and a quarter square, with an oval hole in the centre six inches wide and eight long; one kitchen apron for the operator; one

clean blanket for the patient's lower extremities; two large platters or two meat-dishes, to be used as trays for the instruments;[1] clean towels, clean sheets, clean blankets, clean comfortables, and clean pillows.

Instruments.—In simple cases very few instruments are needed; but as one never knows beforehand what complications may be met with, it is best to be always prepared for every emergency. One must therefore have on hand every instrument likely to be wanted in the most formidable operation. The following list comprises all the instruments and other articles that I carry with me in my operating-bag, but it will not suit every surgeon, who will after a few operations choose his own favorite instruments:

One steam spray-producer, which will work two hours; assorted silk ligatures on spools; Lister's antiseptic gauze or salicylated cotton; two dozen straight surgeon's needles; assorted needles with varying curves; two large needles for transfixing pedicles; an aneurismal needle; one needle-holder; one hypodermic syringe; two dozen assorted pressure-forceps; one uterine tenaculum; assorted hair-lip pins and acupressure needles; one grooved director; two scalpels; Baker-Brown's cautery clamp; ten fine surgeon's sponges of different sizes; two long and flat sponges; one wire écraseur; one wire clamp or Koeberle's serre-nœud; Paquelin's cautery or three cautery-irons; one Wells's trocar with rubber tubing; one aspirator; two Nélaton's cyst-forceps; one straight pair of scissors; one pair of scissors curved on the flat; one right-angled pair of scissors; Allis's improved ether-inhaler; one flexible male catheter; three glass drainage-tubes of different sizes and lengths, together with the rubber sheeting and the sponge used with them.

The twenty-four needles should be threaded, two on one thread of fine silk eighteen inches long—viz. No. 1 or 2, of an excellent quality furnished by Messrs. J. H. Gemrig & Son of Philadelphia. To keep these threads from becoming snarled they are rolled up in a strip of muslin gauze, each pair of two needles with their thread being covered up by one fold of the gauze. The two pedicle-needles should also be threaded, but with stouter thread (No. 4), fully two feet long. All these armed needles should be put into a 5 per cent. solution of carbolic acid for several hours before the operation. Assorted needles of varying curves come occasionally into use, and it is always well to have several very fine needles on hand, together with the finest Chinese silk, in order to close a wounded viscus, such as the bladder or the bowels.

As an aid to the memory it is well to have invariably at every operation the same number of sponges and the same number of pressure-forceps, for these are the only articles likely to be left behind and closed up in the abdominal cavity. The cautery-irons should be wedge-shaped; the iron spreader used by apothecaries in making plasters forms an excellent substitute. In my hands the best pressure-forceps is Koeberle's. Its pointed beak catches the tissues far better than that of Wells's forceps, which looks like a crocodile's muzzle. The ordinary hæmostatic bulldog clips, or the serres-fines, must on no account be used, because if

[1] These platters are usually too shallow to hold a solution of carbolic acid deep enough to cover the bulkier instruments. It would therefore be well to have a tin tray made especially for the purpose, measuring nineteen inches long, twelve wide, and three deep; or a nest of smaller trays can be carried in the operator's bag.

they should lose their hold and drop into the abdominal cavity they would be too small to be readily discovered, and might indeed be hopelessly lost in the coils of the bowels. Long strings attached to each one would, however, overcome this objection.

The ten sponges must be of the best quality and about the size of one's fist. Two of them should be flat, long, and thin, such as are called by the trade potter's sponges. When first bought, sponges almost always contain sand. To rid them of this they are beaten, then soaked for twenty-four hours in a 3 per cent. solution of muriatic acid, and afterward washed out in clear running water. Sponges should never be put into boiling water, which destroys their elasticity, shrivels them up, and spoils them. After every operation the sponges should be thoroughly cleansed in cold water and immersed for forty-eight hours in a solution of washing soda (sodii carbonas) containing four ounces to the gallon of water. They are then rinsed out in running water, and placed in a 5 per cent. solution of carbolic acid. At the end of a week they are to be taken out and hung up in a bag. Instead of a solution of soda, some prefer an 8 per cent. solution of sulphurous acid, in which the sponges are soaked for from two to four hours. This bleaches the sponges, but does not cleanse them so well as the alkaline solution.

Only three assistants are needed—two are enough if they are experienced—and they and the surgeon should take a soap-bath, and not see on that morning any patient ill from a zymotic or a contagious disease. Their clothes should also be scrupulously clean. To ensure still further protection, each one takes off his coat, waistcoat, and neck-tie if they are of a material which cannot be washed. The nurse must also wear clean clothing which can be washed. A few bystanders may be permitted, but they should wear clean clothing and take off their overcoats. They should also be cautioned not to visit before the operation any case of contagious disease.

Upon arriving at the patient's house the surgeon, together with his assistants and the nurse, proceeds at once to get everything in readiness. The two tables may be arranged in the form of a ⊤, covered with several thicknesses of quilts, and with a pillow on the cross-table. When the tables are thus arranged a third one will be needed for the instruments and the spray-producer. In order to economize room and furniture, I am in the habit of putting one table at right angles to the other—viz. with its short arm to the left instead of to the right, thus: ⌋. The woman lies on the long arm of the ⌋, with her feet directed to the short arm, and on the projecting and free portion of the table forming the short arm are placed the tray of instruments and the spray-producer. As it takes time to get up steam in the necessarily large spray-producer, hot water should be poured into the boiler, and it should be one of the first things attended to. In order not to chill the patient, the spray solution of carbolic acid should also be heated before it is used. The edges of the oval hole in the rubber cloth are next smeared with some adhesive preparation, but a plaster suitable for all seasons of the year is not easy to devise. Keith's formula is the following, but it will not always stick:

℞. Emplastri saponis, ℥iv;
Emplastri resinæ, ℥iij;
Olei olivæ opt., ℥i. M.

After many trials, W. D. Robinson of Philadelphia has succeeded in making for me a very good plaster according to the following formula:

℞. Emplastri saponis, ℥ij;
Resinæ, ʒvi;
Terebinthinæ albæ, ʒij. M.

I must, however, add that I now very rarely use this rubber cloth.

Not all the instruments in one's bag, but only those likely to be needed, are now placed in the tray or in the platters, and covered over with boiling water, to which in a few minutes is added the same quantity of a 5 per cent. solution of carbolic acid. The best plan would perhaps be to pour into the tray a boiling 2.5 per cent. solution of carbolic acid. Into the same tray is also laid the roll of gauze containing the threaded needles. By its side on the table, and within easy reach, is placed a small bottle filled with a 5 per cent. carbolated solution in which are kept two small spools of Nos. 1 and 2 silk. The adhesive or rubber plaster is cut into strips of appropriate length, and the antiseptic dressing put in readiness. The trocar with tubing attached is hung on a nail near by. The sponges are carefully counted and placed in one of two basins arranged side by side on a table to the left of the patient. The other basin is one-third filled with a 5 per cent. solution of carbolic acid, which later on is reduced by the addition of pure hot water to a strength of 2.5 per cent. On a chair is placed a bucket of clean warm water.

Let me here say, once for all, that throughout the operation the assistant who looks after the sponges attends to them in the following way: Every soiled sponge returned to him is first cleaned in the bucket of warm water, next rinsed in the carbolated solution, then squeezed out and placed in the empty basin. This sequence must be rigidly observed, because, if the soiled sponge be plunged first in the carbolated water, the blood and serum which it contains will at once coagulate in its meshes, and become liable to be dislodged in the abdominal cavity as foreign bodies.

Meantime, the woman, in another room, has been inhaling the anæsthetic—the best being, in my opinion, the ether fortior of our leading manufacturing druggists. It should be administered by Allis's inhaler, which largely dilutes it with air. Wells and Thornton employ the bichloride of methylene; Keith uses pure ether; Bantock resorts to chloroform, and Tait to a mixture of two parts of ether and one of chloroform, given by means of Clover's apparatus.[1] When the patient is wholly unconscious her water is drawn off, and she is carried into the operating-room and laid on the table. To this table she is strapped down by a belt over her thighs, and her hands are also secured to the same belt. Her legs are wrapped in warm blankets, and her clothes are drawn up out of the way. Her chest and body are then covered by the rubber sheet, but the edges of its oval opening are made to adhere to the skin from just above the navel to the pubic hair, thus exposing only a limited portion of the abdomen. After this the spray is turned on, and the 5 per cent. solution of carbolic acid in the tray and in the basins is diluted with hot water down to 2.5 per cent. The operator and his assistants now take off their rings and cleanse their hands very carefully with carbolated soap and a nail-brush. They may clean and pare their nails with a penknife

[1] *The Medical Record*, Jan. 3, 1885, p. 2.

before the use of the nail-brush, but not after, because the knife not only does not remove all dirt, but it loosens up that which remains. Arranging themselves in their places, the operator stands to the right of the woman, his chief assistant to her left, the one who gives the ether at her head, while the other, who attends to the sponges, takes his place near the basins at the side of the chief assistant. The nurse holds herself in readiness to hand towels when called for, and especially to see that a third basin always contains warm water, so that at any stage of the operation the surgeon can wash his hands without delay.

When everything is ready the door is locked, and the exposed portion of the abdomen washed with the solution of carbolic acid. An incision about three inches in length is made with a free hand, and not by nicks, in the median line below the navel, where the blood-vessels are few in number. It should end about one inch and a half above the pubes; that is to say, low enough for the pedicle to be easily reached, but high enough to avoid cutting the fold of peritoneum reflected from the bladder to the abdominal wall. The brown line running below the navel is the surface guide, but after cutting through the skin and fat one cannot always hit the linea alba beneath. When the cyst is large the recti muscles have become separated from one another, and there is no difficulty in keeping within the wide tendinous interspace. But when the cyst is small the linea alba is, as its name indicates, a mere line, and the knife will often go astray into the anterior sheath of one of the recti muscles. The red muscular fibres pouting out of the opening will be the danger-signal of one's having got off the track into more vascular regions. To recover it a probe is passed in across the muscle to the right and to the left, and the nearest point of arrest will note the linea alba. The disadvantages arising from the wandering from the linea alba are—that the sheath of the rectus muscle being cut open, or the muscle itself being wounded, there results hemorrhage; that the wound is more jagged, and therefore less easily coaptated; that suppuration in the suture-tracts is more liable to take place; and, finally, that in cases of small cysts with but little abdominal enlargement a spasmodic contraction of the wounded muscle is very likely to embarrass the operator both in removing the cyst and in introducing the sutures.

Again, one cannot on a grooved director cut canonically through the different layers of tissue described with so much precision in the text-books. On the contrary, all that one needs is to know when the knife is approaching the peritoneum. An excellent landmark is the thin layer of fat overlying the peritoneum. So, after pinching up the abdominal wall to estimate its thickness, the surgeon can boldly cut down through the skin and its underlying fat, but somewhat cautiously through the aponeurotic structures until the second layer of fat is reached. Practically, therefore, he need regard but the following layers: skin with its underlying fat, the intermediate tendinous or muscular structures, the supra-peritoneal fat, and the peritoneum.

Before the abdominal cavity is opened all bleeding is stopped by the use of pressure-forceps, of which one dozen will sometimes dangle from the wound. When the hemorrhage has been wholly stayed, and not until then, the peritoneum is hooked up by a delicate uterine tenaculum and nicked open. On a broad grooved director or on the finger this opening is slit up for a distance of about two inches, either by a right-

angled pair of scissors or by a probe-pointed bistoury. A little serum usually escapes and the nacreous wall of the cyst comes into view. This is called an exploratory incision, for by it the diagnosis is confirmed, the presence of adhesions ascertained, and the possibility of completing the operation determined. When it has been decided to go on with the operation, more working room will be needed, and the wound is therefore enlarged by the scissors, the finger being used as a guide to prevent injury to the omentum or to any chance knuckle of bowel that may lie in the way. The size of the incision will depend upon the character of the cyst and on the number of its adhesions. Hence it may range from a length of three inches to the distance from ensiform cartilage to symphysis pubis. An incision contained between the umbilicus and symphysis pubis is technically called a short incision, and one extended above the umbilicus a long incision. Should it be found needful to prolong the wound to a point above the umbilicus, the incision is usually carried to the left of the navel and brought back in a curved line to the linea alba. This is done to avoid the round ligament of the liver and its vessels, which come in there from the right side. Keith, however, cuts directly through the navel; and I find this straight incision to be superior in every respect to the curved one. Other things being equal, the short incision is safer than the long one; but it is a good rule to have an opening large enough for easy manipulation and for the easy withdrawal of the cyst. For instance, a large monocyst without adhesions after being emptied can, like a wet rag, be pulled out, hand over hand, through a very small opening, whereas a much smaller polycyst, which cannot be wholly emptied, and which is more or less adherent, will need a long incision. I once removed an oligo-cyst weighing one hundred and twelve pounds through an incision barely admitting my hand; while I had to open the abdominal cavity from ensiform cartilage to symphysis pubis in order to remove a solid ovarian fibroid tumor weighing but eighteen pounds. Both patients recovered, but the chances were, of course, more against the woman with the long incision. To avoid the escape into the abdominal cavity of any blood from the wound, and to prevent the soiling of the operator's hands, a clean napkin wetted with the carbolated water is doubled over each edge of the incision.

Whenever the cyst-wall in the line of the incision is glued by adhesions to the parietal peritoneum, the latter is liable to be mistaken for the former, and accordingly to be stripped off from the abdominal wall. To avoid this very serious error, either proceed with the cutting until the cyst-wall unmistakably comes into view or is opened, or else extend the incision upward until a point is reached where the cyst is free from adhesions. Adhesions binding the cyst to the abdominal wall are of importance only from the troublesome oozing their rupture often gives rise to. To lessen this risk, they are to be sundered by the finger whenever possible. Should the scissors be used, the adhesion bands must be snipped close to the surface of the cyst, and not to that of the abdominal wall. Thus, a free end is gained, which may, if needful, be subsequently tied or in which the dangling blood-vessels may the more readily constringe. All thick and long bands of adhesion should be tied in two places and be divided between the ligatures. These ligatures should consist either of very fine silk or of gut. For isolated vessels the latter

are the better ones, but the silk is more suitable for tying en masse a group of bleeding vessels or for pursing up an oozing surface by an in-and-out stitch. A very important rule, on the observance of which one's success greatly depends, is, never to let a bleeding point or an oozing surface get out of sight. It must either be ligatured at once, or else caught by pressure-forceps and tied later if needful. If the delicate omental apron be found glued to the cyst, it should be carefully detached with as little tearing and splitting as possible, for each shred will bleed, and so will the fork of the split. It should then be turned out of the abdominal cavity on a clean napkin wetted with the carbolated solution. If its bleeding vessels be few, each one may be tied with gut; but if they are many, the torn portion of the omentum should be tied en masse or in sections, and the ligatures cut off close to the knot. All shreds and ragged ends of omentum must be trimmed off, and it is then returned to the peritoneal cavity.

When all the adhesions within reach, and those that do not demand great force, have been severed, it will be time to tap the cyst. This should be done with a large-sized trocar, such as Wells's, which is furnished with spring teeth to prevent it from slipping out of the cyst. Any trocar will do, provided it has a large bore, so that the vent may be free and that none of the acrid fluid can escape along its side into the abdominal cavity. In order to save time, neither Schroeder nor Martin use a trocar. They incise the cyst, and try by pressure and the lateral position to direct the contents externally. Frequently, however, some of the fluid escapes into the abdominal cavity, but they contend that if antiseptic precautions be taken no harm accrues.[1] Although dissenting from this opinion, I must confess to having had the contents of the cyst escape repeatedly into the abdominal cavity without doing any harm whatever. Always tap at the upper angle of the wound, because as the cyst collapses the trocar is drawn downward toward the lower angle. Hence, were the trocar entered low down it could not travel with the collapsing cyst, which would therefore slip off. While the fluid is flowing flat sponges should be packed in between the abdominal wall and the cyst, and the edges of the incision should be pressed firmly against them, so that the peritoneal cavity may not receive a single drop of that which frequently escapes along the side of the trocar. To avoid this accident—which, without being a very serious one, is yet not to be invited—some ovariotomists before tapping turn the woman well over on her belly and over the edge of the table; but this is liable to cause a protrusion of the bowels; which is, in fact, a more dangerous accident than the entrance of some of the fluid into the abdomen. Rosenbach, indeed, reports that during the extraction of biliary calculi through an abdominal incision a cure resulted, although several calculi were lost in the peritoneal cavity.[2] Should the mother-cyst not collapse on account of its containing a few other large cysts, the point of the trocar, without being withdrawn, can be made to enter each one. But if the child-cysts are many and small, the trocar is withdrawn, the opening enlarged, its edge seized by several pressure-forceps, and the hand introduced to break up these cysts.

Before this hand can again be used for separating adhesions it must be

[1] *Berlin. klin. Wochenschrift*, 1883, No. 10.
[2] *Medical News*, Feb. 3, 1883, p. 130.

carefully cleansed with soap, and dipped into the carbolated solution in the tray of instruments.

The empty cyst is next gently pulled out through the abdominal wound. It is, however, so slippery that this cannot ordinarily be done with the hands alone. A strong forceps with a firm grip is needed, and one of the best is Nélaton's. While the cyst is being withdrawn the bowels are sheltered from the air and the spray by one large flat sponge, and the abdominal cavity must also be packed with smaller ones at every exposed point; and one of them should always be placed between the womb and the bladder.

In the majority of cases there is not much difficulty in freeing the cyst from its ordinary attachments and in reaching its pedicle. But should adhesions bind the cyst to the adjacent viscera, matters will not go on so smoothly. Such adhesions to bladder, liver, bowels, or to other important organs sometimes present difficulties which are insurmountable. The problem here is to sever these bands of adhesion without injuring the viscera to which they are attached. When these adhesions are numerous or very firm, much advantage will be gained by having the assistant put his hand within the cyst and stretch its wall while the operator severs the adhesions over it. By this means the adhesions can be better broken off close to the cyst, which is the all-important course to pursue in visceral attachments. Sometimes it will be needful to peel off the outer and non-secreting layers of the cyst and leave them behind—sometimes to cut off the adherent portion of the cyst and scrape off or strip off the secreting surface. Whenever the stalk of the tumor can be reached before all the adhesions are severed, it will be well to catch it with one or two pressure-forceps, or even to tie it and cut it off between two ligatures, like the umbilical cord. This will prevent bleeding from the torn surfaces of the cyst. When the cyst is closely adherent to the edges of the abdominal incision, either extend the wound upward until a free point is reached, and work downward on the adhesions, or else cut into the cyst, empty it, and seize with strong forceps its inner surface just beyond where the adhesions begin. The sac is then inverted by traction, which will break up its adhesions to the abdominal wall, the last portions to be freed being those attached to the edges of the incision. This prevents the stripping up of the peritoneum. Should the appendix vermiformis be so adherent to the cyst as not to be detached, it must be ligated in two places, between which it is to be cut, in order that its contents may not escape into the abdominal cavity. The fecal plug in each distal end should also be carefully squeezed out. Double ovarian cysts sometimes fuse together, and, rupturing at the point of fusion, form apparently one cyst. Such a cyst will have two pedicles, and will be very puzzling to the inexperienced operator.

When the cyst has been freed from its attachments and turned out of the wound, the very important question comes up of the treatment of the stalk or pedicle. Shall it be secured by a clamp? shall it be burned off by the actual cautery? or shall it be tied, cut off, and dropped back? The first is called the extra-peritoneal method; the others, the intra-peritoneal. For many years the clamp claimed the most advocates, but it has lost ground on account of possessing the following disadvantages: By keeping the wound open it prevents a strictly antiseptic treatment;

the stalk sometimes sloughs below the line of constriction and conveys putrilage into the abdominal cavity; the stalk always becomes united to the abdominal wall, hence when it is short the womb is dislocated or it is too much dragged upon. Then, again, in one-third of the cases the oviduct has a trick of remaining open, and the woman will menstruate indefinitely from the abdominal cicatrix. This is owing to the fact that the clamped portion sloughs off too early for a firm plug of cicatricial tissue to be formed, and the oviduct is therefore liable to stay open. In my first case of ovariotomy this happened, and one year later the cicatrix degenerated into a malignant growth which destroyed the life of my patient. It is, however, probable that in this instance the cystic disease of the ovary was malignant, although the sac did not look so at the time of its removal. Another disadvantage arising from the use of the clamp is the subsequent weakness of the cicatrix at its site, and the liability of ventral hernia to form there. These are the objections to the clamp, and they are so valid that at the present time all distinguished ovariotomists have abandoned its use.

The actual cautery, performed by Paquelin's instrument or by platinum-tipped irons, which do not scale off or discolor the tissues, is theoretically the very best way of dealing with the stalk. No foreign body besides the charred portion of the stalk is left within the abdominal cavity; but, on the other hand, it cannot always be trusted to close the vessels. On this account it is looked upon with disfavor by all ovariotomists with the exception of Keith. His method is as follows: The pedicle is spread out evenly within Baker-Brown's clamp, so as to get equable compression. The cyst is cut off, leaving a stump about an inch in height above the clamp. To protect the parts from heat a folded napkin wetted in the carbolated solution is tucked under the clamp. The stump is next carefully dried, and then burned slowly down to the level of the clamp by wedge-shaped cautery-irons at a brown heat. They give off a whistling sound during the process. The thick end of the stump can be more quickly burned down, but the thin end should be burned very slowly, and the blades of the clamp by prolonged contact with the cautery-iron must also be made hot enough to dry up and shrivel that portion of tissue which they compress. In order not to disturb the stump after it has been cauterized, it is best to clean out the peritoneal cavity first, and to leave this treatment of the pedicle for the last thing. Before removing the clamp, which is to be unscrewed very slowly and carefully, one side of the pedicle is seized by a pressure-forceps, by which it is kept in sight and out of harm's way if the peritoneal cavity needs further cleansing.

The plan of treating the pedicle most in vogue, and the one which I adopt, is that of the ligature—one of fine carbolated silk, the finest compatible with safety. The ends are cut off close to the knot, and the stump is dropped into the peritoneal cavity, where the silk, being animal tissue, will in time become disintegrated and absorbed. Now, when I say silk, I mean silk, and not silver or gut ligature. Silver, being inelastic, cannot bind a shrinking stalk, while the gut is a treacherous ligature, and will sooner or later bring one to grief. It slips in the tying, it is liable to untie, it gives instead of shrinking, and it is too short-lived for the obliteration of large vessels.

The reasonable objection has been urged that since the abdominal cicatrix left by the use of the clamp is liable to reopen every month to give vent to menstrual fluid, the same phenomenon will by this intra-peritoneal method happen within the abdominal cavity and expose the woman to all the risks of a hæmatocele. But fact is here opposed to theory, for it has been found that either the oviduct in the stump atrophies into an impervious cord of fibrous tissue, or that its raw end, by contracting adhesions with the surrounding tissues, becomes hermetically sealed. It might also be supposed that the distal end of the ligatured stalk would slough and expose the woman to septic peritonitis. But such sloughing rarely happens, and for the following reasons: From shrinkage of the stump the constriction is lessened, and the capillary circulation is re-established; or the peritoneal surfaces on each side of the narrow and deep gutter made by the fine silk will bulge over and touch one another. Adhesion then takes place between the two, and the blood-vessels which shoot over from the proximal or uterine side of the ligatured stump will carry life into the distal end; or lymph exuded by the irritation of the ligature will throw a living bridge across the gutter in the stalk; or, what is the least desirable, the raw end of a long stalk glues itself to any peritoneal surface with which it may come in contact. I say least desirable, because sometimes such an adhesion makes a kink in the bowel, and may so constrict it as to give rise to fatal obstruction. To prevent this accident, Thornton stitches with gut the raw end of the stump to the broad ligament, to which it adheres; while Bantock catches it up out of harm's way by including it in the lowest abdominal suture, which, being of silkworm gut, can be left in for a long time. If the stump be short, it stands upright, and does not then need this treatment.

If the stalk be a thick one, it is transfixed by a blunt needle threaded with a double ligature, and is tied on either side, each half by itself, and then the whole is further tied by the free ends of one of the ligatures, or the Staffordshire knot, recommended by Tait, may be used. If it be a broad one, it is tied in three or more sections by cobbler's stitches. In thick or in broad stalks it is a good plan to catch the stalk in Dawson's clamp, which compresses it circularly, and to transfix and tie it in the furrow made by the clamp. This lessens the risk of secondary hemorrhage, which is usually caused either by the slipping off of the ligature or by its loosening through tissue-shrinkage. When this clamp is used the pedicle need not be tied until the wound is ready to be closed. The stalk must be cut off at a distance from the ligature of not less than three-fourths of an inch, so as to leave a button of tissue sufficiently large to prevent the loops from slipping off. In short and broad stalks the outer or broad ligament portion, which is thin and membranous and sustains most of the tension strain, is liable to slip out of its ligature and cause a fatal hemorrhage. To avoid this accident the ends of the corresponding ligature may, before being tied, be repassed in opposite directions through the stalk very near its margin to form the cobbler's stitch. Another way is to pass a fine silk thread through the thin portion of the stalk about one-third of an inch from its edge, and tie it. In the notch thus made, and below the knot, is laid and tied the outer ligature.

In anæmic cases Thornton ties the arterial side of the pedicle first, but in young and vigorous women he ties the venous side first, so as to

deplete the woman by gorging the tumor with blood. While cutting off the cysts the abdominal cavity must be so protected by sponges that not a drop of blood shall fall into it. A dilated oviduct in the pedicle tends to suppurate; hence in such a case the ligature should be applied as close to the womb as possible, so as to get below the expanded portion. Before the cyst is cut away the pedicle should be seized on one side by a pressure-forceps, and kept more or less in sight until the wound is ready to be closed up. This will also prevent the ligatures from being rubbed off by the sponges while the abdominal cavity is being cleansed.

Sometimes the cyst has no stalk, but lies between two folds of the broad ligament, or else it is bound to the bladder, womb, and the pelvic tissues by intimate adhesions which cannot be safely severed. Formerly, under such circumstances the abdominal wound was hastily closed up and the case abandoned. Now, thanks to Miner of Buffalo, New York, we can fall back on enucleation, and need rarely be foiled.[1] This operation is performed by slitting open the peritoneal capsule of the sac at points close to its attachments, by introducing one finger or more into the opening, and by stripping off this serous and vascular envelope up to where the vessels enter the cyst-wall and become capillary. The artificial stalk thus made is to be treated precisely like a natural one—that is to say, by clamp, ligature, and cautery, or, if it does not bleed, by nothing whatever. This operation I have repeatedly performed, but it is seldom easy, and is always anxious work. Should the cyst be so wholly adherent to the viscera as not to be even enucleated, an incision is made into it. It is then emptied, thoroughly cleansed, and the child-cysts are also crushed by the hand. The edges of the opening thus made in the sac are now included in the stitches of the abdominal wound, but the latter is kept open either by a large cloth tent at the lower angle or by two glass drainage-tubes, one at each angle running down into the sac. Sometimes it may be needful to tie the adherent portion in sections and to cut the free portion away. A drainage-tube must then be inserted at the lower angle of the wound. This expedient has the sanction of Atlee and Olshausen, who have reported successful cases thus treated.[2] My own practice in such cases would be, after breaking up the child-cysts, to gather together the free portion of the cyst and bring it out at the lower angle of the wound. A short nickel-plated steel drainage-tube of large bore is inserted, the sac firmly clamped to it by a small wire écraseur, and the redundant portion cut away. Into this metal tube is passed a glass drainage-tube long enough to touch the lowest portion of the sac.

In such cases, when feasible, I think it would also be well to adopt Freund's plan of tying the pedicle and severing it, in order to lessen the blood-supply to the cyst.[3]

The sac having been removed, the other ovary should be examined, and, if diseased, be tied and cut off. From the sundered bands of adhesion more or less bleeding has been taking place, which must now be attended to. It can usually be stopped by pressure with a sponge or with a finger, or with sponges wrung out of very hot carbolated water. For single vessels torsion will usually succeed, but if it does not, fine

[1] *Transactions International Med. Congress*, 1876, p. 801.
[2] *Monthly Abstract*, July, 1877, p. 334.
[3] *Boston Med. and Surg. Journal*, Aug. 24, 1876, p. 219.

carbolated silk or gut ligatures must be used; and it is wonderful how many can be applied without materially compromising the safety of the woman. I once tied over thirty vessels in a lady sixty-eight years of age, who recovered without any symptoms of peritonitis. The free ends of the ligatures should always be cut off close to the knot. Stubborn oozing surfaces can very generally be stanched by searing them with Paquelin's thermo-cautery, or by passing a needle armed with fine silk under and ligating any vessel that may be detected leading up to the seat of the oozing. In some cases nothing answers so well as the pressure of the finger moistened with alcohol or with a drop or two of the ferric subsulphate or of the tincture of iodine. In oozing from inaccessible points in the pelvis a sponge dipped in the undiluted solution of iodine or in Monsel's solution of iron, and afterward well squeezed out, may be pressed firmly down for a few moments into Douglas's pouch. When the oozing comes from a large surface of the abdominal wall, it may finally be arrested by the doubling of the raw surface on itself. The fold thus made is then secured either by a long acupressure needle or by cobbler's stitches passed through from skin to skin. Forty-eight hours after, this needle or these stitches should be removed. For this ingenious device we are indebted to the late Kimball of Lowell, Mass. Should all these measures fail, put in a drainage-tube, close up the abdomen in the manner about to be described, and temporarily lay over the dressings some heavy weights, such as bags of sand or of shot. This plan I have not been obliged to resort to, but it has the sanction of Nussbaum, who uses two large bricks, and it is worthy of being borne in mind.[1] In my hands an elastic flannel binder pinned very tightly over a large roll of cotton wool has made pressure enough to check the hemorrhage.

The toilet of the peritoneum next comes in order. By this is meant the peeling off from the peritoneum of plastic deposits, the removal of the sponges packed into its cavity, and the careful cleansing away of all fluids and of every blood-clot. In the search for all such foreign bodies, or, indeed, for obscure oozing-points, the reflector of the ophthalmoscope or Colin's illuminating lamp will give much aid. Douglas's pouch and the peritoneal fold between the bladder and the womb are favorite localities for the collection of blood or of serum, and should therefore be thoroughly mopped out by small sponges on holders, otherwise peritonitis or septicæmia may result, which are the two great factors of death in unsuccessful cases. When this has been thoroughly done, a clean sponge is placed in Douglas's pouch, another in the sulcus between the bladder and the womb, and a third, a large and broad flat one, is laid over the intestines under the wound to catch the blood that may drop from the needle-tracks. Each needle is passed from within outward a quarter of an inch away from the peritoneal edge of the wound, and is made to emerge at the same distance from its cutaneous edge. If the recti muscles are included in the sutures, there is said to be a liability to the formation of abscesses in the suture-tracks. Hence almost every ovariotomist advises that the peritoneum and skin should be pinched together, and that the needle should be passed through them alone without perforating the muscles. Yet I believe that from a too close observance of this rule come many cases of hernia in the track of the wound, and that were the recti muscles

[1] *British Med Journal*, Oct. 26, 1878, p. 617.

more closely coaptated they would not recede from one another and thus aid in the formation of a rupture. My own rule is to include these muscles in the suture wherever they are exposed to view. The sutures should lie about one-third of an inch apart. The needles should be lance-pointed and held by a needle-holder. In fat women it is not always easy to get the two surfaces of the wound in exact coaptation; consequently, more or less puckering and eversion of the edges may take place. To avoid this, it will be well, before passing the needles, to bring the edges of the wound together, and make with a fountain-pen transverse lines at proper intervals across the incision as landmarks for the introduction of the sutures. These cross-lines are also of advantage whenever the abdominal walls are too tense for accurate coaptation, as after öophorectomy, after the removal of a small abdominal tumor, or after an exploratory incision for a solid tumor which cannot be removed. In these cases, indeed, it would be well to make the cross-lines the first step of the operation, before even the abdominal incision has been made.

The reasons why the needle is made to enter the peritoneum first are, that the stitches are lodged more evenly on that vulnerable surface, and with less injury to it, such as the stripping of it off from the abdominal wall; and, further, that a stray knuckle of bowel is not so likely to be wounded by the upward as by the downward thrust of the needle. The object of including the peritoneum in the stitches is to bring in contact two long and narrow ribbon-like surfaces of a membrane, which will quickly unite—so quickly as to forestall any formation of pus in the overlying tissues, and to bar the entrance of this or other septic fluids from the wound in the abdominal wall. Another advantage is, that this inclusion of the peritoneum by presenting an uninterrupted surface of parietal peritoneum to the visceral peritoneum prevents the adhesion of the omentum and of the intestines to the internal lips of the wound, which otherwise takes place.

When all the sutures have been passed, their ends on one side are loosely twisted together into a single strand, which is securely caught by a pressure-forceps. The same thing is done with the ends on the other side. A finger of each hand is now passed down into the centre of the wound, and the middle portion of all the upper sutures and of all the lower ones are separated from one another by being drawn to opposite angles of the wound. This permits the removal of the sponges, and, if they are stained with blood, the further search for some overlooked bleeding vessel. To guard against twisting of their convolutions, the bowels, still further disturbed by these final manipulations, are now restored to their natural position, and the omentum, after being again examined for some bleeding vessel, is gently spread out over them. The forceps and sponges are then counted to see that not one has been left in the abdominal cavity. The importance of this cannot be too strongly impressed upon the operator, for distinguished ovariotomists have overlooked these articles, and have left them behind in the abdominal cavity—a sponge and a bulldog forceps in one case.[1] Tait has heard of ten such cases.[2] It is indeed sometimes no easy task to find a missing sponge when lost in the convo-

[1] *Lancet*, May 26, 1877, p. 783; *British Med. Journ.*, Jan. 28, 1882, p. 115; *Ibid.*, Dec. 25, 1880; also, *Ovarian and Uterine Tumors*, by Spencer Wells, London ed., p. 336.

[2] *Diseases of the Ovaries*, by Lawson Tait, 4th ed., p. 261.

lutions of the intestines. The sponges therefore should not be much smaller than the fist.

Before closing the wound the operator removes the pressure-forceps and catches in one hand all the ends of the sutures on his side, his assistant does the same thing on the other side, and the edges of the wound are brought together by a firm pressure, which also chases the air out of the abdominal cavity. To stop the bleeding from the needle-tracks as soon as possible, each suture is rapidly tied and by the surgeon's knot. When the whole wound has been closed, and not till then, the ends of all the sutures are gathered together in one hand, and they are cut off about two inches from the knot by one snip of the scissors. This saves precious time, which would be lost were each suture by itself to be cut after being tied. At gaping points of the wound intermediate superficial stitches should be put in. In fat women several such stitches will usually be needed.

Dressing of the Wound.—After the wound has been closed the rubber apron is removed and the abdomen cleansed and dried. The wound may now be dressed according to Lister's plan. This consists, first, of a narrow protective of prepared oiled silk, moistened by a 1 : 40 solution of carbolic acid; next, of one broad layer of antiseptic gauze wetted with the same solution; and over this eight folds more of the dry gauze, having a piece of mackintosh interposed between the seventh and the eighth layer. The lamp is now blown out, and the spray-jet being directed away from the abdomen, the dressing is secured by an elastic flannel binder, the rucking of which can be prevented by tapes pinned to it around each thigh. Most of the leading ovariotomists, however, employ simpler dressings, which have been found equally antiseptic. Wells covers the wound with a dry dressing of thymol cotton, kept in place by long strips of adhesive plaster, going two-thirds of the way around the body. Over all is pinned a flannel binder. The thymol cotton is prepared by steeping absorbent cotton wool in a solution of one part of thymol to one thousand of water, and drying it. Keith dresses the wound with gauze wrung out of a 1 : 8 glycerole of carbolic acid. On this are laid several layers of dry carbolated gauze, next some cotton wool, and over all a flannel binder. Thornton uses Lister's gauze and the mackintosh, but without the protective. This dressing is secured by adhesive straps. On these are laid several folded napkins, and over all a flannel binder is pinned very tightly. Bantock resorts to dry thymol gauze. Tait uses nothing but ordinary absorbent cotton. Salicylated cotton I have found to answer so well that for years I used nothing else. It is made by steeping two parts of absorbent cotton in a solution of one part of salicylic acid to two of commercial ether, and afterward drying the cotton by a low heat. Lately I have been resorting to Keith's dressing, but it probably possesses no greater advantages.

The flannel binder having been pinned on, the night-dress is pulled down and the patient put to bed. The opium suppository containing one grain of the watery extract is slipped into the rectum, the six bottles of hot water are applied to different portions of the body, and she is covered with warm blankets. The tables, tubs, and other articles used in the operation are now removed, the room is darkened, and she is left alone with her nurse, who has positive instructions to admit no one besides the physician.

Drainage.—When blood in small quantities is effused into the peritoneal cavity, coagulation usually takes place, the serum is then absorbed, the clot becomes organized, and no harm results. But when blood in large quantities collects in Douglas's pouch, it may behave as a foreign body and cause mischief. When, also, blood is mixed with serum, coagulation is not so likely to take place; the blood-corpuscles then are liable to break down, the fluid to become putrid, and septicæmia to set in. For these reasons the removal of these fluids by different modes of drainage has long been put in practice. The best mode is by a glass tube passed down to the bottom of Douglas's pouch through the abdominal wound, and not, as has been recommended, through a special opening made for it in the roof of the vagina. Drainage is at present very rarely resorted to by those operators who use strict antiseptic precautions, for they contend that septic changes in the blood do not then take place. Wells and Thornton have virtually given it up, while Keith, Tait, and Bantock, who have abandoned Listerism, are warm advocates of it. This question is a very important one, because a drainage-tube tends to the formation of a ventral hernia, and, being a foreign body, is in itself hurtful, and therefore should not be resorted to unless it will do more good than harm.

After a careful consideration of the subject I am forced from experience to believe that between the two extremes there lies a golden mean, and that drainage, even when the spray is used, is needed under the following conditions:

(*a*) Whenever a purulent or a colloid cyst has burst, and its contents have escaped into the cavity of the abdomen, either during the operation or some days beforehand.

(*b*) Whenever the contents of the cyst are putrid or purulent, and septic symptoms or those of peritonitis are present.

(*c*) Whenever a large amount of ascitic fluid is found in the abdominal cavity.

(*d*) Whenever four drachms or more of pure blood, or especially of a sero-sanguinolent fluid, can be squeezed out of the sponge in Douglas's pouch when removed just before the closure of the wound.

(*e*) Whenever the operator is in doubt what to do.

Should it be deemed needful for some of the above reasons to make use of drainage, a glass tube, open at both ends and about six inches in length, is passed through the salicylated cotton or other dressing, then between the two lowest stitches, down to the bottom of Douglas's pouch. A wire suture is first introduced between these sutures and left untwisted, its object being to close firmly the opening left by the removal of the tube and to hasten its union. Otherwise, a weak cicatrix results, tending to the subsequent formation of hernia. Keith's drainage-tube of three sizes is the one that I prefer. Its lower end is perforated with holes, and its upper end has a shoulder which keeps it from slipping into the abdominal cavity, and also enables it to hold a piece of thin rubber sheeting about eighteen inches square. In the centre of this a small circular hole is made, which, by stretching, is sprung over the tube. The mouth of the tube is covered by a cup-shaped sponge wrung out of a 5 per cent. solution of carbolic acid, and over this the sheeting is folded four times. The flannel binder may either be pinned over the drainage-tube, or else

it may be slit at the site of the tube and passed on each side of it, leaving the sponge and rubber sheeting outside of the dressing. They are then best held in place by a narrow strip of flannel, so as to permit inspection without interfering with the main dressing. Several times a day the sponge is removed, squeezed out, cleansed in a 5 per cent. solution of carbolic acid, and replaced. This in a hospital had better be done under the spray. Bloody serum collecting in this tube is sucked out either by a fine rubber tube attached to a syringe, or else by the long nozzle itself of the ordinary uterine syringe.

To prevent injurious pressure on the rectum, the tube must be lifted up occasionally about half an inch, and allowed to slip back of its own accord. It can be removed whenever the discharge has been reduced to not more than one or two drachms, and this usually happens within the first forty-eight hours. After its removal the opening left in the wound is closed by twisting the free ends of the wire suture placed there for this purpose.

After-Treatment.—The subsequent treatment needs the greatest attention. The first care is to establish reaction. This is best done by stimulants, such as brandy and whiskey given in iced soda-water. Enemata of beef-tea and brandy or of milk and brandy will also be of advantage, while artificial heat is kept up. For the vomiting, which comes partly from the anæsthetic and partly from shock, repeated deep inspirations should be tried. They help by getting the blood rid of the anæsthetic as soon as possible. Chloral may also be given, or small lumps of ice may be swallowed. Sips of very hot water, or a tablespoonful every hour of a mixture containing equal parts of lime-water and of cinnamon-water, may also do good. A hypodermic of morphia will often allay vomiting, and I have seen it yield to small doses of atropia, and also to two grains of pure pepsin given every two hours in a tablespoonful of raw-beef juice. Twenty drops of ether given by the mouth will sometimes relieve it, and so also will a few drops of chloroform confined by a watch-glass over the pit of the stomach. In some cases I have tried, with the best results, the following effervescent mixture, recommended by Chèron:[1]

℞. Potassii bicarb. } āā gr. xxxij;
Potassii bromidi, }
Aquæ, fʒij. M.

℞. Acidi citrici, ʒj;
Syrupi, fʒj;
Aquæ, fʒiv. M.

A dessertspoonful of the former is added to a tablespoonful of the latter, and given every hour. For vomiting, especially of the bilious variety, Lawson Tait recommends Monson's pepsin wine, given every ten minutes in drachm doses with a little ice-water.

Flatus is another annoying symptom, which, however, can very generally be dispelled by turning the patient over on her side and inserting a flexible catheter high up in the rectum. If this fails to relieve it, enemata of turpentine may be tried, or five-drop doses of the tincture of nux vomica may be given every two hours. Should the abdomen become painfully bloated, the binder must be loosened and the adhesive straps

[1] *Archives de Tocologie*, Février, 1883, p. 122.

nicked in several places. The painful tension on the stitches can be relieved by drawing the knees up and supporting them over a pillow doubled on itself. Should the flatus not yield, and symptoms of obstruction set in, the bowels must be opened at all hazards. Castor oil and Epsom salts are good cathartics for this purpose. When vomiting accompanies obstruction, calomel answers best, because it is not so liable to be rejected.

For the first thirty-six to forty-eight hours after the operation nothing whatever should be given to the patient excepting cracked ice, sips of hot tea or of barley-water, and an occasional teaspoonful of old whiskey. After that time tablespoonful doses of milk, of beef-tea, of thin oatmeal gruel, or of barley-water can be given every hour or two. The diet may then be cautiously increased, and especially after wind begins to escape from the rectum, the patient being enjoined not to hold it back from motives of delicacy. If the condition of the patient is such as to demand more nourishment, it had better be taken by the rectum. For a week the urine should be drawn off by the nurse, and the bowels kept quiet by a morning and an evening suppository. No other anodyne need be given unless called for by pain, wakefulness, or restlessness. Should the body-heat indicate a temperature of 101° or over, a bladder filled with broken ice, or, what is far better, a rubber ice-cap, should be kept on the head of the patient as long as it feels comfortable and does not chill her. If the temperature does not fall, and peritonitis or other septic symptoms set in, ice should also be applied to the pit of the stomach. Quinia and morphia must then be given in very large doses, preferably by the rectum, together with ten drops of the tincture of digitalis every hour until the pulse-rate is lessened and the temperature falls.

When a full week has elapsed the bowels should be opened; and, as this is a matter of importance, and is occasionally attended with symptoms of obstruction and with a good deal of constitutional disturbance, a few words will not come amiss. If the hardened feces can be softened down and dislodged by enemata, this is perhaps the best plan, clysters of ox-gall and water or of glycerin and water being the most efficient. But in my experience enemata have so often failed that I rarely resort to them in the first instance. If the woman's stomach is not irritable, I prefer to give her an ounce of castor oil. This is disguised in the compound syrup of sarsaparilla or in some other suitable vehicle, as warm milk, and is brought to her without any previous warning early on the morning of the eighth day. Should it be deemed unwise to try the oil, two Lady Webster pills and two compound cathartic pills can be given at bedtime of the seventh day, or a pill containing three grains of the compound extract of colocynth with one grain of the extract of hyoscyamus may be swallowed every four hours. The compound licorice powder of the German Pharmacopœia, to which has been added potassium bitartrate, also answers well, provided the patient's stomach will bear teaspoonful doses every four hours. Should these remedies fail to act, they must be supplemented by enemata.

Fatal obstruction of the bowels from matting or from constricting bands of organized lymph has been frequently reported. Thus far, I have met with one fatal case, which, however, passed out of my hands after the operation. But occasionally I see cases of obstinate constipa-

tion which give me great uneasiness and put me to my wits' ends. In one case, after the failure of other remedies the obstruction was overcome by broken doses of calomel combined with sodium bicarbonate, and by the distension of the lower bowel with very large enemata slowly given. Another desperate case yielded to repeated doses of tincture of belladonna. A third case, complicated by obstinate vomiting, was saved by ten grains of calomel given every two hours until the bowels were moved. Seventy grains were thus administered before the desired effect was attained, yet salivation did not occur.

When symptoms of obstruction once present themselves, they are likely to recur. The contents of the bowel should therefore be kept fluid, and for this purpose I know nothing better than the German compound licorice powder, given in teaspoonful doses at bedtime.

Suppression of urine sometimes follows ovariotomy, and in cases of diseased kidney is an alarming complication for this condition. For this symptom digitalis and the acetate of potassium should be given. Thornton treats it by baring the arms and packing them in towels which are kept wet with ice-water.

Tetanus may destroy the life of a patient while convalescing from the operation of ovariotomy. J. M. Bennett reports such a case.[1] The symptoms first showed themselves on the sixteenth day, and the woman died two days later. Chloral in drachm doses, administered by the bowel in the yolk of an egg, is perhaps the only remedy from which any good can be expected.

Occasionally, a few days after the operation, without any septic symptoms whatever or without any marked rise in the temperature, the parotid glands grow tender, swell up, and run through a course precisely like mumps, ending in resolution. This complication has been met with so frequently by myself and others that it cannot be a mere coincidence, but must be due to a reverse sympathy between the ovaries and these glands. It does not appear to increase the risk of the patient, for recovery took place in all the reported cases, of which three occurred in my own practice.[2] Parotid bubo may also take place after ovariotomy, but this sign of blood-poisoning, being a general one, happens as well after other grave surgical operations and during the course of specific fevers. Yet from the sympathetic relation between the parotid glands and the sexual organs it seems to occur more frequently in the septicæmia following ovariotomy.

Acute mania sometimes follows ovariotomy, especially when both ovaries have been removed. The attack is usually temporary, but it sometimes ends in insanity, and even in death, as in one of my own patients. Keith, Thornton, Tait, and other leading ovariotomists report analogous cases.[3]

Surgical Treatment.—The dressings, being antiseptic, need not, as a rule, be removed until the day following that on which the bowels are moved. Every other stitch may then be removed, and especially all that are loose or are cutting the tissues. The wound is then washed with a 2.5 per cent. solution of carbolic acid, and dressed anew with salicylated

[1] *Lancet*, Dec. 3, 1881.
[2] Wm. Goodell, *Transactions of American Gynæcological Society*, 1885.
[3] *The British Medical Journal*, March 21, 1885, p. 597.

cotton. I usually find the first dressing so sweet that I am able to reapply the unsoiled portion of it for a second dressing. A clean binder is now pinned on and the woman's clothing changed. Three or four days later all the stitches should be removed, the wound secured by narrow adhesive strips, and dressed as before. For fear of a weak cicatrix and the formation of a hernia at the site of the wound, the patient should not get out of bed until fully three weeks have elapsed, and should for as many months wear some kind of close-fitting gored binder or abdominal supporter.

If, before the week is over, the dressings become soiled or give out a bad odor, they should be at once renewed. They should also be removed whenever a high temperature, without being accompanied by tympanites, leads to the suspicion of cutaneous abscesses.

The Accidents and Complications of Ovariotomy.—When by the breaking up of adhesions to it the liver is wounded, the bleeding surface can usually be stanched, as Koeberle has shown, by the ferric subsulphate applied to the raw surface by the finger. If this fails the actual cautery at a dull heat should be used.

If, unfortunately, an adherent portion of the bowel is torn open, the wound should be carefully closed with very fine silk by the continuous suture. The sutured portion is then fastened to the lower angle of the abdominal wound as a safeguard in case of the subsequent formation of stercoral fistula.[1] Should the intestine be injured to any extent, the wound must be closed by two sets of fine silk sutures, the first set uniting the mucous edges of the wound by the continuous suture, the other set uniting one serous coat to the other at a line about one quarter of an inch distant from the wound. An ordinary cambric needle with fine sewing-silk will answer admirably for this purpose. In small wounds one continuous suture, carried through all the coats but the mucous, will suffice. A mere puncture can be closed by hooking it up and surrounding it by a single fine ligature.

Wounds of the bladder have frequently happened, but they are by no means necessarily fatal.[2] These accidents are liable to occur when the bladder, being adherent to the cyst and carried upward by it, lies directly under the line of incision, or the bladder may be torn open while adhesions to it are being severed. The wound should at once be grasped by a pressure-forceps, the bladder emptied by the catheter, and the operation proceeded with. When the operation has been completed the wound in the bladder is attended to, and in one of the following ways: Either the vesical wound is brought up within the lips of the abdominal incision, and is closed by being included in the abdominal stitches, or it is closed by the continuous or Glover's suture, without including the mucous membrane in the stitches. A self-retaining catheter, such as the Skene-Goodman, must then be kept in the bladder for at least a week.

One of the ureters will sometimes be torn across while pelvic adhesions are being broken up. This accident is most likely to happen during the enucleation of a cyst growing downward because enveloped in the folds

[1] "Discussion on a Paper by Garrigues," *Am. Gynæcol. Soc. Trans.*, 1881.

[2] Eustache, *Archives de Tocologie*, April and May, 1880, pp. 193, 277; *Boston Med. and Surg. Journal*, Feb. 16, 1882, p. 153; *British Med. Journ.*, Jan. 28, 1882, p. 115; *Am. Journ. Med. Sci.*, Jan., 1883, p. 123.

of the broad ligament. It is almost always fatal, and is usually not discovered during the life of the patient, and, I am disposed to think, not often discovered after her death. Sometimes, however, urine will ooze out of the abdominal wound, and in rare cases the patient has recovered with a urinary fistula. In such a case Simon[1] successfully removed the corresponding kidney; Nussbaum[2] constructed an artificial ureter leading from the fistula to the bladder; and Tauffer[3] inserted the upper end of the divided ureter into the bladder by an artificial opening. It, however, failed to unite, and he later made an artificial ureter.

When an umbilical or a ventral hernia of moderate size is present at the time of the operation, efforts should be made for its radical cure. This is done by cutting out the thinned-out sac by two incisions meeting below and above, and by bringing together the thick edges of the abdominal wall in the final closure of the wound.

In cases of ascites complicating ovariotomy the ascitic fluid should not be wholly removed until the cyst has been cut off and the wound is ready to be closed. By this means any blood oozing from broken adhesions, or any fluid escaping from the cyst into the abdominal cavity, being diluted, is less likely to irritate the peritoneum, the cavity of which can also be more readily cleansed.

When a patient seems in danger of dying on the table from shock or from exhaustion the anæsthetic should be withheld while hypodermic injections of ether and enemata of brandy are given. Warmth should also be applied to the body by bottles of hot water, or, what is better, by rubber bags of the same. Theoretically, atropia administered subcutaneously would be the proper remedy, but I have not yet tested it. In all cases of ovariotomy, especially if prolonged, the woman should not be kept profoundly under the influence of the anæsthetic for any length of time, but should be allowed from time to time to come to at least enough to make her flinch or move about. This caution should especially be observed in very feeble patients and in those with very large cysts.

The Removal of Both Ovaries.

Whenever both ovaries are diseased there can be no question about the extirpation. But when only one has undergone cystic or other degeneration the question of the removal of the sound one may come up. There always is a tendency to the subsequent degeneration of the sound ovary after the diseased one has been removed. More especially is this tendency observed in sterile women and in those with malignant affections of the ovary. Many women, therefore, whose lives should have been imperilled but once, have been compelled to face the dangers of a second operation. In view of these facts, it seems to me wise to remove the sound ovary in all cases of sterility, in every case of malignant degeneration of one ovary, and in all women who have either passed the climacteric or are approaching it, provided its removal is not attended with great additional risk. Double extirpation should also be performed whenever the womb con-

[1] *Annales de Gynécologie*, June, 1877.
[2] *Edinburgh Medical Journal*, July, 1876, p. 1.
[3] *Archives de Tocologie*, Avril, 1880, p. 201.

tains a fibroid tumor or whenever it seems desirable to hasten on the climacteric. In these convictions I am further strengthened by the disappointment often expressed to me by my patients that one ovary had been left behind, and by their great fear afterward lest the remaining organ should also become diseased. On the other hand, in women who are in the prime of their menstrual life the sound ovary should be left untouched, unless there exist grave reasons for its removal.