SURGICAL DIFFERENTIALS

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TO MY MOTHER.

PREFACE.

"Diagnosis" has for some time been accepted as meaning "Differential Diagnosis." This term is too long for convenient use and of the two words, clearness seems to demand that "diagnosis" be dropped. This is offered as an explanation of the title of this book.

The subject matter has been compiled with but a single purpose. This is to present to students intending to enter the competitive examinations of the New York Hospitals, a well-tried scheme and its mode of application. It is not the actual learning of surgical facts but their selection and grouping which is most difficult to the student.

In the opinion of over one hundred graduates who during the past six years secured hospital positions, the ability to apply this scheme was the primary cause of their success. These pages represent simply an effort to present as tersely as possible the system which has proved so highly efficacious. It will therefore be seen that no attempt to make a text-book or book of reference has been thought of.

Ability to sketch rough outlines in place of giving long word answers has always been very helpful in securing hospital positions. In recognition of this, forty graphic illustrations have been introduced. They were made by Dr. Chas. K. Stillman, a successful graduate of last year. Having been made by a student they can be duplicated by a student, for they have been drawn with studied simplicity and it is believed, with accuracy. Except in three or four instances they are entirely original;—I cannot too cordially thank Dr. Stillman for his care, or endorse his work too highly.

Copies of some recent hospital examination papers have been added, in the interest of students at Universities outside of New York City.

The Differentials have been made with care and by painstaking reference to leading text-books. It is feared, nevertheless, that many errors may be found. These Differentials have been chosen with the intention of indicating the general broad trend of to-day's hospital questions. The time for memorizing special material for each examiner is happily past and with it the value of the obnoxious "quiz compend." Examiners no longer ask for narrow isolated facts but require the broad practical Differential.

Dr. Jos. A. Blake, Dr. Geo. E. Brewer, Dr. R. H. M. Dawbarn, Dr. John Rogers and Dr. L. A. Stimson may recognize in the text some of their own familiar aphorisms. The author wishes to acknowledge the debt which he owes these Teachers of Surgery.

J. W. Draper Maury.

September 1st, 1904.

CHAPTER I.

SCHEME.

A clear and uniform recitation scheme is essential to every student of medicine. This is particularly true of those who enter competitive hospital examinations.

For more general surgical diseases the same scheme may be applied which is universally used in the practice of medicine.

1—Definition { Simple—Such as is given in a modern general dictionary.

2—Etiology { Predisposing—Age, sex, race, color, occupation, social status, climate.
Exciting—Trauma due to { germs or violence.

3—Pathology { Gross.
Minute.

4—Symptomatology { Subjective or General Symptoms { See Sub-scheme I
Objective or Local Symptoms { Inspection, Palpation, Percussion, Auscultation

5—Differentials—(See Sub-scheme II)

6—Complications and Sequelae { Immediate, mediate and remote

7—Prognosis { Immediate, Mediate, Remote } As to life and return of function of injured part

8—Treatment { Medical { Nurse, Feed, Stimulate
Surgical { Palliative, Radical

SUB-SCHEME I.

Many surgical lesions, however, require further detail than this familiar scheme affords.

In giving subjective symptoms, for example, it has been found convenient to follow the course of a particle of food through the body. All the patient complains of in the usual surgical lesions is **pain** or **disability.** One or both of these symptoms may occur in the

1, Mouth
2, Pharynx
3, Esophagus
4, Stomach
5, Small and great gut
6, Liver (Jaundice) or other glands
7, Here the food enters the blood from which indirectly is derived the T. P. R.
8, Heart
9, Lungs
10, Brain
11, Special senses
12, Peripheral nerves
13, Kidneys and G. U.
14, Extremities

SUB-SCHEME II.

1—Historic Differentials.

a, History of Tumor, Injury, Disease or Malformation.

Note.—T. I. D. as used in prescription writing, convenient way to remember this.

b, History of previous Injury, Disease or Operation.

c, Age, Sex, Race, Occuption, Social State, Climate.

2—Subjective Differentials.

a, Pain—Local and referred.

b, Disability
c, Vomiting
d, Bladder and Rectum
e, Jaundice
f, T. P. R.

T— Important always to give the actual figures. Never say elevated or depressed.

P— 120 is the danger line of the pulse. Pulse has six characteristics: **Force, Frequency, Rhythm, Length, Fullness, Compressibility.** The first three are determined by the heart, the last three by the condition of the vessel wall.

g, Nervous symptoms { Central (vertigo, delirium, consciousness, convulsions); Peripheral (paresthesiae, special sense)

h, Urinary symptoms.

3—General Physical Differentials { Inspection; Facies; Nutrition; Glands; Superficial and Deep Reflexes

4—Local Physical Differentials { Inspection; Palpation) Pressure; Percussion) pain; Auscultation; Mensuration) Serous Sanguinous Purulent; Exploratory Puncture)

5—Laboratory Differentials.

A, Sputum

B, Stomach

a, Chemical of contents { Free H. Cl. (N. = $\frac{1}{10}$%); Combined H. Cl.; Carbon Compound Acids

b, Physical of contents—Color, sediment, odor, etc.

c, Microscopic of Contents { Boas-Oppler; Sarcinae; Atypical Cells

d, Motor Power of Stomach { X-ray (with Bismuth); K. I. in capsules; Asparagin; Measured quantity of liquid

C, Blood

a, Leucocyte Count, Differential Count

(Normal) { Small lymphocites, 20–30%; Large " 4–8%; Polymorphonuclear neutrophiles, 62–70%; Eosinophiles, ½–4%

b, Hemoglobin per cent
c, Color Index (Hemoglobin per cent divided by per cent of red cells. Normally one.)
d, Parasites (Malaria, Spirillum, Bacteria, etc.)
e, Injection into animals
f, Widal and other tests

D, Urine in addition to usual tests
Indican (Intestinal putrefaction)
Cryoscopy (In renal involvement)

E, Feces: Undigested Food, Blood, Ova, Parasites, Bacteria.

F, Tissue Section and Staining Reactions

G, Examination of Punct. Fluid, Exudate, Transudate or Pus { Specific Gravity. Albumin Germs

6—Drug Differentials.
Effect of K. I. Hg., Quinine, etc.

7—Mechanical Differentials.
Effect of Rest, Extension, X-ray, Hydrotherapy, etc.

8—Exploratory Incision.

SUB-SCHEME III.

To answer the frequently asked question **"Causes of."** For example: Causes of hemorrhage; of dyspnea; of vomiting, etc. All such questions are answered by reference to the first portion of Sub-Scheme II, viz.

(T.I.D.) TUMOR, INJURY, DISEASE OR MALFORMATION.

If the question is so framed as to require the causes of a lesion of one of the hollow viscera T. I. D. M. should be applied, —within the lumen; to the wall of the viscus, and to the region about it. It will thus be seen that by applying this simple scheme to such question as the causes of intestinal obstruction, no less than twelve points are immediately suggested by the scheme for discussion.

Such a system of schemes would be too long and cumbersome for practical use unless abbreviated and adjusted to each subject, and in recitation work it is not intended that the negative, but only the positive and most important factors be dwelt upon. The advantage of knowing a system such as has been given is that if called upon to talk on any given subject or to write about it, the work can be done speedily, fully and without hesitation. In the pages which follow, an attempt will be made to pursue in general the outlines suggested, but it will be readily seen that they cannot advantageously be followed in full. It may be well before going on to a general consideration of certain surgical questions, to illustrate in some detail the mode of application of these schemes.

Apply, for example, the general scheme to such a disease as erysipelas. This is intended to be used if a general description of erysipelas be asked for. If, however, the subjective or general symptoms of the disease be desired, apply "Sub-Scheme I." If the differential diagnosis,—and it may here be said that in any case, whenever diagnosis is asked for, it is understood to signify **differential** diagnosis,—apply "Sub-Scheme II."

As the application of this scheme is possibly a little more complicated than that of the preceding, it may not be amiss to follow it out in detail.

As suggested, the phrase "T. I. D." with an M added to it is the first thing to think of for differential diagnosis.

Tumor? Negative. Injury? The patient may or may not be cognizant of having been injured. Disease? Onset sudden and severe. Malformation? Negative.

History of previous injury? May or may not be negative. Of previous disease? Often affirmative.

History of operation? Positive or negative.

Age? More common in early adult life.

Sex? Somewhat more common in the male.

Occupation? More common in those exposed to traumatism.

Social State? Negative.

Pain? Usually not marked. "Stiff."

Disability? Present.

Vomiting? Often a prominent symptom.

Bowels? Irregular.

Jaundice? Absent.

T. P. R.? 105, 120, 24.

Nervous Symptoms? Early delirium.

Glands? Typical involvement of glands in the neighborhood, specially true of facial infection.

Reflexes? Negative.

Inspection? Swelling; peculiar color.

Palpation? Typical harsh feel.

Sputum? Negative.

Stomach? Negative.

Blood? Leucocyte count roughly parallel with temperature chart. (Von-Limbeck).

Differential Count? Marked increase in polymorphonuclear cells.

Hemoglobin per cent? Negative.

Color Index? Less than one.

Parasites? Bacteria not in sufficient numbers to be readily seen.

Injection? Toxic to animals.

Urine? Free amount of albumin and finely granular casts, if far enough progressed.

Indican? Negative.

Cryoscopy? Negative, except in presence of renal disease.

Feces? Negative.

Tissue Section? Bacteria seen crowding the lymphatic spaces.

Such a scheme as this is of necessity cumbersome, but it affords the only known means of covering a given subject rapidly without omitting any important details.

It will clearly be seen that the points established here will serve to differentiate this disease as clearly as it may be from any disorder with which one might confound it.

Throughout these notes, the terms **"Proximal"** and **"Distal"** will be used, the heart being understood to be the center.

In less detail apply this scheme for differentials to:—

Non-impacted Fracture of Neck of Femur.	Dislocation of Femur. (Dorsal)
TUMOR.	
Moderate fullness in Scarpa's triangle.	If thin, marked, postero, external.
INJURY.	
Moderate violence.	Great violence.
PREVIOUS INJURY.	
Not infrequent.	Absent.
PREVIOUS DISEASE.	
Some form of rarifying ostitis, not uncommon.	Absent.
AGE.	
Past adult life.	Adult life.
SEX.	
Female.	Male.
OCCUPATION.	
Sedentary	Hard labor.
PAIN.	
Great, but not constant.	Excruciating, constant.
DISABILITY.	
Typically complete unless impacted.	Complete.
INSPECTION.	
Characteristic attitude, extension and external rotation.	Flexion, internal rotation, adduction.
Moderate swelling in Scarpa's triangle.	Postero-external swelling.
PALPATION.	
Pain increased on crowding extremity upward.	Pain decreased on crowding extremity upward. Increased by traction. May be Crepitus.
Decreased by traction. Moderate tenderness in Scarpa's triangle. May be Crepitus.	

MENSURATION.

Fracture.	Nelaton's Line.	Dislocation.
Tip of great tuberosity, proximal to, instead of upon it.		Relation to line, not constant.

BRYANT'S TRIANGLE.

Negative or minus.	May be approximately normal. Variable.

TAPE MEASURE.

Shortening from ½ to 3 inches A. S. S. to internal maleolus.	May be shortening or lengthening.

LABORATORY FINDINGS.

Obviously negative in this class of cases.

Subjective symptoms are frequently asked for. It must be understood in the use of the schemes that that one is intended to be utilized, which is obviously most applicable to the disease or injury under consideration. For example, as has been said before, the general scheme is indicated chiefly in the wider or more general surgical diseases, although there is hardly any form of lesion to which it may not be applied. In the case of more localized injuries, as for example fractures, the scheme must necessarily be a narrow and exact one. This is further considered in the Chapter on Fractures.

The giving of subjective symptoms is very much facilitated by remembering that practically all surgical lesions present but two subjective symptoms—**Pain** and **Disability.**

Should a disease presenting such multifarious symptoms as, for example, colelithiasis, be asked for, the subjective symptoms are easily given by Sub-Scheme I. Disability can be understood to include a broad variety of conditions,—almost anything deviating from the normal. It may be local or general, and of any degree. In this disease, the patient will not have observed anything abnormal in Mouth, Pharynx or Esophagus.

Stomach? This is typically the seat of pain and disability so great that eminent authorities have found it difficult to differentiate between colelithiasis and carcinoma of the pylorus.

Small and great gut? There is no pain save that attending habitual constipation. The disability results in clay colored stools.

Liver or other glands? Jaundice depending on the position of the stomach and other factors. Often pain at Robson's point.

Lungs? Foul breath.

Brain? Headache and increasing dyscerebration.

Special Senses? Yellow conjunctivae.

Peripheral Nerves? Paresthesiae frequent.

Kidneys and G. U.? Bile stained urine.

Extremities? Progressive disability.

No claim for special excellence or for any originality is made for these schemes. They have been printed in their present form on the conviction that what has worked well for one series of men will work well for another. Individuals will probably be able to modify them to suit their needs and fancies, but adherence to some such general system will win in the future as it has in the past, the much coveted Appointments in the New York Hospitals.

CHAPTER II.

INFLAMMATION.

In the erection of any building, a scaffolding is the first consideration. Even if the work be simply the repair of an existing edifice, this scaffolding must begin at the ground and reach to the break. It often costs more than the repairs.

Such a scaffolding is used in nature. A clear grasp of this simple proposition makes the subject of inflammation, generally considered a great bugbear difficult to understand and uninteresting, a very simple matter.

The subject of tissue repair is by no means intricate. The process naturally depends, as in the case of a building, on the degree of repairing which is to be done. The red cells and the plasma are the bricks and mortar; the phagocytes and nature's other agents are the laborers.

If the injury to the parts be not so severe as to have actually destroyed cellular life, the scaffold erection naturally does not take place. Consider the familiar case of a weal on the back of a horse. It rises soon after the horse is struck with the lash. What happens? Something very easy to understand. There is a disturbance of the vaso-motor nerves. The small vessels along the line of the traumatism immediately dilate; as a natural consequence, the current slows. The leucocytes, presenting a greater degree of resistence from their larger size and coarser texture, naturally lag behind and are arranged around the outside of the stream against the vessel wall. Following their instinct, they immediately begin to emigrate through the chinks of the endothelial lining.

FIG. 1.

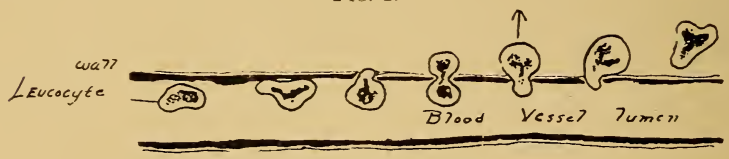


Figure showing emigration of leucocytes.

Coincidental with this the fluid part of the blood leaks out into the intercellular spaces. If the blow has been a hard one, a certain number of red cells will pass out in a manner somewhat similar to that described for the white cells. This process is called **diapedesis.** In most cases of moderate injury, probably a few of these erythrocytes escape from the vessels.

This process, in the case of the horse under consideration, continues at so rapid a rate, that a local swelling is produced. This is because the exudate, as the materials which pass out are called, cannot be diffused into the neighboring tissues as rapidly as they are extruded. It requires only common sense to see that as this process continues, the characteristic weal will form. After the recovery of the vaso-motor nerves, a balance is gradually established between the rate of exudation, —the vessels gradually assuming their normal tone,—and the absorption of the exudate into neighboring uninjured vessels. The establishment of this balance marks a cessation in the growth of the weal and immediately thereafter, the ridge begins to be absorbed. Any one, who has had anything to do with horses, knows that this may take twelve, twenty-four or even more hours before its completion.

In this case there has been no need of a scaffolding, for the only moderately injured tissues have returned entirely to normal. The process which has been here portrayed has been named **Simple Exudative Inflammation.**

This simple exudative inflammation will be found to be the direct cause of the symptoms of many of the minor sicknesses, both medical and surgical. Whether it attacks the mucous membranes, as is evidenced by a cold in the head, an inflammation of the uterus or of the gut; whether it occurs in connective tissue, in the muscles, or in any of the hard or soft parts of the body, the process is always the same, a simple affair easy to understand.

However, the organism is not always so fortunate as to have its cells live after the primary injury, and it may therefore become necessary for it to replace those which have been lost. It is not meant by this that the organism is always able to replace the special cells which were lost if they belong to a very specialized type, but connective tissue cells, at any rate,

are created to repair the loss of continuity and prevent the danger of infection.

Now suppose a case in which the injury has been sufficiently severe and of such nature as to have admitted pus producing germs to the part. It is wise to remember that almost any germs with the exception of a few such as the tetanus bacillus and the diphtheria bacterium, which remain localized, can all produce pus. Now, if some of these germs, either in pure culture or in mixed, are introduced into this wound of graver character which we are considering, the tissues have, in addition to the primary injury, to fight against the poisonous toxins which are created by the germs. They are simply the products of the life of these organisms, but they produce when in small quantity what is known as **Cloudy Swelling**,—a condition in which the protoplasm of the cell is seen under the microscope to be granular and the nucleus to have become indistinct—and when in large quantities, early death of the cell.

Undoubtedly, in a great many cases which grossly appear to be simple exudative inflammation, as in the case of a weal before referred to, there are a moderate number of cells which undergo this cloudy swelling. It is to be understood that this condition gives rise to no marked symptom by which it may be recognized clinically. The cells, which have undergone this granular change, either return to their normal condition in the course of a few days, or else they die. If they die, they disintegrate, and the particles are removed by the phagocytes and by the circulating plasma. This process takes place slowly and gives no gross external evidence.

Suppose the double trauma of injury and poison to have been so great that the cells, not only underwent granular change, but actually died. What then takes place? Death occurs not only in the cells of the inflamed connective tissue, but also in any parenchymatous cells which may be in the neighborhood. The entire mass becomes saturated with the body fluids. It is **"Walled Off"** by nature from the living parts and an effort is made by the organism to extrude it.

This is the type of the process which takes place when a stitch abscess forms, or an ordinary boil develops. The so-called core of the boil is the mass of dead lymphatics and

other vessels, nerves, muscular and other tissues, together with the blood elements which extrude into the tissues, as before described, immediately after the beginning of the injury. In the case of the boil, the traumatism is either absent or insignificant as compared with the infection. This core, so familiar to all, is removed, and the parts are then in position to begin to heal. Now it is that the scaffolding is erected. It consists of a reticulum or net work of fibrin, which fills the whole part as though a spider had woven a web in every direction within the cavity. Leucocytes and erythrocytes swarm along the strands of this network and become entangled in its meshes. The process of creation of what is known as scar tissue is technically called **Productive Inflammation.** It will be noted that whereas the changes referred to in exudative inflammation have affected the **vessels** only, those in productive inflammation have to do particularly with the changes in the **cells** of the affected part.

Productive Inflammation may or may not be accompanied by an appreciable degree of exudative inflammation. In any reconstructive process, there is probably always a certain amount of exudation taking place. Nevertheless, it is certain that there are types of productive inflammation which are to be seen at certain periods in the healing of granulating wounds in which the fluid is taken up by the parts just as rapidly as it is extruded. This may be called **dry productive inflammation,** as contrasted to the combined or wet form. The typical example, however, of dry productive inflammation is to be seen in the so-called sclerotic changes of the arteries and the cirrhoses of the liver, kidneys and other organs.

The boil under consideration has reached the condition in which the scaffolding has been erected and the laborers with their bricks and mortar are aloft. It is obviously not possible for them to recreate the intricate arrangement of the tissues as it existed prior to the toxemic injury. What they proceed to do, therefore, is to make granulation tissue, which in course of time turns white, and is known as a **Scar.**

How is this done? A great deal is heard now-a-days about abscesses being "walled off." This term is used every day

in speaking of appendicitis. What is the wall and where does it come from?

By a process which has been called **Chemotaxis**, white cells from far and near have been called into the neighborhood of the injury. They arrange themselves in the form of a hollow sphere about the dead part and after assuming the function of thus protecting the general body from invasion, they are called instead of leucocytes, phagocytes from the Greek phagein—to eat. From having been simple white cells, they become, by a process of conscription, or chemotaxis, the eating or defending cells.

Nowhere can the process about to be described be seen more beautifully than in one of the small tubercles so frequently observed in the muscular tissue of the diaphragm. These tubercles may for the purposes of description be regarded as miniature boils, and as the whole tubercle may be seen under one field of the microscope, which is not the case with a boil, the process of "walling off" may be conveniently and accurately studied in it. What is true of the wee tubercle is equally true of the large boil, and what is true of the boil is true of the appendicular or pyemic abscess containing a pint to a quart of pus. The point is to understand that this process is the same for all like conditions irrespective of their size or position. So in the great abscess, the tubercle or the boil, this hollow spherical layer of protecting white cells masses itself between the well tissues on the one hand and the dead on the other,—between the sterile body on the one side and the infected wound on the other. Between the phagocytes there is some fibrin. This is what is meant by "walling off." There are other elements in the "wall" as will be seen later, but this **"Round Cell Zone"** is all-important.

The next element to consider in the process of dry productive inflammatory regeneration are the so-called **Fibroblasts**. Whether they are derived from pre-existing connective cells, or whether they spring from certain of the white cells, is not definitely known, but the practical point is that coincidental with the establishment of the zone of white cells, already described, there is laid down between the dead part and the outer wall of leucocytes, a secondary wall of these fibroblasts. These

are to strengthen the "wall." A convenient way to remember about these fibroblasts is to ask the question:

How does a fibroblast differ from a woman? The answer is that the fibroblast is fat when it's young and thin when it's old, whereas a woman is thin when she's young, and fat when she's old.

This is a homely and perhaps ungallant means of stating the life history of the fibroblast. By mutual pressure, and by pressure derived from the outside shell of phagocytes; called **"Round Cell Inflammatory Zone,"**—the fibroblasts assume first a hexagonal form and are finally pressed out into the familiar ribbons characteristic of fibrous tissue. A good illustration to show how this process begins may be seen in the Giant's Causeway at the North of Ireland, where by mutual pressure columns many feet in length have been formed, each and every one being hexagonal. Drops of mercury, when allowed to press upon each other, will also become hexagonal before they are confluent.

As the young fat fibroblast gradually elongates, its nucleus becomes more and more indistinct until it is finally lost. Before this takes place, however, the cell accomplishes the purpose for which it was in part designed, viz.—the deposition of intercellular material. This aids largely in the formation of the fibrous tissue.

Starting with a comparatively small number of these young fibroblasts, it is necessary that they should be multiplied as rapidly as possible. This is accomplished in part by emigration, just as among people in a new territory; in part by reproduction. This takes place by the process formerly known as karyokinesis, but now commonly called mytosis. The great care of nature in splitting the nucleus so that it shall be accurately divided between the two new cells shows what an important function it plays in human life.

The fibroblasts are now increasing at a rapid rate and are beginning to be crowded into the fibrinous reticulum. It must not be lost sight of that this net work is a well defined definite visible mass, spongy to the touch and red to the eye, because of included red blood cells. The whole structure is shortly to be swept away. How is this accomplished? Before nature

attempts it, she makes sure that the permanent structure destined to take its place is well established. This cannot be done without providing food and nourishment for the new cells to live upon. How is this brought there? When the sphere of fibroblasts is only one or two cells thick, they can readily be fed by the transudation to them of life giving plasma, but there is a limit to the distance to which this food can percolate between the cells, and it becomes necessary to establish channels to carry it toward the interior of the structure.

Capillary Formation begins by a head to tail union of a series of specialized connective tissue cells. The walls at the point of juncture break down, their included protoplasm guided by unknown forces, begins to circulate, and what was a simple series of end to end cells, has become a tunnel through which blood soon begins to flow.

These **Capillary "Tufts"** are by a marvellous provision constructed in a loop so that they start and end in the living parts. If they coursed straight away into the new territory, they would obviously soon become blockaded. Through their delicate endothelial walls along the whole course of the new vessel, but more particularly at the turn of the loop which is nearest the dead part, the plasma with its cell feeding elements streams, and the products of metabolic cellular life are in like manner returned.

It will often have been noticed how closely this microscopic picture conforms to the clinical findings when granulation tissue is treated. Such tissue frequently has to be curretted. This can be done without pain to the patient, because there are no nerves in the part. The hemorrhage, however, is always very brisk. This is because the tissue, as already described, is largely made up of young capillaries.

At about this time, supposing a large number of successive spherical walls of endothelial cells to have arranged themselves, like the many skins of an onion, about the scaffolding which had filled in the site of the extruded dead tissue, nature begins to realize that in the region of capillary development the scaffolding is no longer necessary. The builders, which were instrumental in creating the new and permanent wall,

are now obliged to see to their own removal and to the destruction of the net work which supported them. As is often the case with people, they are "turned down" by those whom they have helped.

How does this process of removal of the scaffolding take place? The phagocytes, which it has at length been decided, are able to destroy living cells as well as dead, now turn their attention from quarreling with the invading horde of bacteria to carrying away the slowly disintegrating net work of fibrin. Many of these remarkable white cells have themselves died, either in conflict with the bacteria, or because of a failure of their food supply. The commissary department is as necessary to them as it is to soldiers in the field. When dead, it becomes incumbent upon living phagocytes to carry them into the blood stream or to extrude them through the surface.

Thus it is seen that these dead leucocytes, which had, when called upon to do so, assumed a phagocytic function, enter largely into the formation of what is called **Pus.**

The white cells, the dead bacteria, the devitalized and toxin charged plasma, together with broken masses of tissue, basement substance and other refuse are carried away either by the plasma stream or by the remaining leucocytes.

This process continues until the primary structure which was laid down immediately after the infliction of the injury is entirely removed and its place taken by the permanent tissue. This permanent tissue does not resemble the original tissue which was destroyed. When it has filled the wound and granulation is said to be complete, the region looks red and is only partially enervated. As time goes on, nerves, the most delicate structure in the human body, are gradually formed, so that sensation returns in part or in whole. The fibroblasts as they grow older and following the inverse of a woman's career, grow thinner and thinner; they have an inherent tendency to contract. This shrinkage of the granulation tissue is of vital importance in plastic surgery. Without it, the scars of wounds would always be red. Because of it, in from six months to a year, the capillaries are squeezed so that they no longer carry a similar volume of blood and the part turns white.

Such is the general history of the course of **Wet Productive Inflammation.**

Dry Productive Inflammation, it has been said, is seen typically in sclerosed arteries, in the well known "hob-nailed" liver and in contracted kidneys. This process, so insidious in its development and so fatal to life, is known to be unaccompanied by the production of pus, but its "dryness," or freedom from the products of accompanying exudative inflammation is probably as already stated more or less relative. It is convenient, however, for the purposes of classification, to look upon the process as a dry one.

In point of time, dry productive inflammation is infinitely slower than the wet. As is well known, it takes years for a liver to become cirrhotic or for arteries to sclerose, but the processes although differing much in time, are identical in the means of their execution. While one capillary tuft is being formed in the dry type, a hundred are created, utilized and pinched out of existence in the wet. The one is a chronic process and the other is acute, but save for the presence of moisture in the one and its relative absence in the other, of slowness in the one, and of speed in the other, these so-called "types" are indistinguishable.

SUMMARY OF CHAPTER II.

(1) Inflammation, if looked at from a practical common sense standpoint and if shorn of the enormous amount of detail with which it is usually surrounded, is a very simple process quite easy to understand. The most common form of inflammation is called **Simple Exudative Inflammation.** This has nothing to do with the formation of new **cells,** and is characterized only by changes in the **vessels.** This form of inflammation gives rise to the familiar symptoms of many every day diseases such as colds and the like. It may, or may not be accompanied by granular change, or so-called **"Cloudy Swelling,"** and there may, or may not be, slight destruction of cells. Cell death is frequently absent from this form of inflammatory change.

(2) **Productive Inflammation.** This is not to be looked upon as a separate and distinct phenomenon apart from exudative inflammation. It is as a rule a continuation; a termination of the exudative process. It may be for convenience divided into the **"Dry"** and the **"Wet,"** these groupings being made in accordance with the degree to which it is accompanied by the exudative change. Productive inflammation has to do not with the **vessels,** as in the case of the exudative form, but with the **cells.** It produces fibrous scar from granulation tissue. The **"dry"** form is chronic and is accompanied typically by **no dilation of the vessels.** This form, it is, which is instrumental in producing the various cirrhotic and sclerotic changes, often called disease.

(3) **"Walled Off."** This term, which is now so frequently used, can be properly understood only as interpreted from its inflammatory relations. The **"wall"** is first round cells and fibrin—later fibroblasts and fibrous tissue. It is a typical **product of Productive Inflammation.**

(4) As the vessels are the important factors in exudative inflammation, so are the fibroblasts and other cells in productive inflammation.

(5) The so-called "phagocyte" is nothing more than a leucocyte which has been brought to the scene of the injury by a conscriptive process called **Chemotaxis.** They are capable of destroying bacterial life, but their most important function is to remove the solid products of inflammation, which when diluted form **pus.**

(6) One of the easiest means of understanding the process of productive inflammation is to look upon the primary deposit in the part killed as a **temporary scaffolding** which is to be removed by nature's processes as the permanent cells take their position. An excellent illustration of the application of this stage of productive inflammation for the uses of surgery lies in its employment in operations where a portion of the tissue is removed and the sealed cavity allowed to fill with blood clot. This, as will be found later, is customarily referred to as **"healing under Schede's moist blood clot."**

(7) The various processes of the inflammatory condition, although they are recognizedly diverse and in spite of the fact

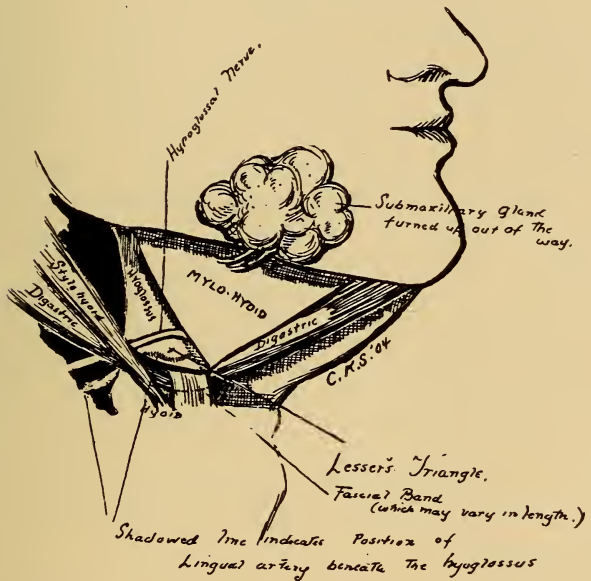
that they extend over very wide fields, viz.—those in which the injury is inflicted, and those upon which its recovery takes place, must be recognized as part and parcel of one continuous interrupted process. Whoever looks upon them as separate cannot possibly clearly understand them. Furthermore, inflammation once clearly understood, constitutes by all odds the most important stepping stone to a basic interpretation of the science and art of surgery. It must be remembered that not a solitary lesion exists which is unaccompanied by one or other, or all of the forms of the inflammatory process here described.

CHAPTER III.

THE ARTERIES AND THE VEINS.

This chapter may be well introduced by a sketch showing the smallest, the least known and the most frequently asked triangle in the body.

FIG. 2.



ANEURISM.

This is the most important surgical disease of the arteries. It will not be amiss to apply the scheme from Chapter I in this interesting lesion.

Definition,—An aneurism is a pulsating swelling, filled with blood and communicating with an artery.

Etiology,—The predisposing causes.

Age? Period of active life.

Sex? Male more liable.

Color? Said to be more common in the negro.

Occupation? Hard labor. Traumatic aneurism was four times more common after the Civil War than it is to-day.

Exciting Causes? **Spontaneous aneurisms** may be due to congenital defects or to the toxins of a hypothetical germ (syphilis). **Traumatic aneurisms**, usually seen on the extremities and not infrequently in the popliteal space, are the direct result of trauma. Popliteal aneurisms are commonly said to be of frequent occurrence in grooms and liveried footmen who are obliged to dress in very tight pants and stand for hours at a time with the popliteal artery on the stretch from bending their knees backward. This is an excellent illustration of an occupation disease. Fig. 3, shows the surgical relations of the popliteal space and emphasizes the depth at which the artery lies.

Pathology,—Aneurisms result from the **stretching of weak areas** in a vessel wall. The gross pathology varies according to the type of aneurism. Spontaneous aneurisms are usually in the chest or abdomen, those occurring in the first situation being typically saccular whereas those found in the abdominal regions, particularly in the aorta, are generally elongate, or, as it is called, **"Fusiform."** A great many sub-divisions of the gross pathology of aneurisms have been made. One of these is the rare **"Circoid"** aneurism. In this the aneurism does not communicate with the artery but the entire vessel becomes aneurismal. It has therefore been defined as a "uniform dilatation of an artery and all its branches." It is, in other words, a **varicose artery.**

Classifications of aneurisms have been based upon the shape of the sac; upon the method of infliction of the injury causing the aneurism, etc., but for practical purposes it is necessary simply to remember that they may be saccular, cylindrical, dissecting, spontaneous or traumatic.

Minute Pathology,—This deals with the condition of the vessel wall at the site of injury and with the character of the contained clot. Occasionally the blood current splits an inner wall of the vessel, separating the coats and an aneurism results from the stretching of the outer wall. This forms a so-called **dissecting aneurism.** If all the coats of the vessel are not included in the sac wall it is known as a **false aneurism. True**

Aneruisms on the contrary have all three vessel coats in the sac wall.

Symptomatology,—The detailed subjective symptoms of aneurism are of importance chiefly to the internist, for aneurisms which lend themselves to surgical intervention, or as they have been called **"Surgical Aneurisms"** present little beyond the two characteristic surgical subjective symptoms of **pain** and **disability.** Medical aneurisms, as those which must at present be relegated to the internist have aptly been called, present a very characteristic and intricate chain of symptoms, which, it is not in the province of this book to discuss. An interesting one, for example, is the dilatation and subsequent contraction of the pupil in thoracic aneurism.

The **objective symptoms** of surgical aneurism:—

Inspection,—A pulsating swelling seen in the course of an artery.

Palpation. Expansile pulsation.

Percussion. Flat.

Auscultation. Occasionally a "bruit."

Differential Diagnosis. Again excluding the medical aneurisms, the question of differential diagnosis depends naturally on the position of the swelling. Let it be supposed that a swelling has appeared spontaneously in the popliteal space of an old syphilitic soldier. It might be a gumma; it might be an osteosarcoma; it might be a bursa from one of the numerous tendons in the neighborhood; it might be an aneurism.

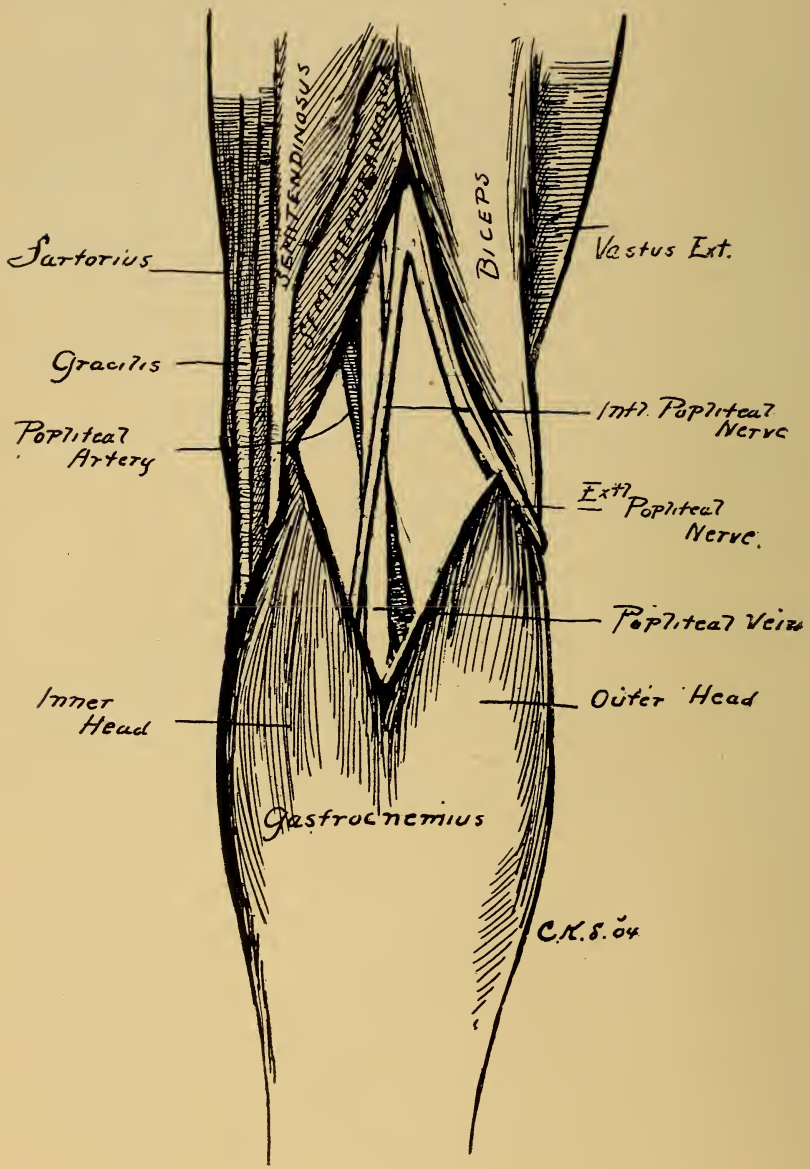


FIG. 3

The relations and, particularly the depth of the popliteal artery, are shown in this figure. Note origin and course of external popliteal nerve.

Gumma.	Sarcoma,	Bursa.	Aneurism.
	History of Tumor.		
Slow growth.	Rapid growth.	Probably slow.	Growth moderately rapid, but onset acute.
	Injury.		
Absent.	Often present (as fracture).	Absent.	May be absent or present.
	Disease.		
Evidence of syphilis elsewhere. Onset slow.	Cachexia. Onset rapid.	Absent. Onset slow.	Arterio - sclerosis frequent. Onset rapid.
	Previous Injury.		
Absent.	Often present. (Some form of chronic irrit't'n)	May be present.	Typically present, either acute or chronic.
	Previous Disease.		
Chancre.	May be metastatic	Absent.	Arterio - sclerosis, endocarditis, alcoholism, syphilis.
	Age.		
Adolesence.	Childhood.	Early middle age.	Adult.
	Occupation.		
Negative.	Negative.	Continuous overwork of one muscle.	Heavy work.
	Pain.		
If present, not severe.	Always present, often intense.	Negative.	Sometimes very severe.
	Disability.		
Not marked.	Marked.	Moderate.	Marked.

GUMMA.	SARCOMA.	BURSA.	ANEURISM.
	NERVOUS SYMPTOMS.		
	(CENTRAL.)		
Often marked, particularly night headache.	Negative.	Negative.	If present, due to sclerosis.
	PARESTHESIAE.		
Often marked.	Occasional.	Absent.	Occasional.
	GENERAL PHYSICAL.		
	FACIES.		
Pale and anxious.	Cachectic.	Negative.	Drawn.
	NUTRITION.		
Disordered.	Much disordered.	Negative.	Negative.
	GLANDS.		
General discrete enlargement.	No local enlargement unless infected.	Negative.	Negative.
	REFLEXES.		
	DEEP.		
May be absent.	Negative.	Negative.	Negative.
	LOCAL PHYSICAL.		
	INSPECTION.		
Red swelling.	Darker red.	Normal color.	Normal color.
	PALPATION.		
Cool. May pulsate (heave).	Hot. May crepitate and pulsate	Cold. May pulsate (heave).	Hot. Expansible pulsation.

GUMMA.	SARCOMA.	BURSA.	ANEURISM.
	AUSCULTATION.		
Negative.	Possible bruit.	Negative.	Typical bruit.
	LABORATORY FINDINGS.		
	TISSUE SECTION.		
Characteristie.	Characteristic.	Negative.	Negative.
	COMPLICATIONS.		
	IMMEDIATE.		
Negative.	Often pressure pain.	Negative.	Gangrene or rupture.
	MEDIATE.		
Moderate increase	Fracture, Metastasis and death.	Negative.	Disability.
	REMOTE.		
Softening.	.....	Disability.	Disability. Loss of extremity.
	PROGNOSIS.		
	IMMEDIATE.		
Life: Negative, K.I. improves.	Almost surely fatal.	Life negative, fuuction questionable.	May be fatal, function impaired.
	TREATMENT.		
K.I. or mixed.	Disarticulation at hip.	Excision of sac.	Mata's operation if possible.

Undoubtedly much more might be said in attempting to give the differential diagnosis between these hypothetical cases, but it is not claimed that this differential is complete in all details. Further application of the scheme will supply these if

desired. As with Darwin's article on earth worms, very little, will remain to be said after the scheme has been thoroughly applied. Earth worms have been observed for the last thirty years, but nothing new has been added to the observations of the famous naturalist.

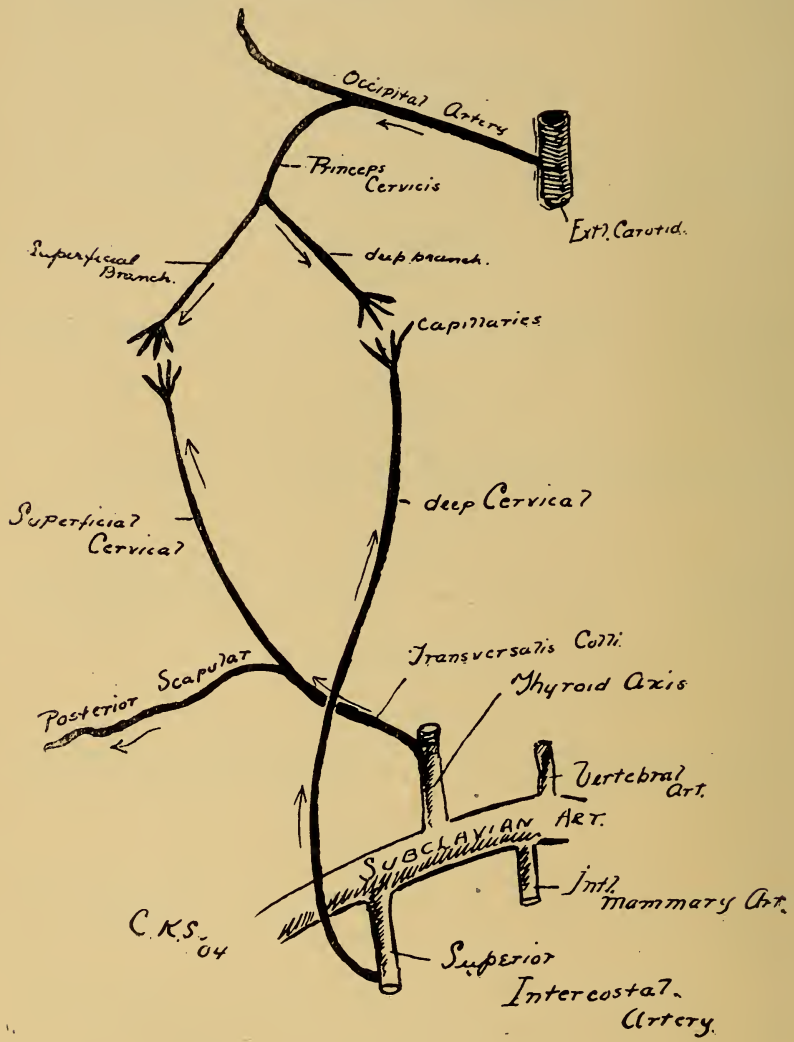


FIG. 4.

Cervical Anastomosis.

Word schemes, however, are not the only ones which lend themselves favorably to a discussion of the arteries. Fig. 4. shows an invaluable diagrammatic scheme of the difficult and too-often asked cervical anastomosis. It is not artistic but immensely useful. One of the important differences between medicine and surgery is that medicine is given over very largely to diagnosis, whereas surgery is concerned more particularly, or at least to as great an extent, with treatment. An eminent authority has said perhaps not too wisely, but certainly concisely, that in general the **medical treatment** of a given condition can be summed up in three words: **Nurse, Feed** and **Stimulate.** This is obviously an exaggeration if applied too widely, but it serves to emphasize an important point.

As a result of this essential difference between medicine and surgery, and partly because of the trend of the times, which is to leave medical cases more to themselves than was the custom until recently, it has been noted that particularly in the matter of aneurisms, the **surgical treatment** has always come in for a wide share of attention.

Until a couple of years ago, very little change had been made. It was regarded as settled that no improvement could be looked for in the time honored methods of ligation or of extirpation. The classical procedures will be presented first and then the modern method of Matas. It is always a disagreeable chore, but one which has become a sort of classical entity, to learn the names of the surgeons who devised various methods, good, bad and indifferent, for the treatment of aneurism. It is almost impossible to hold these without the aid of visual memory, and they can be conveniently kept in the mind's eye by learning to draw the accompanying sketch:

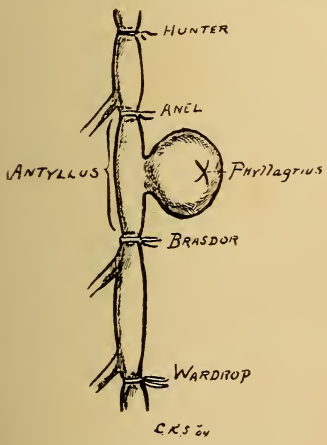


Fig. 5.

Dawbarn has used a similar one in his lectures for many years. Hunter, it will be observed, tied proximally, one or more branches being given off between the position of the ligature and the aneurismal sac. Anel (like the German word meaning ass) tied in the soft and friable tissue too near the aneurism.

Brasdor was as unfortunate in the choice of his position as was Anel, although there is no German word to commemorate his failure. In our own Bowery vernacular, however, he may be said to have had an over abundance of "**brass**" to expect a ligature placed as he placed it, to do any good.

Antyllus, although he lived long before the two preceding gentlemen, was sufficiently courageous and intuitive to combine their methods, except that he went further and removed the sac.

Phyllagrius, the old Greek, boldly opened the sac, as shown by the X in the diagram.

Wardrop placed his ligature in exactly the inverse position of Hunter's. It was no good, and therefore "**dropped off.**"

The above mnemonics albeit inelegant have been found useful.

All medical aneurisms and those of a surgical nature under certain conditions, are subjected to medical treatment. For aneurism, this is summed up in four words; instead of the three which usually cover it. They are **Rest, Starve, Purge** and **K. I.** This is known as **Tuffnell's Treatment.** He was a sagacious Irish surgeon who hoped to dry the patient so that his blood would coagulate in the sac.

There are several other methods which are only occasionally used. Perhaps the most important of these,—important because the changing fancy of surgical fashion appears to be bringing it into prominence once more, is **compression by digetal pressure.**

Shepherd, of Montreal, has recently advocated the reintroduction of this method, although he admits that with the modern methods of aspetic technic, there is no very strong ground in favor of it. It is a sort of relay race, ten minutes being the limit of time which any one hand can hold a large artery.

Tuffnell's treatment failing, efforts have been made in the case of certain inoperable aneurisms to increase the thickness

of the sac wall by causing the blood to clot upon it by local treatment. Of course, Tuffnell's treatment aims at increasing the coagulability of the blood by simply drying it up. The patient is desiccated and starved so that the heart becomes weak and the blood current very much diminished in force and rate. Slowing the pump also favors clot formation.

Recently another means of **increasing the coagulability** of the blood which has been used in aneurisms, and particularly in pancreatitis, is the exhibition of immense doses of **calcium-chloride**; from 30 to 50 grains being given three or four times a day.

All these efforts failing, bodies have been introduced into the sac upon which the fibrin could be whipped out as the blood rushed through it. The sac has been needled; it has been treated with electricity; it has been filled with hundreds of feet of watch spring steel; it has had crowded into it many yards of fine malleable wire. The supposed difference between these two materials is that the spring coils itself upon the periphery of the sac as it is fed in, whereas the malleable wire makes a net work in every possible direction back and forth across the diameter of the sac, not being confined to the wall.

The danger of these local methods of treatment is self evident. There is no means of safe-guarding against tearing loose and freeing into the blood stream particles of clot which, swept away to the lungs, cause pulmonary embolism and speedy death; to the brain, death, hemiplegia or other lesions; to the spleen, kidneys or other organs; infarcts and various degenerative processes. These local methods of attacking the aneurism consequently are indicated only when its site renders it absolutely inoperable; when all methods of cure by concentration and slowing of the blood stream have failed; when the patients life is despaired of.

Matas' Operation. This technic is being very generally introduced for the treatment of surgical aneurisms, and will probably soon be adopted to cure certain medical aneurisms which are now practically hopeless. Very favorable reports are being made upon it. It represents by far the most important advance which has been made in the surgical treatment of aneurism since the introduction of asepsis.

Preservation of the Lumen of the Artery is the object of the technic. For admirable details and illustrations of the operation, reference is best made to Brewer's Manual. The technic, in general, consists in the application of plastic surgery to the sac, by which means it is obliterated and the opening between it and the artery is closed. The lumen of the artery is preserved. Obviously it is the ideal method. When it was first advocated by its creative author, objection was made to it upon the ground that the extensive endarteritic changes, which in the nature of the lesion, must always be present,—often to the extent of depositing solid plaques of limestone—would in most cases prevent its employment. The "proof of the pudding, however, is in the eating," and the suggestion, although apparently based on sound mechanical reasoning, seems happily to have lacked confirmation. It even appears possible that this method as already suggested may soon enable surgeons to invade the territory of the medical man and take from him the treatment of many abdominal and thoracic aneurisms. (See "Surgical Treatment of Abdominal Aneurism," by C. B. Maunsell, British Medical Journal, June 18, 1904).

Large **arteries are often cut** accidentally. **Brewer** has demonstrated experimentally (Surgical Laboratory, Columbia), that such wounds may be closed and the lumen of the vessel preserved. After stopping the blood flow and thoroughly drying the part he winds the artery with a thin extremely adherent elastic bandage.

PHLEBITIS.

This is one of the most interesting conditions in surgery. Its sequelae are formidable; its etiology in many cases is entirely unknown.

It is a disorder to which the schemes of Chapter I, can most advantageously be applied. As before stated, there is not room to carry this out in a small book, but the point to be made is that by conscientiously following the scheme any one, after a little reading, can write or say all that is known on the subject of phlebitis. The point to be striven for here as everywhere else, is such a thorough acquaintance with the scheme

that it naturally revolves in the brain like a rotary sifter, picking out all the points bearing upon the subject matter and excluding everything extraneous to it. Obviously, it is a question of time and patience to attain this end.

What are the important points in phlebitis which naturally suggest themselves as the scheme is perused?

Definition. An inflammation of a vein, due either to the toxins of germs, or to unknown spontaneous causes.

Etiology. Femoral phlebitis in particular, often follows aseptic and **successful laparotomies.** Usually on the left side. Believed by Keen to be caused by mechanical pressure on the left common iliac vein.

Pathology. Gross. If septic, full of decomposing blood clot. If sterile, vessel dilated and clot may be incomplete. Minute. If septic crowded with the specific germ.

Symptomatology. General. If septic, evidences of septicemia. Local. If septic, blue line, rat-tail feel.

Differential Diagnosis usually to be made between the two varieties.

Complications. If septic; those of septicaemia. Swelling of extremities.

Prognosis. If septic, may cause death. In any case often impairs function of extremity for a long period.

Treatment. Medical, nurse, feed, stimulate.

Surgical. Palliative; mild case; elevate, rest, ice bag, elastic bandage. Radical; severe case, septic, excise and drain.

In this particular case the sub-schemes for giving subjective symptoms and differential diagnosis are seen under ordinary conditions not to be necessary, but they may be applied to phlebitis as to anything else, if it be so desired.

Summary of Phlebitis. It may be septic or aseptic, the latter form being one of the most dreaded sequels of aseptic laparotomies. It is on a par with pulmonary embolism in this respect, for it steals in after the door has apparently been closed. **Like varicocele, this form is usually on the left side,** and as in the case with varicocele, is probably due to the mechanics of the anatomical structure. The septic form is occasionally a sequel of operations; but may follow any dirty wound. It is common in the internal jugular, that vein having

been infected through contiguity of the lateral sinus to a germ laden mastoid, or by continuity with the facial vein. (See Fig. 13)

VARICOSE VEINS.

These interesting lesions are the bread winners of the young surgeon. They cause an immense amount of human suffering. Their **etiology** is simple. Shaler has said, that as in the case of hernia; of all the displacements of the uterus and ovaries, and a host of similar lesions, varicosities arise from man's getting too ambitious and **rearing up on his hind legs to walk.** This class of lesions, from which the animals are practically immune, could well be classified under the general term **"Gravitation Diseases."**

The three most important varicosities occur in the leg, in the pampiniform plexus of the spermatic cord; where they are familiarly known as varicocele, and in the inferior and middle hemorrhoidal plexuses, where they are called hemorrhoids.

Practically these are self-evident, and except in the case of varicocele, rarely have to be differentiated. Their treatment consequently is of first importance. In the legs, this depends somewhat upon the type. Suppose a diffuse varicosity to exist all below the knee giving that red, nasty, swollen, boggy leg, so characteristic of the "hobo" and of the worn out cook. As Jacobi says: "What to do?" Make a boot of the patient's own skin by cutting a circle around the leg, just distal to the knee. Avoid the important cutaneous nerves and cut to the muscles. Tie the vessels as you cut, and on completing the section, suture the skin. This is called **"Schede's operation."** It blocks every cutaneous vessel and forces the circulation into the deep veins.

If the lesion be characterized by swelling of the distal portion of the long saphenous and with dilatation and tortuosity of the vessel in the upper part of its course, the tortuosities may be excised and the upper segment treated by subcutaneous ligation or by removal of small sections along the course of the vein. For treatment of proximal long saphenous varicosity, Fowler has devised a unique method. He ligates at a chosen

point six odd inches distal to the saphenous opening and again ligates between the opening and the first ligature. At this point he cuts the vein and frees it enough to grasp it with a wet towel. He then, by a sudden jerk, pulls the severed section of the vein, hook, line, bob and sinker, clean out of the tissues.

Every one must remember the pictures in school text books of physics which show Torricelli's famous experiment in which he burst a tremendously powerful cask by screwing a pipe into it and pouring water in at the top of the pipe. By this means and without a very high pipe, such a cask can be blown to pieces. No wonder the veins dilate, for in getting up upon our hind legs, **we illustrate admirably the Torricellian principle.**

Varicocele. This lesion has until recently been treated to a large extent by subcutaneous ligation. It is recounted of a famous French surgeon, that on one occasion a patient called at his office and the surgeon found him to be suffering from a bi-lateral varicocele. Esculapius was about to go to the opera, but hastily taking his needle, after injecting a little cocaine, he threw a ligature about the parts on both sides. The varicocele promptly disappeared, but in six months time the testicles had atrophied! On discovering this, the patient bought a revolver, went to the office of the surgeon and shot him dead. He was arrested, tried and promptly discharged by a court on the ground of "justifiable insanity!"

Accidents similar to this have combined to put a quietus on sub-cutaneous ligation for varicocele. It is contrary to the spirit of surgery to work in the dark.

The **open operation** here as elsewhere is to be preferred. Most surgeons advocate placing the incision as high as possible so as to avoid cutting the tissue of the scrotum which is most difficult to sterilize. The **important points** are to note the **vas deferens** by its rat-tail like feel; to remember that the **three arteries** are so small that their pulsation can hardly be felt; to note that the offending veins are usually separate and distinct from the normal veins of the vas; to tie above and below; to excise the included inch or more of the plexus and to make an **internal suspensory** by approximating the cut butts together.

Hemorrhoids. The easiest way to treat these varicosities

efficac ously is to put an **angiotribe** on them for a few minutes. This instrument is a giant forceps designed to exercise a pressure of from one to 2,000 pounds to the square inch. The tissues embraced in its jaws are compressed to the thinness of the finest sheet of tissue paper. This treatment is particularly suitable for the single external hemorrhoid, for it can be done very conveniently under local anesthesia.

Many people dread a general anesthetic more than they do an operation. For severe cases of internal hemorrhoids, the suggestion by **Tinker** that the entire perineal region may be completely anesthetized by using massive infiltration of a half per cent. of eucaine in the neighborhood of the great ischiatic tuberosity where the internal pudic and long pudendial nerves course about the bone will be of importance in furthering the treatment of these cases. If prostrates can be painlessly enucleated by this method, surely hemorrhoids may be similarly treated. (See illustration under Prostatectomy.)

The **clamp and cautery** is probably the favorite method of treating hemorrhoids.

Another widely employed technic is to seize the apex of the tumor with a blunt clamp, to circumscribe its base with a sharp knife through the mucous membrane, to transfix it with a needle bearing heavy pedicle silk; to cast a Staffordshire knot over the growth, to tie it so tightly as if possible, to kill the nerve endings, and finally to cut off the apex as near to the suture as is safe. This is known as **ligation.**

In the execution of this technic, the flaw is apt to lie in the fact that it is almost impossible to tie the suture tight enough to kill the nerves. If these live, for several days after the operation, the surgeon had better leave the patient exclusively to the nurse, for the pain makes the remedy worse than the disease. **Injecting** the veins with irritants and escharotics, such as equal parts of tincture iodine, glycerine and phenol, is widely practiced by quacks and constitutes, in the hands of some of these men a useful, although admittedly dangerous **palliative treatment.**

The **Medical treatment** of hemorrhoids is satisfactorily embraced by the four words, **nurse, feed, stimulate** and **bidet.**

Fig. 6, shows the veins of the face and neck. They are

frequently asked for in hospital examinations. The temporo-maxillary sinus, when varicose, constitutes a very evil lesion, its removal being extremely difficult.

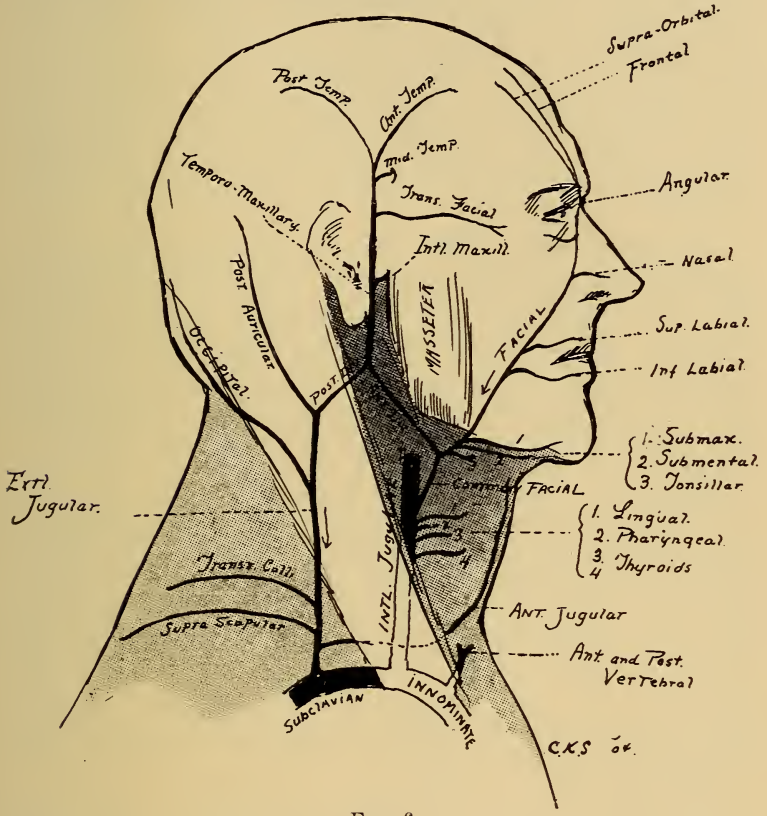


FIG. 6

Nevi. These dilatations occupy a mid-position between the arteries and the veins, by virtue of their occurring either in the small continuations of these vessels, or else actually in the capillaries which connect them. They have been conveniently divided into **capillary** and **cavernous.** The capillary form is best known in the familiar "mother's mark." All "mother's marks" are, however, not due to capillary dilatations, some being caused by pigmentary deposits. These dilatations are usually **treated in one of two ways.** They are either **excised,** and the part is skin grafted, or else they are subjected

to **electrolysis.** The negative needle of a galvanic battery is run longitudinally its full length into the growth. The electrolytic action destroys a number of cells in the near region of the puncture. Productive inflammatory changes take place, and as explained in Chapter II, the gap is presently filled with granulation tissue. At no distant time this contracts, and, clinically, where once was a disfiguring red blotch, will be seen a fine white line. A multiplication and an irregular crossing of these fine white lines eventually destroy the growth, enough capillaries being left to preserve the normal skin color. The technic is tedious to the operator and expensive to the patient.

Cavernous Nevi are lesions which sometimes threaten life. They have an evil habit of growing with such rapidity that they may be difficult to differentiate from a rapidly growing sarcoma. They occasionally yield, when inoperable by the knife, to prolonged treatment by electrolysis. Bubbles of hydrogen can in these cases be seen, when the electrical action is going on satisfactorily and when the needle is suitably placed, coursing at the rate of one or two to the second through the dilated and about to be destroyed veins.

Wyeth has recently devised a characteristically ingenious and simple method for the treatment of these growths. It consists in the introduction of **boiling water** directly into the tissues, the water being boiled by a lamp held under a syringe which holds half a pint to a pint. This process is much more rapid than electrolysis, and it is safe if care be taken not to introduce enough boiling water to cause necrosis. In other words, not more tissue should be destroyed at a time than can be taken care of by the phagocytes and the plasma, without the necessity of the organisms pushing the devitalized material out through the surface.

The knowledge of the paths by which the blood may return when the portal system is obstructed is an important aid in establishing many diagnosis. It is a frequent hospital question and is therefore given. (From Gray)

(1) By anastomosis of mesenteric veins with superficial abdominal.

(2) Of phrenic and gastric veins with those of Glisson's capsule.

(3) Of superior hemorrhoidal, inferior mesenteric and internal iliac.

(4) Gastric and esophageal with azygos minor.

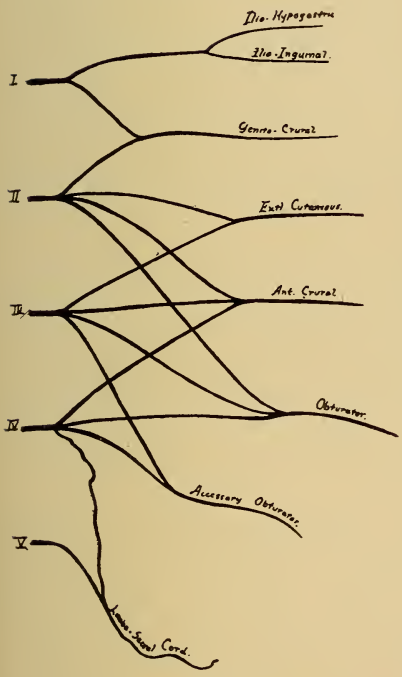
(5) Left renal and intestinal.

CHAPTER IV.

NERVES, MUSCLES, TENDONS AND BURSAE.

LUMBAR PLEXUS.

FIG. 7.



From upper four Lumbar Nerves.

The 1st Lumbar splits into two; the 2d, 3d and 4th split into four each.

The 2nd division of I., and the 1st of the II. unite. (Genito-crural)

The 2d division of II., and 1st of III. unite. (External cutaneous)

The 3d division of II, and 2d division of 3d, and 1st division of IV. unite. (Ant. crural)

The 4th division of II., the 3d division of III. and 2nd of IV. unite. (Obturator)

The 4th division of III., and 3rd division of IV. unite. (Accessory obturator)

The 4th of the IV. unite with V. (Lumbo Sacral Cord)

The Mnemonic for this is:

"If I get examined, all's over. Oh!"

The two most interesting problems in the surgery of nerves are **suture** and **transplantation.**

According to very recent views, the **outlook** on suturing a nerve many months after its section, is almost as good as if the operation had been done immediately after the infliction

of the injury. This is not in accordance with the older teaching, which was that there is very little use in attempting to do anything with a severed nerve, unless it can be operated on immediately after being cut. This recently demonstrated ability of the nerve to re-establish its function, even if united long after the reception of the primary injury, seems to show that the much dreaded **degeneration** is not so grave as was formerly supposed and suggests that function returns in some other way than by the actual re-establishment of the axis cylinders. The conclusion from these recent observations is that no case of peripheral nerve injury should be refused operation simply because the opportunity to unite the divided ends comes at a late hour. In any event, whenever the union is made and whatever the process of repair, return of function, which may be either incomplete or complete, comes at best only after months of patient treatment with electricity, massage and hydrotherapy; one and all.

Another conclusion, which is of very great importance is this, viz.—no attempt should be made to unite the ends of a divided nerve in case the wound is known to be dirty. Inasmuch as a moderate delay or even a prolonged delay appears not to have the profound importance which was formerly ascribed to it, some surgeons now advocate postponing the operation until after the active manifestations of the inflammatory reaction have cleared away.

The attempt to replace a destroyed segment of human nerve by **grafting** an equal length of animal nerve has failed. So it did in the case of bone grafting. The body does not take kindly to any form of graft, except skin graft! Decalcified bone **tunnels,** and a host of similar devices, the supposed purpose of which is to keep the pathway open for the axis cylinders to grow along, have also proved failures. They should probably therefore, be entirely abandoned and recourse had, in the event of destruction of a segment of the nerve, to **bone resection.** This of course applies only to wounds of nerves on extremities, and although in the arm it shortens the "reach," this is justifiable except of course among a certain class of athletic gentlemen.

Transplantation has lately awakened a widespread interest,

because it appears that the possibilities before it are as yet only half surmised. As has often happened before, supposed advantages of this technic may have been exaggerated.

The present status of transplantation, however, is such that a thorough knowledge of how the technic is applied; its indications, and its limitations is desirable. So far, the most important application of the principle has been made in cases of paralysis of the seventh. The process is a simple one. Given a case of facial palsy, what can be done for it? Obviously it can be massaged, electrefied and hydrotherapized, but as is well known, if the disturbance be centrally situated absolutely no good will follow. Until very recently, it was held that the centres of the cranial nerves differed widely from each other. They certainly send out impulses having utterly different characteristics. The medullary centers have become peculiarly specialized, in that for example, one interprets hearing, while another almost adjacent to it, controls the muscles of the tongue. The one is a higher class of work than the other. How can it by any possibility be that one of these little bunches of cells, after a short education, can assume the functions of the other? Whatever be the answer, the fact remains that if a portion of the hypoglossal nerve, as it courses in the neck toward the tongue, be grafted into a centrally paralyzed seventh nerve, the patient will, under favorable conditions, regain facial control. When first done, it was not expected that anything would happen. As is sometimes the case, however, the unexpected did happen and the control of the muscles of the face was assumed by the center of the twelfth. This center did its own work and that of the seventh as well. What an interesting series of possibilities this awakens. It is true that both these centers have to do primarily with the creation of motor impulses, but if such a switching of motor centers is possible, may it not untimately lead to a switching of the special sense centres as well? Will, for example, the first nerve ever be made to assume the functions of the second, thus giving sight to the blind?

MUSCLES.

A **strain** is an injury produced by over-stretching a muscle. A **sprain** is also an injury produced by over-stretching a mus-

cle. Each of these may occur in the ligaments. The first may be said to be distinguishable only with a microscope, or perhaps not even by such delicate means, whereas the second is always accompanied by a macroscopic, or physical tearing of the fibres. Strains are more apt to occur in muscles than sprains, which are usually seen in the neighborhood of joints, the ligaments being torn.

Muscles are apt to undergo **calcification.** It is well to note that this change differs from ossification. The one is a dead process, the other a living. **Ossification,** while not so common as calcification in the muscles, is not by any means unknown. **Rider's bone** is a plate forming in the adduct or longus and is frequent among the cavalry men. Drill bone occurring in the deltoid muscles is occasionally seen among infantry-men. These lesions are the result of chronic irritation and are grouped under the general term of occupation diseases.

Muscular Contractures are of great interest and importance. Their treatment forms a large portion of the work of the orthopedic surgeon. They are of two distinct types, **spasmodic** or **relaxing** and **non-relaxing.** Spasmodic contractures are often called **contractions.**

The most practical way to differentiate contractures is to give the patient chloroform. The first type is seen typically in those cases where Nature endeavors to make splints out of the organism's muscles, as for example, to protect a joint inflamed with disease from harmful motion. The rigidity of such muscles is so great and the tone of the tension so constant that it is often impossible, except under an **anesthetic,** to tell whether such a stiffness is of the transitory or permanent type. Naturally, if transitory, when the element of pain, which symptom calls this muscular tone into action, is obliterated, the muscle relaxes, and the condition is seen to be spasmodic. Muscles in a state of chronic tonicity are apt to become permanently shortened. If no relaxation occurs a non-relaxing contraction is demonstrated.

Myotomy or Muscle Section is indicated in non-relaxing contractures. Familiar examples are, section of the sterno-mastoid for spastic torticollis, or of the flexors and adductors in late stages of coxitis. Tenotomy usually takes the place of myotomy.

The **fasciae** are very liable to degenerative changes. As elsewhere in the body, so in the fasciae fibrous tissue tends on slight provocation to become very thickened, or **sclerosed,** as it is called. It will be remembered that this process has been described in Chapter II, as dry productive inflammation.

FIG. 8

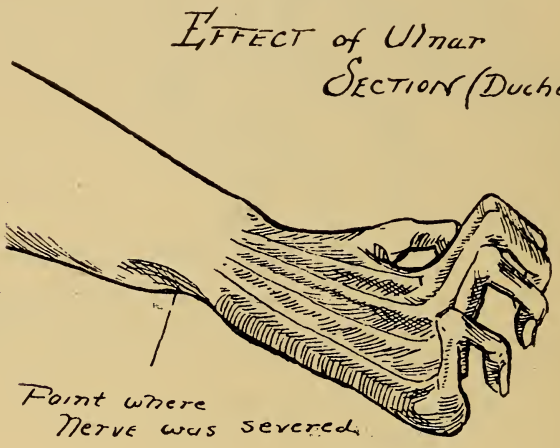
One of the most interesting, as well as most common, contractures of fasciae, is what is called **Dupuytren's Contracture.** It occurs in the palmar fascia. It has nothing to do with the tendons. It is a superficial lesion. It is infinitely more common in men. It is characterized by a gradual closing of the fingers, which are held in a pathognomonic position as though by bands of steel. As it is often bi-lateral, a central cause has been suggested for it. Probably chronic irritation favors this sclerosis, although it is by no means uncommon among men who have done but little manual labor.

The figure shows that the hand assumes, (no doubt for the convenience of ones memory), the well known position of **Papal Blessing** or **Apostolic Benediction.** Were it not for this obliging resemblance, it would be very difficult to remember the fact that the lesion occurs almost entirely in the fascia leading to the ring and little finger.

Treatment. The **open** and the **closed** methods are advocated. By the open, some cocaine is introduced and a longitudinal section is made directly over the steel like band of fascia. This band is tensed by traction on the closed finger. After a little dissection it easily comes into view, is sectioned proximally and distally, and as much as possible of it is removed. The subcutaneous method consists in making a series of sections

of the tense band with a fine tenotome.. It occasionally gives good results, but as a rule is to be utterly condemned because, as time goes on, more sclerosed tissue grows as a result of the traumatism and irritation of the operation. Tenotomy is, today, practically the only closed operation that has survived.

FIG. 9



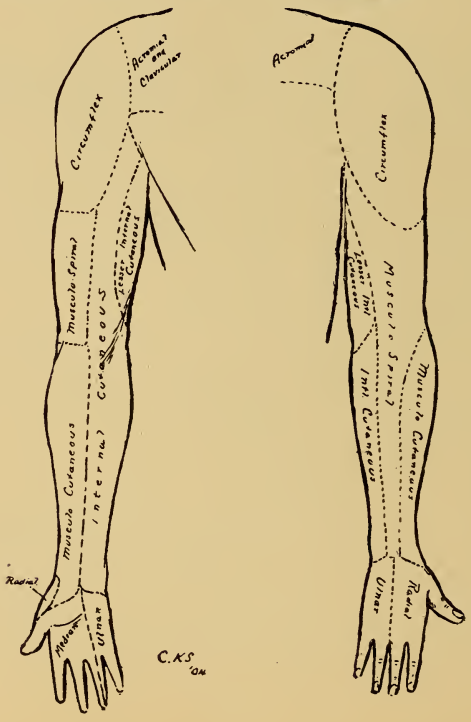


FIG. 10

DIFFERENTIAL.

Dupuytren's Contracture.	Ulnar Section.	Median Section.	Burn Contracture.
	History of Injury.		
Absent.	Cut near wrist usually.	Cut near wrist usually.	Burn of severe degree.
	Disease.		
Onset extremely slow; begins little finger.	Onset immediate.	Immediate.	Moderately slow.
	Sex.		
Male.	Male.	Male.	Negative.
	Disability.		
Unable to let go after taking hold Sensation normal. No wasting. Posture: typical; **apostolic blessing.**	Unable to grasp objects normally. Loss of sensation as in Fig. 10. Atrophy of hypothenar, eminence marked. Posture: typical; **claw-hand.**	Small objects cannot be picked up by thumb and fingers. Loss of sensation as in Fig. 10 Atrophy of thenar eminence marked. Posture: typical. **Ulnar flexion** with extension of wrist and fingers.	Depends on extent and position of the burn. If nerves were destroyed, the parts supplied by them will undergo the four characteristic changes cited below. Posture: **atypical.**

Note four important points in diagnosis of nerve section: **Atrophy, Paralysis, Anasthesia, Posture.**

Note also that every nerve which crosses a joint supplies filaments to all the soft parts as well as to the hard.

TENDONS AND TENDON SHEATHS.

Tendons are more frequently the scene of operative intervention than muscles. This word is used advisedly instead of interference, because the surgeon does not "interfere." The

Tendon Sheaths are exquisitely delicate sacs much like diminutive pleurae. They are subject to inflammatory changes, not dissimilar to those which occur in the great sac. One characteristic sign of pleurisy is the see-saw friction rub heard as the patient breathes. It can sometimes be felt. Similarly, in the small sac, dry inflammatory processes go on. The smooth bearing surfaces usually so well oiled and presenting infinitesimal obstruction to motion, become dry and corroded. On pulling the tendon back and forth after this change has taken place, they emit a grating sound and transfer what is called a **fremitus** to the hand. This is known as **tenosynovitis.** It is usually an acute or sub-acute lesion, and it occurs frequently in the tendo-Achilles. "Tender feet" who have over indulged in walking often fall a prey to it.

Chronic teno-synovitis is present in most cases of tuberculous joints. It is characterized by an increase in the size and number of the inflammatory particles characteristic of the acute form. These may gradually grow until they finally become detached. They are soft at first but ultimately undergo calcareous degeneration. After this they are known as **rice-bodies.** Most of these formations contain in their center **tubercle bacilli.** It frequently happens that the chronic form of teno-synovitis as in the case of many other lesions, usually originates in the acute. Obviously the chronic form is amenable only to operative **treatment.**

Tendons often have to be cut to correct muscle contractures. This is done subcutaneously. Repair of the part takes place under Schede's moist blood clot referred to on page 25 Consequently great care should be exercised not to allow the dressings to press out the blood clot, failure of which to organize means loss of function in the part.

A **felon** is an acute inflammatory process in the distal phalanx of a thumb or finger. It begins on the palmar surface. It is typically a periostitis, although the other soft parts, particularly the tendon sheath, may be primarily involved. **Treatment** consists in section over the point of the greatest pain through the periosteum. The indication for this section is not the presence of pus but the symptom of pain.

Ganglion. The lay name for this is **weeping sinew.**

Ganglia are now thought to have no connection at all with the tendon sheaths, but to take their origin from the synovial fringe of the neighboring joint. They are therefore a form of **distention cyst.** They may be **treated** by rupture subcutaneously or by aspiration or excision.

Tendon Transplantation. This is often useful in cases of acquired paralysis of the extremities. It has been employed more particularly upon the foot. It consists, for example, of inserting a slip of the tendon of the peroneus longus into that of the tibialis anticus. It is of value only in rare cases where there is a healthy muscle near a paralyzed one.

BURSAE.

The lesions of the bursae are classed as **occupation diseases.** They are the result of exudative and productive inflammation. Morphologically they are distention cysts caused by long continued pressure. Child believes them to be essentially protective rather than pathologic in nature. From hoary antiquity we have inherited the following old classics:

House Maid's Knee or pre-patella bursitis; **Miner's Elbow;** rarely seen in this country, but frequently in England and Wales, where the coal seams are so narrow that the men are obliged to lie on their sides to use their picks. As they pick, the elbow rotates back and forth on the Olecranon process and the bursa enlarges. **Coachman's Bottom.** This, on account of the hard seats which the liveried flunkies of the British nobility are obliged to sit upon, combined with their tight pants, arises on the tuber ischii. It is rarely seen in this country because of adequate upholstering.

CHAPTER V.

LYMPHATIC VESSELS AND THEIR NODES.

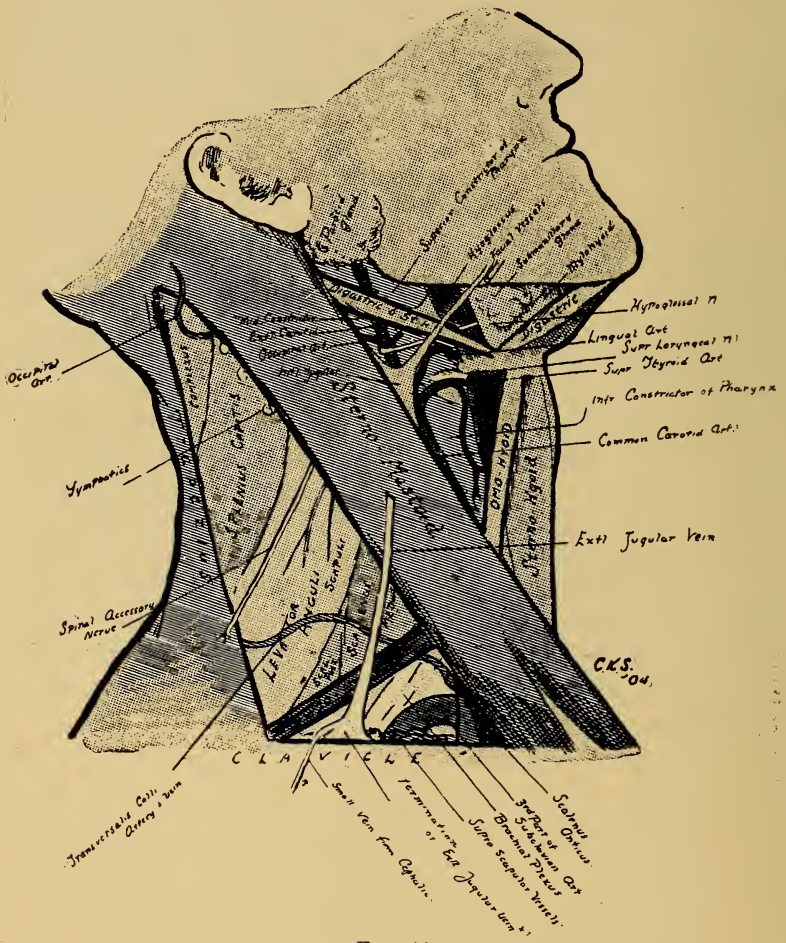


FIG. 11

Shows the group of cervical glands typically involved in syphilis. This figure is designed also to show the cervical triangles as simply as possible.

The relation of the lymphatic **vessels** to diseases in general and particularly their influence upon the metastatic distribution of carcinomata make them of very great importance surgically. A thorough knowledge of the distribution of the lymphatic vessels which drain the tongue, the breast and the uterus is a **sine que non** for all, but most particularly for those wishing to rank in a hospital examination. The character of the operations on these important parts is governed entirely by the distribution of the lymphatics.

The **glands** may well, for purposes of convenience, be looked upon as nature's sieves. They protect the body from germ infection and other dangers, and are therefore of great surgical importance. They do not, however, bear as intricate a relation to surgical pathology and treatment as the vessels.

The lymphatic vessels play a very important part in the distribution of germ toxins as well as of the germs themselves. The glands or nodes are thought to filter out the germs themselves much more efficaciously than their chemical products, although it is well known that in passing through these barriers of infection, the toxins are greatly moderated in their virulence. Reciprocally the glands are enlarged and often permanently damaged. It is, however, in the protection of the body against invasion of the actual germ bodies themselves that the glands show to the best advantage. Their well known splenic reticular structure seems to have been specially devised to entrap the invading vegetable hordes. When a germ is lodged in the gland, there is plasma enough and leucocytes enough in this vascular organ to inhibit its development if not actually to kill it very shortly after its lodgement. If the dose of infection at the primary wound, supposing it to be on an extremity, is not sufficiently great to entirely overwhelm the lymphatic nodes, they will sieve out the intruder to the entire protection of the general organism. If, however, the dose is overwhelmingly large, there is naturally a limit to the number of germs they can accommodate, and the result is that, like sponges filled with water, they can take no more. The germs then pass on and are swept either into the general vascular stream where the great lymphatics join the veins, or into the

inner breast works as they might be called, of lymphatic nodes, unless this last line of defense has already been passed.

This introduces the very important subject of **lymphangitis** and **lymphadenitis.**

This is not an inopportune time to grind out these various endings. Very few students know them, but it is a blessing to realize that if the half dozen odd terminations are once memorized and thoroughly understood, they can be applied throughout surgical pathology.

For nerves, for the stomach, for tendons and so on down the line, these terminations will be used.

Lymphangitis. "Itis" means inflammation of. Seen also in appendicitis, gastritis, otitis, etc.

Lymphadenoma. "Adene" in Greek means a gland, so that this termination means a lymphatic grandular swelling devoid of inflammatory reaction.

Lymphadenitis. Here the two terms are combined. The "itis" showing that the enlarged gland has undergone inflammatory change.

Lymphangitis. "Angi" in Greek means a vessel. This, therefore signifies an inflammatory condition of the lymph vessels.

Lymphangiectasia. "Ectasia" in Greek means dilatation. Therefore this term as applied to the lymphatics means that the lymphatic vessels are dilated.

Lymphangiorrhaphy. "Rhaphy" in Greek means a line of union. It is seen in the "median raphe," a term familiar to all. Now raphe means also to sew. Whenever it is suffixed to a word, therefore it means that the parts have been sewn together. For example, enterorraphy means a sewing of the gut. This naturally is rarely practiced in the case of lymphatic vessels, because they are too delicate to sew together, but attempts have been made to suture the thoracic duct.

Lymphangiostomy. "Stoma" means mouth. (Kindly remember that this has nothing to do with stomach). Stomatitis is an inflammation of the mouth. If you make a mouth on a thing, it implies that you have made a hole in it for good. This differs from a temporary opening, which will be considered in a moment. If it were desired to make a fistula to drain the

lymphatic duct, experimentally, for example, this would be a lymphangiostomy. . It will readily be noted that this operation is not practically used on the lymphatic vessels, but it is introduced here to show that theorectically all these terminations can be applied at will to almost any organ. The familiar operation in which this termination is used, is one done on the stomach and it is therefore called **gastrostomy.**

Lymphangiotomy. "Temno" in Greek means to cut. If you cut into a vessel, you make an opening into the lumen. Usage has determined that this term shall apply to a temporary opening in contra-distinction to the one just considered in which "stoma" is used, which implies the making of a permanent opening. This is illustrated particularly well on the stomach. A gastrotomy is done on a man who has swallowed his false teeth. It is immediately closed by gastrorrhaphy. If his esophagus is destroyed, however, he requires a gastrostomy.

Lymphangiectomy. "Ectomy" is derived from two Greek expressions "ec" and "temno" "ec," meaning out, and "temno," to cut. "Angi," here, as elsewhere, means vessel. Therefore this long word means simply a cutting out of a lymphatic vessel. In practice this is rarely deliberately done, the fine lymphatic vessels being removed with masses of other tissue. The terminations are used very frequently to denote operations on other viscera. For example, neurectomy, is practised for the relief of sciatica; enterectomy, a removal of a section of the enteron or gut is frequently done for strangulated hernia.

Lymphedema. From the Greek "Oidos," a swelling. This means a transudation into the areolar tissue of lymph. It is generally due to a blocking of the vessels. It is distinct from venous edema in that it is solid.

Returning from this excursion into etymological fields, it is interesting to note what definite relations lymphatic vessels bear to disease in general.

Filariasis. This is the general term for a series of symptoms which until quite recently were regarded as having separate entities. They are called into being by the presence of an animal parasite called **filaria sanguinis hominis,** which means the thread worm of man's blood. It is 1-80 of an inch long. The embryos are harmless, but the adults produce a train of

symptoms, the like and diversity of which is not paralleled by any other known organism. One of the most important of this series is

Elephantiasis. This disease is rarely seen outside the tropics. It is a productive inflammation, due to the presence of the filaria in the lymphatic vessels. This occludes the vessels, and ultimately they either burst or degenerate into solid strings. So terrible is this disease in its ability to cripple and render useless great numbers of men and women that immense prizes of money await him who is fortunate enough to discover its remedy.

Chyluria. This symptom is also produced by the filaria. The urine looks like milk. The pathology is not yet understood.

Lymphadenitis is a commonly seen swelling of the nodes. It is due, as already stated, to the snaring of pyogenic germs in the meshes of the node and to the irritation of its parenchyma by their toxic products. The **parenchymatous** cells are the cells which do the specialized work of an organ. They are supported by the **interstitial** or frame creating cells which unite to hold them in place. Six years ago, the pus producing organisms were supposed by many to be confined to the three varieties of the streptococcus and the staphylococcus, viz.—the albus, the aureus and the citreous. This list has now been lengthened to over thirty. The best way to remember it, is to learn the germs that do **not produce pus.** Prominent among these are the parasites of tetanus and diphtheria.

Lymphadenitis may be acute or chronic. It is not uncommon in the groin. If a patient is found to have a swelling of the glands **below Poupart's** ligament, look for a **sore on the foot.** If the **cross bar** of the lymphatic T is involved, look for **venereal** infection. Acute lymphadenitis, particularly when the inflammation is localized either in one gland or in glands which are close together, is sometimes called **bubo.** Bubo is from the Greek "Boubon," meaning groin, but the term is also occasionally used to denote an inflammatory condition in glands situated elsewhere.

The **treatment** is palliative or radical. If the infection has been of such a degree and nature as to kill the gland, ice bags

and rest will do no good. These agents, however, should always be employed, and it is well to remember that in practically all cases of acute inflammation, **cold** is indicated during the first 36 hours and **moist heat** after that time. Moist is much more efficacious than dry heat.

The radical method of treatment consists in free incision and drainage. The after-treatment is very tedious. Attempts to heal these lesions rapidly by the application of the principle of **Schede's moist blood clot** have been successful. The technic after opening and curetting is simply to swab the cavity out with pure carbolic acid, douching it immediately with alcohol. This stops further action of the acid. This method of treating abscess cavities has recently been widely adopted by many New York surgeons. It has been used with favorable results in thousands of cases at the Hudson Street Hospital. After irrigating with the alcohol, the incision is tightly closed with

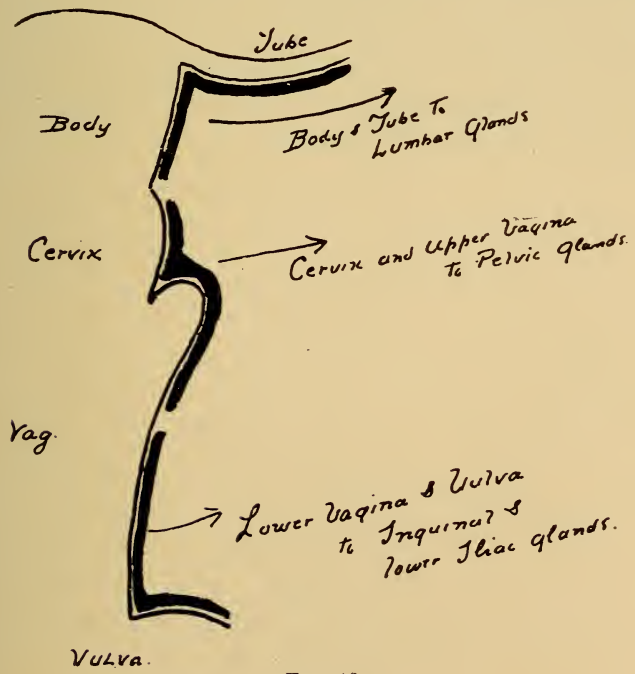


FIG. 12

Lymphatic drainage of Female Genitals. (Frequently asked)

sutures. Chronic inflammatory conditions have been found to do well under this form of treatment, it having been used many times for **tuberculous bone disease.**

Chronic Lymphadenitis occurs typically in the course of three general diseases,—**tuberculosis, syphilis** and **pseudoleukemia.** In the first the glands are often removed; although this may be followed by general infection. In the second, they are treated constitutionally and sometimes locally by mercurials. In the third, they are, unless seriously threatening to life or function, left alone.

A most admirable series of diagrams showing the relation of the lymphatics and their nodes to surgical procedures are given on page 428 et. seq. of "Park's Surgery." Eisendrath also devotes much attention to the subject.

These studies of lymphatic drainage have been the determining factors in establishing the present technic of all important operations for the removal of carcinomata. This form of malignant growth is believed to spread entirely along the lymphatic channels, the characteristic enlargement of the lymphatic nodes draining the involved tissues, affording perinent evidence of in support of this belief.

CHAPTER VI.

SHOCK.

Crile has shown that the complicated condition known as surgical shock consists, when synthecized, of three secondary symptoms. These are loss of **vasomotor control, disturbance of respiration,** and **interference with cardiac action.** For the best and most recent presentation of the subject, reference is made to Brewer's text book, page 87, where the academic and clinical questions associated with it are fully discussed.

It has been demonstrated that the great abdominal veins can hold all the blood there is in the body. A man, therefore, under certain conditions may bleed to death into his own abdominal veins. One of the most frequently discussed subjects in connection with shock is the question of establishing a differential diagnosis between it and abdominal hemorrhage. Now truly he who thinks to accurately establish such a diagnosis is wise beyond his years, no matter what his age. Why? If a patient suffering from shock has bled into his abdominal veins, and another one along side of him has slipped a ligature off, say the deep epigastric artery, and has bled into the cavity **surrounding** the veins, what important difference could one expect to find between the two? That the differential diagnosis is so difficult as in many cases to be impossible, is attested to by the fact that the most expert diagnosticians may be expected to fail.

Obviously, the need of making this differential diagnosis is found chiefly among those cases in which the traumata have been limited entirely to the abdomen, signs of hemorrhage elsewhere being easily recognized.

Another factor which obviously increases the difficulty of establishing a differential, is that every case of hemorrhage has associated with it a certain amount of shock. In other words, every case which bleeds into its abdominal cavity,

bleeds also into its partially paralyzed abdominal veins. It therefore becomes practically a question of degree.

Perhaps the one distinguishing feature between hemorrhage and shock, outside of the history, is the attitude of the patient. In shock, he is said, as a rule, to be apathetic, whereas in hemorrhage, there is often a tendency to excitement. The excited form of shock is not, however, uncommon.

Efforts have been made to differentiate the two by a **blood examination,** but the results have not yet been positive.

Because of the failure to differentiate shock from internal hemorrhage, many persons have been killed. Nature's method of controlling hemorrhage is to slow the heart until coagulation in the wound takes place. This is why strong men faint at the sight of blood. Nature means to slow that man's heart the moment he is cut. Evidently the thing to do is to leave cases of internal hemorrhage alone, unless abdominal or vaginal section can be done. The treatment of shock is, on the other hand, to stimulate the heart. If therefore, shock be mistaken for hemorrhage, the patient is promptly killed by having the heart stimulated so that it pumps what little blood he has left out through the torn artery.

A differential which is not rare is between fat embolism and shock. This dreaded sequel of injury to the long bones is much more frequent than is usually supposed, a great many cases of shock being mistaken for it. Acute suppression of urine and pulmonary oedema have also to be differentiated from shock.

Treatment. Surgical shock as before noted is almost always associated with more or less hemorrhage. The patient is cold, pale and apathetic. The abdomen is not the only site where the body fluids have collected. They are also stagnating in the extremities. The brain is relatively dry. The indications for treatment are **cardiac stimulation,—external heat—** this should be applied as vigorously as possible. **Posture,—** pour blood into the head by elevating the patient's feet. **Enteroclysis,—**this consists in turning the patient as nearly upside down as possible, and, in the absence of the customary layout, of inserting a large funnel as far into the rectum as possible. Through this funnel is poured a couple of litres of water at

a temperature of 49C (120 F.) Add two heaping teaspoonfuls of NaCl. In osmosis, when the fluid is absorbed, the lighter fluid passes much more rapidly through the membrane than the denser. Fresh water should therefore be absorbed from the rectum more rapidly than salt solution. It is, however, more irritating to the mucous membrane and is therefore rarely used. The position in which the patient is held enables the fluid to run down as far as and across the transverse colon. It is worth remembering that in the treatment of shock, as in that of threatened death from anesthesia, one of the first things to be done is to turn the patient upside down. Gravity will do a great deal to overcome cerebral anemia, as is well shown by the recovery of an over-chloroformed mouse when hung up by the tail.

Infusion is another means of introducing fluid into the system. The execution of this technic requires a suitable canula connected with a cistern, and a certain amount of experience is necessary to carry it out effectively and speedily. In this case, unlike that of the rectum, it is absolutely necessary that the salt solution should be prepared so as to be of practically the same specific gravity as the blood. Otherwise, many corpuscles will be crenated and much damage will be done to the oxygen carrying power of the blood. Air must not be admitted for air bubbles are as dangerous as fat globules.

Hypodermoclysis is another method of introducing water into the body. It consists simply in connecting a large hollow needle with a douche bag, the bag is filled with salt solution at 120° and the needle is plunged into a region of soft cellular tissue, either beneath the breast or in the yielding regions of the back. Kemp has obtained important results in applying this method to conditions of diminished or suppressed urine. Either of the preceding methods will introduce fluid more rapidly than this one. Fifty or more cubic centimeters of salt solution, however, injected by hypodermoclysis over the region of the kidney will, in chosen cases, produce four or five times the amount of urine in an astonishingly short time.

Elastic compression of extremities is an expedient which has been used for shock, notable by Dawbarn. A strong elastic band is placed about the extremity near the body, after

most of the blood has been forced out of it either by compression or by posture. After say ten minutes, during which time the extremity has been deprived of its normal circulation, the blood is allowed to flow into it and another extremity is treated in the same way.

What might be called the **inverse** of this plan has been used for the treatment of **coal gas poisoning.** By tightening the elastic enough to stop the return circulation, the extremity is allowed to fill as full as the heart will pump it. By this means a considerable percentage of the poisoned body fluids are shut up in the extremity for a short time, during which the lungs and other purifying agents of the system have a better chance to get rid of the poisonous products than if they were dealing with the entire mass. So the extremities may be used as reservoirs of the body fluids, to be emptied and filled at will.

Immediate Operation. Relief from shock can generally be obtained by following the palliative treatment outlined. In cases of very severe injury, however, radical treatment may become necessary. As in the case of tetanus, it is imperative to thoroughly remove the focus of infection as well as to treat the symptoms. So in shock, it is important under certain conditions to remove the cause. There are two ways of doing this. First, the mutilated tissues may be **amputated.** This exchanges for a multiple set of nerve wounds, single wounds which naturally do not send as many complaints to headquarters as in the case of the primary multiple injury. Second, the mutilated nerves may be **cocainized.** This is best done by injecting 3 or 4 per cent. solution at the site of the injury, or a much weaker solution into the torn nerves, proximal to the wound.

An application of the principle of the elastic bandage as used on the extremities, is well seen in the use of Crile's pneumatic rubber suit. It resembles a diver's costume, being so arranged that by inflating it, increased atmospheric pressure can be brought to bear upon the entire surface of the body except the head, and the field of operation. It is designed to force the blood from the surface and from the extremities into the starved cerebral circulation, and because more extensive should be more efficacious than the bandage.

Of all drugs indicated in the treatment of shock undoubtedly the most valuable is the remarkable non-toxic vaso-motor stimulant **adrenalin.**

CHAPTER VII.

SEPSIS; ACUTE.

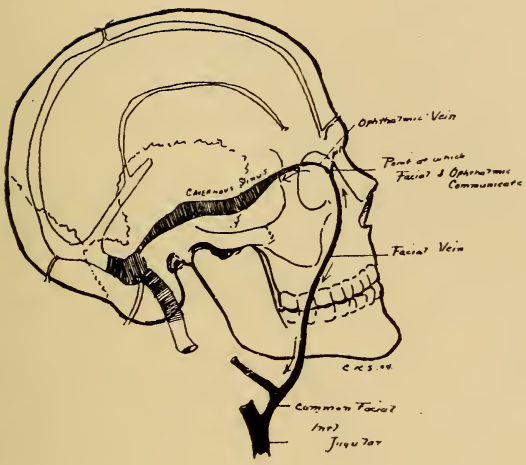


FIG. 13

This is adapted from Eisendrath's Clinical Anatomy. It shows very clearly how sepsis may travel by *continuity* from the face to the Internal Jugular and by *contiguity* to the Brain and its Membranes.

(By courtesy of DR. EISENDRATH)

Brewer, page 41 of text book, presents this subject more tersely and intelligibly than any one else. He says:

"**Septicemia, Pyemia and Septic Intoxication,**—although formerly considered separate diseases, these three conditions are best regarded simply as different types of acute general sepsis. Whenever pathogenic bacteria gain access to and grow in, the systemic circulation and tissues, the condition is referred to as **septicemia.** If, on the other hand, such generalized infection be associated with the development of foci of suppuration, it is designated **pyemia.** The term **septic intoxication** is used to indicate a condition due to the absorption of

toxins mainly of bacterial origin. **Sapremia** is a term sometimes employed to signify a form of intoxication due to absorption of the poisons of putrefactive micro-organisms. It is not always possible to distinguish sharply between infections and intoxications, indeed, the manifestations of infectious disease are nearly always referable to bacterial poisons."

One of the first things suggested by a consideration of sepsis is temperature.

The following **table of temperatures,** with all the failings of an emperic classification, has points of merit.

Given a patient convalescent from some such simple operation as an interval appendectomy.

(1) **One to twelve hours** after operation, temperature 101. This is post-operative reaction, and has been ascribed to disturbance of the thermo-genetic centers.

(2) **Twelve to twenty-four hours** after operation, temperature 101. What is it?

Probably what is known as surgical fever or aseptic wound fever. This is uncommon if there has been heavy hemorrhage. It is also unlikely to occur if no blood has accumulated in the wound after operation. It is due to the absorption of blood clot, ligatures, and possibly antiseptic solutions.

(3) **Twenty-four to thirty-six hours** after operation, temperature 102. This is auto-intoxication from the bowels and is remedied by a purge.

(4) **Thirty-six to seventy-two hours** after operation, temperature 101 and rising. This is the real thing, for this interval represents the average period of development required by the pyogenic germs.

(5) **After seventy-two hours,** out of the woods.

Treatment of all **nurse, feed** and **stimulate.** In addition, for (2), dry wounds; for (3), catharsis. Wash rectum and colon. For (4), drainage, antiseptics, antitoxin-sera, infusions, Credé's ointment.

Recovery has been known to take place between the extreme temperatures of 75.2° and 114.8° F. (Br. Med. Jour. Feb. 7, '04).

DIFFERENTIAL BETWEEN

Tetanus.	Strychnine.	Hydrophobia.	Lyssophobia. (lyssa-rage)
		History of Injury.	
Punctured wound.	Overdose.	Bite.	Bite.
		Disease.	
Incubation 3 to 7 days.	Immediate.	Ten weeks.	Irregular: typically within a week
		Age.	
Babies and adults	Adults.	Children and adults.	Adolesence.
		Race.	
Negro.	Negative.	Negative.	Latin Races.
		Climate.	
Increases as Equator is approached.	Negative.	Central Europe.	Southern Europe.
		Pain.	
Sore throat. Later may be agonizing.	Often in back.	In wound.	Marked mental.
		Disability.	
Stiffness of cervical and maxillary muscles. Inability to open mouth.	Jaws not rigid at first.	Defective speech and inspiration. Deglutition spasms.	May imitate any or all symptoms of others.
		Vomiting.	
Not constant.	Frequent.	Absent.	Often present.
		Bowels.	
Irregular.	May be diarrhea	Negative.	Constipated.

DIFFERENTIAL BETWEEN.—CONTINUED.

TETANUS.	STRYCHNINE.	HYDROPHOBIA.	LYSSOPHOBIA. (LYSSA-RAGE)
		TEMPERATURE.	
99 to 100.	98 to 100, except after a spasm.	99.5 to 102.5	98.6 or sub-normal.
		RESPIRATION.	
Dyspnea during paroxysme.	Dyspnea, not marked.	Respiratory spasms.	Irregularly paroxysmal.
		NERVOUS SYMPTOMS. (CENTRAL)	
Mind clear.	Clear.	Melancholia. Delirium common.	Hysterical manifestations.
		PERIPHERAL.	
Paresthesiae.	Green vision and retinal hyperesthesia.	Nerve irritation or exhaustion.	Parasthesiae.
		GENERAL PHYSICAL.	
		FACIES.	
Sardonic grin.	Anxious.	Anxious and drawn.	Excited, anxious.
		NUTRITION.	
Negative.	Negative.	May be diminished.	Typically depraved.
		REFLEXES.	
Clonic exacerbations converting spastic rigidity into violent and convulsive muscular activity.	**Tonic** exacerbati's with intervals of rest.	Increased.	Diminished or increased.
		LOCAL PHYSICAL.	
In nearly one-half wound is on foot or hand.	No wound.	Bite frequent on face.	Bite anywhere.

DIFFERENTIAL BETWEEN.—CONTINUED.

TETANUS.	STRYCHNINE.	HYDROPHOBIA.	LYSSOPHOBIA. (LYSSA-RAGE)
		LABORATORY FINDINGS.	
		BLOOD.	
		LEUCOCYTE COUNT.	
11,000.	Negative.	Negative.	Normal.
		INJECTION.	
Probably fatal.	Negative.	Probably fatal.	Negative.
		TISSUE SECTION.	
Neighborhood of wound filled with bacilli.	Negative.	Acute hyperemia of wound tissue	Wound tissue normal.

There are other diseases or groups of symptoms which may be differentiated from these four. One frequently confounded with tetanus is **Tetany.** It resembles tetanus only in name and in the fact that occasionally the same muscle groups are attached with spasms. It may have a nervous or an auto-intoxicational origin. It is uncommon in this country and has a zero mortality rate.

SEPSIS; CHRONIC.

As already stated, **Brewer's** classification of the infectious surgical diseases presents them in a very simple and easily understood form. The chronic infections which have a surgical bearing, are **tuberculosis, syphilis,** and **actinomycosis.**

Tuberculosis, otherwise known as the White Man's Plague, kills one out of seven. By far the greater number of these deaths are caused by infection of the lungs or brain. These are as yet practically beyond surgical intervention. There is, however, no known part of the body which the tubercle germ has not invaded.

In the chapter on inflammation, the onion like formation of the typical tubercle was discussed, it being noted that the

irritation produced by the establishment of the tubercle germ in the tissues resembled in miniature, and in a way easily studied, the more vigorous and destructive action of other germs. The onion like series of hollow spheres enveloping the part were particularly noted. It was not stated, however, that the work of the fibroblasts in the case of a tubercle does not end with the mere formation of scar tissue. In tuberculosis Nature goes a step further in the protection of the organism, by causing calcification of the scar tissue. When patients are sent to the mountains, the air furthers scar formation and calcification more rapidly than it does in the lowlands and particularly in the cities. After perhaps a year's sojourn in the hills, the patient is allowed to return. Often within a few days, supposing the infection to have been pulmonary, he begins to cough and to expectorate. What has happened? Lowland air is not as friendly to the newly developed scar tissue as air of the uplands. Some has broken down and has allowed the impounded germs to escape. In other words, calcification of these little areas has not been allowed to complete itself and the patient's life has been placed in jeopardy by bringing him home too soon.

Tuberculosis then is cured by Nature's process of walling the germ off within a limestone shell. These little shells become incysted in the tissues and remain there as harmless foreign bodies throughout life. It is also sometimes cured by spontaneous extrusion of the germs.

What is man's method of curing tuberculosis? Simply a following of Nature. We may help her to incyst or to extrude. The **Radical** method or treatment by open incision has very distinct limitations. The **conservative** method, or treatment by rest and extension has a much wider field. The first is practised by the **general surgeon**, the second by the **orthopedic surgeon.**

What determines the falling of a given case of surgical tuberculosis into the hands of one class or the other? Just one condition, and that one alone. If the infection be a pure one, that is to say if there are no pyogenic germs in conjunction with the tubercular germs the man of plaster, pulleys and weights should have the say. If, however, pyogenic germs be

present, the man with the knife cannot too quickly aid Nature in her effort to cast them out of the body.

For it is to be noted that the "walling off" method is not Nature's only means of curing tuberculosis. Under certain conditions she agrees to let them stay within the organism, making them harmless by putting a stone wall around them, but under other conditions, she breaks open the skin and crowds the offenders out. This accounts for the existence of these two distinct classes of surgeons. They each do their work in accordance with one of Nature's methods, simply giving a hand to help her out.

What is the etiology of the average case of surgical tuberculosis? It may be said in general that **tuberculous lesions arise from moderate acute injuries, once inflicted, whereas malignant lesions arise from infinitely slight injuries many times inflicted.**

A little child falls from its crib to the floor, cries with pain, puts his hand on his hip, and in six weeks has the early characteristic symptoms of coxitis. An old Irishman with broken tooth or rough T. D.,—year in and year out wounds and irritates his lip until the epithelioma grows.

PURE CULTURE, SURGICAL TUBERCULOSIS.

A consideration of this immense field is outside the scope of this book. Pure culture tuberculosis gives bread and butter to the orthopedic surgeon. Some of the most interesting lesions of this class are:

Coxitis. This is also known as hip joint disease. Its etiology has been given. The great majority of the cases can be traced to minor injuries which were neglected. The pathology is that of wet productive inflammation which later on becomes practically dry. This is of course supposing the case to remain free from mixed infection. The tubercle, if it produces pus at all, does so in such very small quantities that the system may be said to be always able to carry it away and never under the necessity of extruding it through the skin. This happens typically only when mixed infection occurs.

The **symptoms** are perhaps more important than those of

any other chronic disease, for the utility or perhaps the life of the individual depends upon their early recognition.

If a recent preparation is made in the dissecting room, with ligaments in place but everything else removed, the pelvis being sawed in two through the median line antero posteriorly and the femur cut at about its middle, a demonstration can be made which probably explains the position assumed in the **first stage of hip disease.** The extremity is abducted and externally rotated. Students often get the idea that the first stage is internal rotation and adduction. It is not. It is, however, too often the first stage in the eyes of the general practitioner, to the eternal misfortune of the child.

Take the preparation above alluded to and bore a hole through the ilium opposite the head of the femur. Screw in a hollow tap and connect it with a water pump. Hold the preparation up and the femur assumes a position governed by gravity. Force in water, and the bone, as though it were alive, will slowly but surely rotate externally and abduct itself from the mid-line. So closely does this experiment simulate the process which must take place in nature, that it affords incontrovertible evidence that the parts assume the position of external rotation and abduction in the first stages simply because the joint is full of water. By rotating the head of the femur in that direction the joint cavity will hold more water than in any other position of the bone.

The **second position of the extremity** is characteristic. It is the result; the direct result as was the first, of the inflammatory process. An understanding of this process should prevent any one from making any mistake about it. It is caused by **contractures** due to the normal and usual process of productive inflammation. There is no better example in the whole of medicine than **coxitis,** of how easy it is to predict the symptoms of a case by simply working them out on the basis of inflammation. It is footless to memorize these symptoms. Know what to expect from a thorough acquaintance with the inflammatory process and there isn't a disease, the bulk of whose symptoms you cannot accurately predict without ever having seen a case or read a word on the subject.

A third stage is sometimes described. Like the big

fibroids weighing forty pounds, it is rarely seen in these days. You are in luck if the gynecologists ever let you see a fibroid weighing ten pounds, let alone forty, and you cannot, except in most densely ignorant communities, expect to see a child in the pitiable advanced third stage of coxitis.

Fig. 14

Acute femoral epiphysitis in child eight years old. Lesion appears as white oval in the epiphysis. Note patella and fibula, also the wide separation of epiphysis from diaphysis.

The **adduction and internal rotation** has gone on and combined with such a degree of **flexion** that deep sores may be made on the well leg by pressure of the contractured sick side. The patient has been unable to walk for months and perhaps for years.

The **differential diagnosis** of the many forms of hip disease is of the gravest importance.

DIFFERENTIAL IN CHILD BETWEEN

Tuberculous Coxitis.	Syphilitic Coxitis.	Coxa-Vara.	Rheumatism.
	History of Injury.		
Slight, single, acute.	Absent.	May be present.	Absent.
	History of Disease.		
Onset insidious.	Usually in parent. May rarely be acquired. Onset slow.	Nutritional disturbances. Onset very slow.	In other joints. Onset acute.
	Previous Disease.		
Occasionally in lungs or elsewhere.	Negative.	Evidences of rachitis.	Tonsilitis, conjunctivitis, rheumatic diathesis.
	Pain.		
Marked.	Marked, worse at night.	Slight or absent.	Marked.
	Disability.		
Marked.	Marked.	Variable.	Very marked.
	Temperature.		
100 to 102.	99 to 101.	Normal.	102 to 104.
	Pulse.		
110.	110.	80 to 90.	120.
	Respiration.		
22 to 26.	22 to 26.	20.	26 to 30.
	NERVOUS SYMPTOMS.		
	Central.		
Negative, unless meningitis complicating.	Negative.	Negative.	May be delirium.

DIFFERENTIAL IN CHILD BETWEEN.—CONTINUED.

TUBERCULOUS COXITIS.	SYPHILITIC COXITIS.	COXA-VARA.	RHEUMATISM.
GENERAL PHYSICAL.			
FACIES.			
Drawn.	Old man.	Square face of rachitis.	Evidence of pain.
NUTEITION.			
Normal or slightly below.	Always bad.	May be fat.	Negative.
GLANDS.			
Absent, if primary	General, discreet involvement.	Absent.	Absent.
LOCAL PHYSICAL.			
INSPECTION.			
First stage, abduction, external rotation. Apparent lengthening.	Same as T. B. in early stage.	Eversion, apparent shortening.	Variable, but often abducted and externally rotated.
PALPATION.			
Adduction and internal rotation painful.	Same as T. B.	Extreme abduction impossible, but not painful.	All movements painful, but particularly adduction and internal rotation.
MENSURATION.			
Trochanter in normal position.	Same as T. B.	Trochanter often above Neleton's line.	Normal.
EFFECT OF DRUGS.			
Tuberculin.	Mixed treatment.	Negative.	Salicylates.

The knee is a favorite site for pure culture tuberculous infection. The T. B. germ has a predilection for new rapidly growing parts, presumably because they are tender. The

epiphysis is consequently a favorite site. The accompanying figure of a radiogram of epiphysitis of the knee of a child not alone shows the lesion of epiphysitis very beautifully, but also demonstrates what a large and tangible structure the epiphysis is. It is often erroneously thought of as a line, but it is in fact a good sized solid body throughout childhood. Reference is suggested to Brewer's text book, page 520, where a diagram is shown giving the time of bony union of the epiphyseal junctions. On the good old principle that the "Last shall be first and the first shall be last," the bones last formed are first to unite, the first formed the last to unite.

Pure culture infection of the ankle is not infrequent. It has frequently to be differentiated from syphilis, rheumatism and flat foot.

DIFFERENTIAL IN YOUNG ADULT BETWEEN

Tuberculosis of Tibio-fibulo-tarsal or Inter-Tarsal Joints.	Syphilis of Same.	Rheumatism of Same.	Flat Foot.
History of Injury.			
Moderate acute and neglected.	May or may not be absent.	Absent.	Often present, either acute or chronic.
History of Disease.			
May be secondary Onset slow.	Chancre. Onset slow.	Diathetic signs. Onset rapid.	Often during convalesence from wasting disease
Malformation.			
Negative.	Negative.	Negative.	Often short tendo Achilles.
Previous Injury.			
None.	None.	None.	Often follows badly set Pott's Fracture.
Pain.			
Severe, constant.	Severe, worse at night.	Very acute.	Only on bearing weight of body.

DIFFERENTIAL IN YOUNG ADULT BETWEEN.—CONTINUED.

TUBERCULOSIS OF TIBIO-FIBULO-TARSAL OR INTER-TARSAL JOINTS.	SYPHILIS OF SAME.	RHEUMATISM OF SAME.	FLAT FOOT.
	DISABILITY.		
Marked.	Marked.	Complete.	Variable, but always present to some degree.
	LOCAL PHYSICAL.		
	INSPECTION.		
Drop foot. Swelling not red, tapering, (if old).	Drop foot, dark red, localized swelling.	Drop foot, scarlet. localized swelling.	Loss of arch, prominence of perineal tendons and scaphoid.
	PALPATION.		
Negative, save for diffuse tenderness and pain over most marked area of infection.	Same.	Diffuse tenderness. Pain over joint line.	Absolutely characteristic points of tenderness: (1) Internal malleolus; (2) Internal calcaneo-navicular ligament; (3) Over center of sole due to stretching of plantar ligament; (4) Dorsal junction of a astragalus and navicular; (5) External malleolus.
	DRUG ADMINISTRATION.		
Tuberculin reaction.	Mixed treatment.	Salicylate.	Negative.
	MECHANICAL TREATMENT.		
Improvement.	Improvement.	No improvement.	Stretch tendon if necessary. Arch curative.

The treatment of all these pure culture forms of infection if they attack the joints as they usually do, is summed up in few words,—**Essence of time and tincture of patience.**

Immobolize; extend, and unless the infection becomes mixed, you should have a cure in a large per cent of cases, in about the same time as it took the patient to get sick.

Pure culture surgical tuberculosis is also seen very frequently in the bodies of the vertebrae. The inflammatory reactions produced in this case are grouped together under a set of symptoms generally known as **Pott's Disease.** Like all other pure T. B. infections it is absolutely essential that it be recognized early to insure protection of the parts from injury. Neglect is the most potent cause of mixed infection. Its early differential diagnosis is therefore paramount.

DIFFERENTIAL BETWEEN

Spondylitis. (Pott's Disease)	Scoliosis. (Curvature)	Hysterical Spine.	Spinal Sprain.
	History of Tumoe.		
May be slight knuckle.	May be tumefaction, but more diffuse.	Absent.	Absent.
	Injury.		
Frequent, but not invariable.	Possible, but rare.	Present or absent, according to whim of patient	Severe, always present.
	Disease.		
Evidence of germ infection. Onset slow.	Negative. Onset very slow.	Onset often acute	Onset always immediate.
	Previous Injury.		
Possible.	Carrying loads on one side or sitting in badly built school chair.	Frequently the suggesting agent.	Negative.
	Previous Disease.		
Possibly secondary. T. B. elsewhere.	Frequently history of anterior polyo-myelitis but rarely recognized as such.	Frequently chlorosis and uterine disorder.	Negative.

DIFFERENTIAL BETWEEN.—CONTINUED.

SPONDYLITIS. (POTT'S DISEASE)	SCOLIOSIS. (CURVATURE)	HYSTERICAL SPINE.	SPINAL SPRAIN.
		AGE.	
Children.	Adolesence.	Young adult.	Adult.
		SEX.	
Negative.	Female.	Female.	Male.
		PAIN.	
Marked on moving. Belly-ache wakes from sleep.	Very slight if any.	Constant, but does not waken from sleep.	Severe, especially during certain movements.
		DISABILITY.	
To jump, absolute; to walk in upright position, increasing. Grunting respiration.	Weakness, no positive disability.	Depends on ability of patient to simulate Pott's.	Often limited to doing the exercise which caused it, for example, lifting.
		TEMPERATURE.	
Evening rise, 99 to 101.	Normal.	Often 96 to 98.	Normal.
		PARESTHESIAE.	
Pain referred to parts enervated by nerve escaping near lesion. Bi-lateral. Central origin.	If present, often due to pressure of rib on intercostal nerve. Frequently unilateral. Peripheral.	Not referred. Located just one side or the other of the spines, usually at one or other of the typical hysterical points.	Localized oversite of ligamentous rupture.
		GENERAL PHYSICAL.	
		REFLEXES.	
Knee-jerk may be exaggerated.	Negative.	Absent, normal or exaggerated.	Negative.

DIFFERENTIAL BETWEEN.—CONTINUED.

SPONDYLITIS. (POTT'S DISEASE)	SCOLIOSIS. (CURVATURE)	HYSTERICAL SPINE.	SPINAL SPRAIN.
LOCAL PHYSICAL.			
INSPECTION.			
Single, sharp knuckle may be present.	If kyphotic in type (rare), it may closely simulate Pott's.	May seem to be a prominence of several spines (owing to usual extreme thinness of patient and to the fact that they droop the shoulders, which partly obliterates the normal lumbar lordosis)	Negative.
PALPATION.			
No tenderness on pressure.	Same.	Marked tenderness.	Tenderness over traumatism.
EFFECT OF EXTENSION AND IMMOBILIZATION.			
Marked improvement within a week.	Continued and progressive disability.	No improvement.	Immediate relief.

It can readily be seen that a differential between Pott's and scoliosis of the kyphotic type is by no means easy. It is nevertheless of very great importance, for in order to obtain the best results the one should be put at absolute rest in extension, while the other should be pulled and hauled and mauled and exercised up to the very last limit of the patient's endurance.

MIXED CULTURE TUBERCULOUS INFECTIONS.

These should rightly fall under the care of the general surgeon as they usually call for immediate radical treatment. Some of the more frequent differentials of this group in the knee region are as follows:

Acute Osteomyelitis.	Acute Epiphysitis.	Rheumatism.	Septic Arthritis.
History of Tumor.			
If present, not marked. Often absent.	Frequently present.	Present.	Present, may be marked.
Injury.			
Within 33 to 72 hours.	Same.	Absent.	33 to 72 hours.
Previous Disease.			
May be pyemia. Typhoid, etc.	Same	Diathesis.	Pneumonia or the like.
Age.			
Child.	Child.	Child or youth.	Any age.
Pain.			
Very severe. Better if tumor appears.	Severe.	Same.	Same.
Disability.			
Not present in joint.	Slight in joint.	Marked in joint.	Same.
Vomiting.			
Usual.	Same.	Occasional.	Very frequent.
NERVOUS SYMPTOMS.			
Delirium.			
Early.	Same.	Present if severe.	Early.

DIFFERENTIAL BETWEEN.—CONTINUED.

ACUTE OSTEOMYELITIS.	ACUTE EPIPHYSITIS.	RHEUMATISM.	SEPTIC ARTHRITIS.
LOCAL PHYSICAL.			
INSPECTION.			
White or light red. Slight swelling usual. Absent if periostium not involved. On diaphysis.	Red. Swelling constant and early; in neighborhood of joint Localized either above or below it, unless secondary joint effusion present.	Crimson. General swelling of joint very marked. Joint outline gone.	Dusky red. Swelling marked. Outline of joint obliterated.
EXPLORATORY INCISION.			
Pus often not reached except by bone section. May be only a drop.	Pus apt to be nearer surface.	No pus. Often much fluid. May show characteristic germ	Quantities of pus free in joint.

CHAPTER VIII.

SYPHILIS AND GONORRHEA.

Syphilis is one of the most interesting of all diseases. We are all more or less profoundly infected with it. If we were not, primary syphilis would kill thousands upon thousands of people, whereas it is known to have practically a zero mortality. There is a large stock of good **lively racial antitoxin** on hand which is the product of our ancestors' struggles for life against this invasion. This antitoxin, like other individual characteristics, is handed on to the child through the agency of the ovum and the spermatozoon. As in the case of other characteristics transmitted through these agents, the inherent resistance of individuals to syphilitic infection varies profoundly. Some appear to be as **immune as goats**, whereas others have been granted but little immunity.

It is only 300 years ago since primary syphilis killed countless thousands of Europeans. Historically the course of this disease is marvellously interesting; suffice it, however, to say that during the restless period of European development, when Naples was infested by the armies of France and of Spain, the disease was so rife among the soldiers and killed such numbers of them that the French called it the Italian disease, the Italians called it the French disease, and the Spaniards were at liberty to choose between the two. Any one who is further interested in this remarkable scourge will find a fascinating account of it and its ravages, as well as the attempts which been made to control it, in that masterpiece, Sanger's "History of Prostitution."

Due to some infectious agent, the character of which is unknown, this disease, in an individual to whom has been granted the usual amount of racial resistance, pursues a course which, for **constancy of symptoms** on the one hand, and for **mimicry** on the other, far excels and surpasses any known disorder. What the actual cause may be for the fact that certain indi-

viduals are endowed with a greater resisting power than others, is, of course, conjectural, but if protection in syphilis arises, as history seems to show it to do, by ancestor infection, it is probable that these fortunate individuals had incestors of questionable morals. Thus arises the possible ethical question as to what our attitude should be toward establishing protection for posterity.

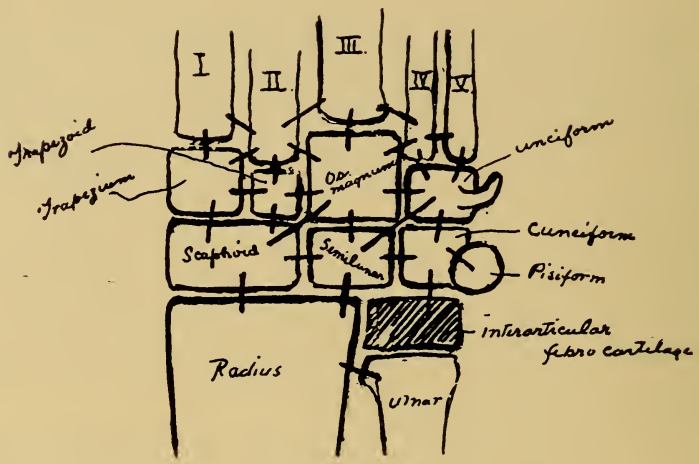


Fig. 15

Scheme for drawing the articulations of the wrist. This composit joint is occasionally invaded by syphilis.

The syphilitic inflammatory process, whatever its activity, or whatever its virulence, has **one constant factor.** It begins on the **surface** of the body and marches relentlessly, slowly, but as surely to the **center.** It may take **twenty years** to make this short journey, but unless retarded by incessant treatment, make it, it will. This conception of the disease is a convenient way of interpreting or of predicting the symptoms of the three classical stages which are familiar to all. Like every other lesion, its course must be studied from the standpoint of inflammatory reaction. In its long career it gives manifestation of every possible phase of inflammation. More properly speaking, it affords excellent proof that the classification of inflammatory reactions which has been developed to facilitate its study, is simply an arbitrary division into several classes all

part and parcel of one process. They are too apt to be looked upon as having separate entities with distinct modes of development.

Syphilis is the most **perfect mimic** of all diseases. It might aptly be called the **Pathological Clown.** So many times has it deceived the most astute diagnosticians that one of them propounded the well known wary phrase: **"When in Doubt Give K. I."** From headache on the one hand to toe ulcer on the other, there is not a condition for which this remarkably versatile disorder may not be mistaken. For this reason the number of differentials between syphilis and its likenesses is simply innumerable. A number have already been touched upon. Conclusion is often impossible except by aid of treatment, which in time reveals the true nature of the case.

No less certain than the classic course of symptoms in this disease is the degree of probability of its occurrence in certain definite cases. These have been carefully studied and have been grouped according to certain laws.

Colle's Immunity.—This law refers to the mother. It signifies that immunity which exists in healthy mothers who, owing to the presence of syphilis in the father, have had syphilitic offspring. The mothers escape all clinical evidence of syphilis.

Profeta's Immunity.—This refers to the child. It is the immunity which exists in the children of syphilitic parents. In many such cases, the father or mother, one or both, being syphilitic, the children nevertheless remain healthy.

Any explanation of these extraordinary facts must, in the light of our present ignorance of the nature of the syphilitic infection, be purely hypothetical. The most probable belief is that the child of syphilitic parents is infected with the anti-bodies (racial) in excess of the pro-bodies (parental). In addition to the racial anti-bodies, the child creates individual anti-bodies by the usual method of reciprocal production. By this overdose he is spared the clinical manifestations of syphilis and grows to healthy adult life.

DIFFERENTIAL BETWEEN

Labial Chancre	Epithelioma.	Chancroid.	Herpes.
	History of Tumor.		
Slight elevation.	Same.	Absent.	Absent.
	Injury.		
Absent.	Moderate, chronic and multiple.	Absent.	Acute irritation.
	History of Disease.		
Signs of systemic infection. Incubation 10 days to 3 weeks.	No incubation. Onset very slow.	No incubation.	May complicate a neurosis, cold or fever. No incubation.
	Previous Injury.		
Negative.	Almost invariably present.	Negative.	Negative.
	Previous Disease.		
Not possible.	Often elsewhere.	May be elsewhere	Same.
	Age.		
Young adult.	More common after 40.	Young adult.	Any age.
	Sex.		
Female.	Male, 2000% more frequent than female.	Negative.	Negative.
	Pain.		
Always absent.	Often severe. (May be referred)	Typically present.	Present.
	Disability.		
Marked.	Not marked.	Marked.	Very marked.
	Temperature.		
99 to 101	Normal.	100 to 102.	Normal.

DIFFERENTIAL BETWEEN.—CONTINUED.

LABIAL CHANCRE.	EPITHELIOMA.	CHANCROID.	HERPES.
GENERAL PHYSICAL.			
GEANDS.			
Early; discreet, epitrochlear first involved.	Only glands of local drainage. Late infection.	Same, but early infection.	No enlargement.
LOCAL PHYSICAL.			
INSPECTION.			
Single or simultaneously multiple Round or symmetrically irregular. Superficial. Either lip. Red glazed scab. Secretion scanty serous.	Single. Unsymmetrically irregular. Superficial. Lower lip. Fungous granulations. Hemorrhagic.	Often multiple. Unsymmetrically irregular. Punched out. Either lip. Worm eaten bottom. Purulent, abundant.	Multiple and confluent. Irregular. Superficial. Either lip. Pultaceons. Moderate.
PALPATION.			
Typically hard. Ends abruptly in normal skin.	Solid, but not hard unless thickly crusted.	Typically soft.	Same as chancroid
BLOOD.			
DIFFERENTIAL LEUCOCYTE.			
Lymphocytes, 40–50%. Polymorphonuclear 45–60%. Hemoglobin 50–60%.	Negative.	Negative.	Negative.
COLOR INDEX.			
May fall as low as .57 (Cabot)	Negative.	Negative.	Negative.
TISSUE SECTION.			
Inflammatory evidence.	Typical pearl nest formation.	Atypical.	Atypical.
DRUG ADMINISTRATION.			
Not indicated but Hg. will modify	No effect. X-Ray heals.	Antiseptics heal.	Antiseptics heal.

Syphilitic infections of the hard or soft parts, particularly in the late secondary and tertiary stages, offer pleasing ground for mixed infection. Hence it often becomes necessary to subject them to radical surgical treatment. In this event one of the most useful differentials is between **Gumma and Sarcoma.** The chancre, which is the characteristic lesion of the primary stage, has often to be differentiated from epitheliomata. This is a bit of side light which shows the relation of these four lesions to the surface and to the deeper structures of the body.

Syphilis is the most frequent cause of Dry Productive Inflammation. The sclerosis of the kidneys and liver kill thousands of men and women. The same lesion invades the cord, causing 90 per cent. of cord diseases, while our asylums are overburdened with the victims of syphilitic **brain sclerosis.**

Remotely, then, syphilis has a tremendous mortality rate.

GONORRHEA.

This second rate acute infectious disease has no right to be associated with a lesion so abstruse, so separate, and so distinct from it as syphilis. It is one of the most typical acute septic infections. Probably the explanation for their having been placed cheek by jowl in most text books is to be found in the importance of the one point which they have in common, viz., the frequency of their venereal origin. The chief interest to be found in a study of gonorrhea lies in the occasional manifestation of the pyemic capability of the germ.

Especially under such favorable conditions as epididimo-orchitis, acute gonorrheal prostatitis, or cystitis, the germ occasionally wanders out in considerable numbers into the general circulation and becomes localized at some point of minimum resistance. Such a point is often a joint, and the knee joint is particularly prone to fall prey to it. This condition of localization of the cocus in or about the joints has been erroneously called **Gonorrheal Rheumatism.** There might be some excuse for it if it resembled in any way acute mono-articular rheumatism, which is undoubtedly of germ origin, but unhappily, it is anything but acute in its course. The moment, furthermore,

that mono-articular rheumatism so called is proved to have a septic nature it ceases to have claim to the word "rheumatism."

Gonorrheal Arthritis, then, is the name of the day. The treatment of this condition has in the past been most unsatisfactory. It is safe to say that **no treatment whatsoever, save one, either local or constitutional, has any influence** upon the course of the disease. Its tendency is toward recovery, but the processes of productive inflammation have so long been active that the joint is always more or less impaired because it is filled with scar tissue.

The Modern Method of Treatment.—Rather than let a man walk around on crutches for two years during the most active part of his life, rather than subject him to the pain of all forms of counter-irritant local treatment, it is now deemed advisable to **cut boldly across the joint** as **Mayo** has recommended should be done in case of acute septic arthritis and prevent the productive inflammatory changes by washing away their creators. Copious irrigation and prolonged soaking in mildly antiseptic solutions are said on very good authority to be distinctly curative of this condition. One of the possible lesions with which gonorrheal arthritis may be confounded is pure culture tuberculous arthritis and another is chronic articular rheumatism.

DIFFERENTIAL BETWEEN

Gonorrheal Arthritis.	Rheumatic Arthritis.	Pure Tuberculous Arthritis.	Loose Body in Joint.
History of Tumor.			
Moderate, diffuse swelling.	May be absent. Occasionally localized.	Apparent tumor due largely to wasting above and below.	Comes and goes suddenly.
History of Injury.			
Absent.	Absent.	Frequently present. Slight.	Almost certainly present. Severe.

DIFFERENTIAL BETWEEN—CONTINUED.

GONORRHEAL ARTHRITIS.	RHEUMATIC ARTHRITIS.	PURE TUBERCULOUS ARTHRITIS.	LOOSE BODY IN JOINT.
HISTORY OF DISEASE.			
Specific complicated urethritis.	Negative.	Negative.	Onset sudden.
PREVIOUS DISEASE.			
Negative.	Involvement elsewhere.	Often secondary to lungs.	Not infrequently a sequel of traumatic arthritis.
AGE.			
Young adult.	Over 40	Adolescence.	Young adult.
SEX.			
Very infrequent in female.	.....	.....	Male.
PAIN.			
Not referred. Constant, grinding.	Varies with barometric pressure.	Constant but worse at night if bone involved	Irregular exacerbations at intervals when body is caught in joint.
DISABILITY.			
Often complete for long periods if over-exercised Remissions.	Depends almost entirely on climatic conditions of temperature, pressure, moisture, electrical state.	Progressively complete. No periods of intermission.	Complete with marked periods of intermission.
TEMPERATURE.			
100 to 102 during exaserbation.	Rarely elevated.	Evening rise 99 to 101.	Normal.

GENERAL PHYSICAL.

INSPECTION.			
Gleet.	Swollen joints elsewhere.	Pulmonary cavities.	Negative.

DIFFERENTIAL BETWEEN.—CONTINUED.

GONORRHEAL ARTHRITIS.	RHEUMATIC ARTHRITIS.	PURE TUBERCULOUS ARTHRITIS.	LOOSE BODY IN JOINT.
LOCAL PHYSICAL.			
INSPECTION.			
Dark red, swollen joint.	Often very little redness and moderate swelling	Characteristically white, very moderate swelling. May be only apparent.	May be small local tumor showing position of foreign body.
PALPATION.			
Warm. (For local temperature, palpate with back of hand which is more sensitive than palm.)	Cold.	Colder than the well knee.	Hot, if recovering from exacerbation.
MENSURATION.			
Often 1 to 2 inches enlargement.	½ in. to 1 in.	Little or no enlargement.	Same as well side.
LABORATORY FINDINGS.			
PUNCTURE.			
Exudate. Sp. Gr. over 1010 and containing gonococci. Much albumin.	If present, transudate. Sp. Gr. 1001–1005. Little albumin. No germs.	Transudate containing occasional T. B. germs.	Exudate. No germs.
EFFECT OF DRUGS.			
Negative.	Often very helpful.	Reaction from tuberculin.	Negative.
MECHANICAL TREATMENT.			
Negative save for partial relief of pain.	Hydrotherapy and dry heat, may improve.	Marked improvement under extension and immobilization.	Freedom from attacks by immobilization. Occasionally curative.

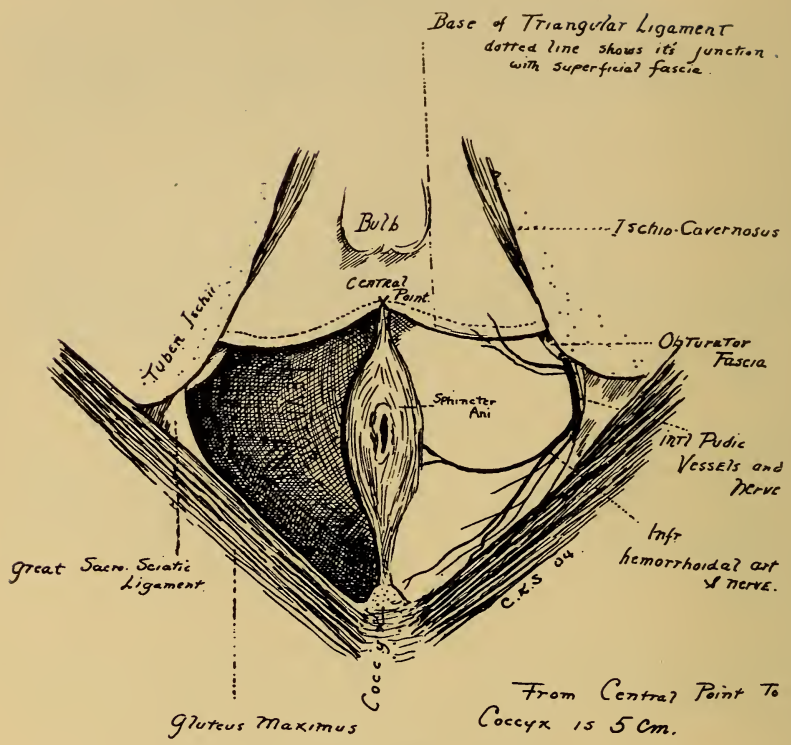


FIG. 16

ISCHIO-RECTAL FOSSA.

Two inches deep, one inch wide.

Base formed by integument of ischio-rectal region.

Apex at angle of division between obturator and recto-vesical fascia.

BOUNDARY.

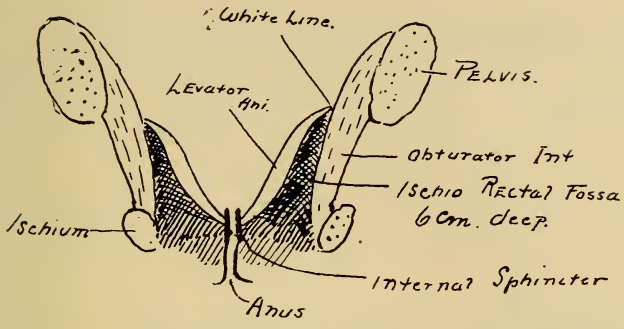
Anteriorly.—1. Base of triangular ligament.
2. Its junction with the superficial fascia. (Dotted line)

Externally.—1. Obturator fascia.
2. Tuber ischii.

Posteriorly.—1. Great sacro sciatic ligament. (Note that it extends as far as coccyx).
2. Gluteus maximus.

Internally.—1. Sphincter Ani.
2. Levator Ani. (Owing to the fact that its insertion is on a lower plane than its origin).
3. Coccygeus. (As it lies in same plane as the above).

Contains.—1. Internal Pudic Vessels and Nerve.
2. Inferior Hemorrhoidal Vessels and Nerve.
3. Superficial Perineal Vessels and Nerves.
4. A Branch of 4th Sacral Nerve.
5. Adipose Tissue.



90° Elevation of the Preceding

Fig. 17

One of the worst possible sequels of gonorrheal urethritis is gonorrheal prostatitis. Not infrequently it goes on to abscess, and although it now seems probable that the enlargement of the prostate is due to gravitational rather than to infectious causes, it is at least not a good thing to have had a gonorrheal infection of the prostate. In a number of symptoms this condition simulates cystitis.

There is a **latent area** immediately posterior to the pubic symphysis, the function of which is not understood, and which is therefore commonly looked upon as fortuitous in occurrence. This is probably erroneous, because it undoubtedly has some function. It is called the **space of Retzius.** In practice, however, its chief function appears to be its liability to become infected. It is not frequently invaded by the gonorrheal organism, but this accident may happen. In any event it may be necessary to differentiate such abscess formation from prostatitis and from cystitis.

There is another possible sequel of gonorrheal urethritis, viz., ichio-rectal abscess.

DIFFERENTIAL BETWEEN GONORRHEAL

Prostatitis.	Cystitis.	Space of Retzius Abscess.	Ischio-Rectal Abscess.
History of Tumor.			
Negative.	Negative.	Negative.	Perineal prominence.
Pain.			
Marked when bowels move. Violent and throbbing.	Pain over bladder. Burning, constant.	Marked retro-symphyseal distress	Over perineum.
Disability.			
Tenesmus usually absent. Retention common. Stream diminished.	Tenesmus always typically present and severe. Retention rare. Stream normal.	Tenesmus absent. Retention improbable. Stream normal.	Ten.ab. Retention absent, except under very aggravated conditions. Stream normal.
Temperature.			
101 to 104.	100 to 103.	101 to 104.	100 to 103.
Urinary Symptoms.			
Frequency of micturition, most marked at night	Most marked by day.	Negative.	Negative.
LOCAL PHYSICAL.			
Palpation.			
Pressure pain marked, prostate enlarged.	No pressure pain or prostatic enlargement.	Tenderness on deep abdominal pressure.	Tenderness over perineum.
Exploratory Puncture.			
Sero-sanguinous or purulent.	Absent.	Absent.	Generally purulent.
LABORATORY FINDINGS.			
Urine.			
Gross appearance normal. No blood or albumin.	Gross appearance changed. Turbid with flocculent masses. Blood present if acute. (Albumin due to pus)	Normal. No albumin or blood.	Normal. No albumin or blood.

DIFFERENTIAL BETWEEN GONORRHEAL.—CONTINUED.

PROSTATITIS.	CYSTITIS.	SPACE OF RETZIUS ABSCESS.	ISCHIO-RECTAL ABSCESS.
		PUNCTURE FLUID.	
If acute and cystic, Sp. Grav. 1010 Alb. in excess. Germs present. (Exudate)	Absent.	Absent.	Dense, creamy fluid. Sp. Grav. 1030. Many cells. Gonococci
		DRUG ADMINISTRATION.	
Negative.	Positive.	Negative.	Negative.
		MECHANICAL TREATMRNT.	
Irrigation often helpful.	Irrigation curative.	Negative.	Negative.

CHAPTER IX.

THE HEAD AND SPINE.

Brain lesions are so frequently associated with scalp lesions and scalp lesions with those of the skull, that it is worth while to draw an analogy between the morphological relations of the hard and soft parts of the entire brain covering.

The **scalp** and the **skull,** fortunately for the sake of one's memory, consist of three analagous concentric shells. There is a relatively soft sheet externally and a tough brittle sheet internally. Between these two corresponding sheets there is a soft and friable layer.

Brain surgery has not made advances in the past five years commensurate with that of other more popular regions of the body. Eighteen years ago Weir and Seguin were just sufficiently advanced to localize a cortical cerebral tumor. They were able at autopsy to verify their findings. They did not, however, feel justified in advising operation.

By clinical experience and by information gained through vivisectional work a very great degree of accuracy in brain surgery has been reached, but it must be confessed that even the surgery of the hitherto prohibited chest cavity is probably more advanced than that of the brain.

It is not that the brain or the cord offer insurmountable technical difficulties, but rather that in from 80 to 90 per cent. of cases, the possibility of reaching a positive differential is denied us. Surgeons do not yet feel justified in making exploratory incision of the spine or cord with the same freedom that they do in the case of the abdomen. This is partly because the immediate danger is greater, and partly on account of the difficulty of interpreting and correctly judging conditions after exploration is made.

There is, however, a small number of reasonably well determined lesions within the brain case, upon which a satisfactorily certain differential can be made. One of the most common, as well as most practical, is a differential between the classical causes of compression.

* DIFFERENTIAL BETWEEN

Bone.	Blood.	Bugs.	Body. (Foreign)
	History of Injury.		
Present.	Present.	Present or absent.	Present.
	Disease.		
Onset immediate.	Onset slow and irregularly progressive.	36 to 72 hours.	Immediate.
	Temperature.		
Normal.	100 to 102. (Clot absorption.)	102 to 105. (Toxins)	Normal.
	NERVOUS SYMPTOMS.		
	Unconsciousness.		
Immediate and continued.	Immediate, due to concuss'n. Vomiting. Recovery. Localized convulsions and unconsciousness within variable time. Depends on rate of hemorrhage.	Delirium, loss of consciousness in final stage.	Immediate.
	Exploratory Incision.		
Spicules of inner table.	Free blood.	An exudate.	Bullet or the like.

* Note that these all begin with "B"

It will thus be seen that the differential between these four causes of compression depends practically on the character of the onset of unconsciousness and upon the temperature.

It is always difficult to differentiate the conditions and find the true one which has caused a person to be unconscious. Among the many possible cerebral causes of unconsciousness, there are four, the first three of which have frequently to be differentiated. As presented in the following columns, the first two occur synchronously under most conditions, that is to say, the second cannot be present without a certain degree

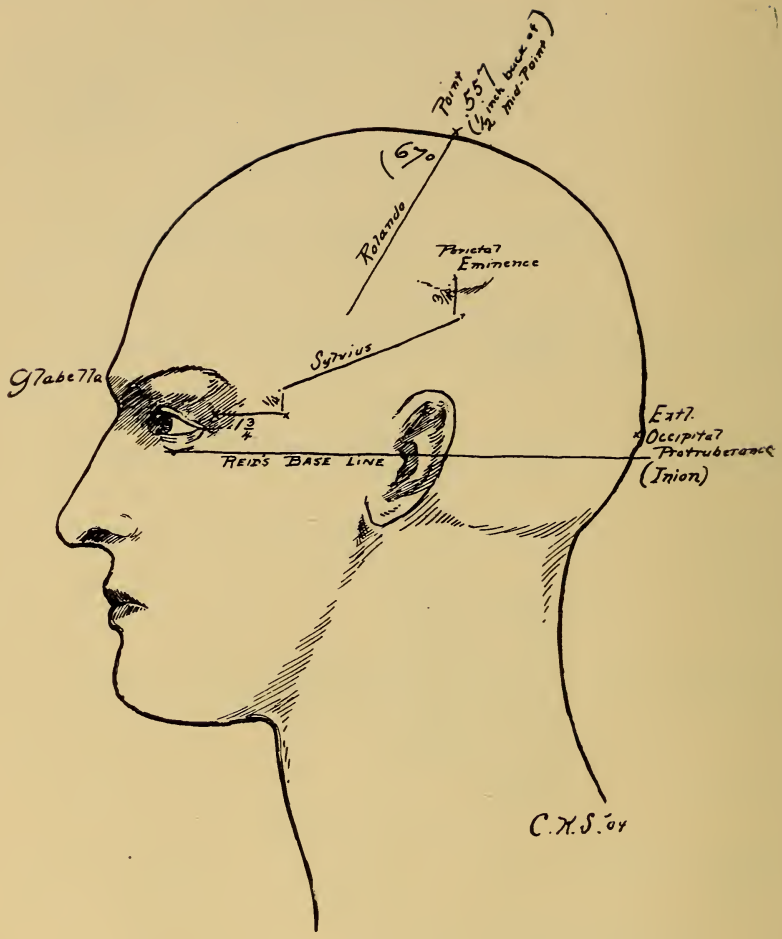


FIG. 18

Shows relation of fissures to surface. Note relation of Reid's Base Line to Inion. Compare position of proximal end of Fissure of Rolando with position for trephining for middle Meningeal, shown in FIG. 19. This explains symptoms of surgical hemorrhage as given in differential.

ROLANDO.—Draw line from Root of Nose to Occipital Protruberance over the convexity of the head. On this line mark off point .557 of the distance from before backward. From this, a line is projected, running downward and forward 3¼ inches at an angle of 67° to the previously mentioned line—this represents the fissure of Rolando.

SYLVIUS.—Draw line 1¾ inches back from Extl. Angular Process, ‖ to Reid's Base Line—Erect a quarter inch ⊥ to this and from the tip of this ⊥ carry a line up and back to meet a ⊥ dropped ¾ in. from the Parietal eminence—giving Fissure of Sylvius.

PARIETO-OCCIPITAL FISSURE:—By prologing Fissure of Sylvius to median line.

of the first. Their symptoms are differently given by different authors, and they are well known to overlap and interdigitate most confusingly.

The first and the third are always synchronous. The differential referred to is between, old friends.

DIFFERENTIAL BETWEEN

Concussion.	Compression.	Contusion.	Grand Mal.
	History of Injury.		
Always present.	Very frequently present.	Always present.	Absent.
	History of Disease.		
Onset sudden.	Onset may be slow	Onset slow.	Onset accompanied by aurae.
	Malformation.		
Negative.	Negative.	Negative.	Stigmata.
	Vomiting.		
Sign of regaining consciousness.	Not frequent. Never present after brain pressure is well developed.	Frequent.	Absent.
	Bladder and Rectum.		
Sphincters may be relaxed.	Emptied only in early stage if at all.	Typically emptied	Rarely emptied.
	Temperature.		
96 to 99.	101 to 102.	99 to 101.	Normal.
	Pulse.		
Weak, 120; irregular, deficient, short, compressible.	Strong, 60; regular, bounding, long and full.	Same as in compression, but rises to 100.	Normal.

DIFFERENTIAL BETWEEN—CONTINUED.

CONCUSSION.	COMPRESSION.	CONTUSION.	GRAND MAL.
	RESPIRATION.		
Shallow, sighing. 30.	Sterterous, puffing, 8 to 14.	No characteristic change.	Sighing, 20.
	NERVOUS SYMPTOMS.		
	CENTRAL.		
Unconsciousness incomplete. Can be roused.	Unconsciousness absolute. Cannot be roused.	Unconsciousness incomplete, but can be roused with difficulty only.	Unconsciousness complete. Cannot be roused.
	CONVULSIONS.		
Often present.	Absent, except when pressure very high.	Depends on position of tear.	Present.
	GENERAL PHYSICAL.		
	INSPECTION.		
Face white and wet.	Face red and dry.	Face red and dry.	Normal color, no sweat, contortions frequent.
	SUPERFICIAL REFLEXES.		
Pupils react. Unequally irregular.	Dilated. Do not react.	Dilated. Do not react.	Pupils dilated.
	DEEP REFLEXES.		
May be exaggerated.	Diminished or absent.	Exaggerated.	Diminished or absent.

These represent some of the most important differential points. So great is the variability in the symptoms presented by these lesions that just exception may be made in the case of almost every attempt to differentiate them. Authorities differ widely in their statements as to the symptoms, it being impossible to find two text books which agree on every point. It would be easy to forecast what the symptoms should be in any one of these conditions, if a thorough understanding of the pathology were possible.

Brewer states that contusion is always associated with concussion. The symptoms of concussion appear first and cloak those of the more serious lesion. His few pages devoted to these subjects render them clearer than chapters of other text books.

Concussion is like shock in symptoms, but not in gross pathology. It is characterized probably by a less extensive degree of cerebral anemia. It differs from shock further in that it is complicated by symptoms of brain tearing. Pure concussion, then, is a hypothetical lesion. Did it exist, it could probably not be differentiated from the apathetic form of shock. It is due either to atomic or molecular upheavals, if such divisions of matter exist. In a measure it resembles neuralgia of peripheral origin, which is supposed to have an origin in molecular disturbance. Practically, however, all one needs to remember is that the symptoms of shock and of concussion may be virtually one.

Compression is a somewhat more definite lesion. It is very easy to understand that although hydraulic pressure normally is transmitted equally in all directions, the tightness of the falx and tentorium membranes must considerably retard the equalization of this pressure. Compression **symptoms** depend, then, partly upon the position of the pressure producing lesion, particularly if this be fluid. They depend also upon the period of the illness at which the patient is seen. This, of course, is true of all diseases. Symptoms are rarely stationery, and, for this reason, it is utterly impossible to give a differential that may not be open to criticism, because it is very difficult to stipulate the exact period at which the observations recorded are made.

The **reflexes of the eye** and the condition of the vesical and rectal **sphincters** afford but unsatisfactory evidence because of their variability.

Contusion.—This symptom is usually seen as a sequel of concussion. The unfortunate subject of this lesion is not infrequently driven from hospital to hospital under the suspicion of malingering. This is not the fault of those who examine him, but because the symptoms of cerebral irritation are, in their early stages at least, indistinguishable from the group

often craftily imitated by men and women suffering from hospitalism. Where 10,000 useless degenerates are turned aside from the hospitals and prevented from preying upon the public, one also is turned aside who has the real symptoms of cerebral irritation.

In more advanced stages the symptoms are characteristic, but even then the victim may easily be mistaken for a bad tempered derelict. This is important to remember in differentiating cerebral irritation.

Picture an old "Bowery skate" who has come into the hospital and has been assigned to a bed. Unless prevented, he will insist on wearing his ragged coat. He is indisposed to pull his dilapidated pants off. With one suspender over his shoulder he lies on the comfortable bed in a typically **tetanoid position**, that is to say, with all the joints in **moderate flexion.** His eyes are closed, his face is apathetic. His bowels are not lost to control, and his urine flows normally. He resents interference with an oath. Because of his irritability, he is shunned by the other patients who regard him as a crank. Unless he is carefully watched, he will empty his bowels in the bed, because it appears to be too much exertion for him to go to the toilet. He will eat, but only if food is brought to him; he will not go and hunt for it. In short, he presents a typical picture of an irritated recluse suffering from a severe "grouch."

This picture, of course, is that of a mild and chronic case. Cerebral lesions, causing irritation, may be so profound as to be unmistakable.

BRAIN HEMORRHAGE.

This may conveniently be divided into two types, the **medical** and the **surgical.** The medical usually occurs from the **lenticulo-striate artery (Charcot's),** the largest branch of the middle cerebral. It is poorly protected, and is known to undergo atheromatous change of an advanced type early in the course of that disease. Its walls do not increase proportionately in strength as the vessel dilates from **over cerebration.** It is consequently dilated and is apt to become atheromatous in men of profoundly active minds. Osler calls pneumonia the friend of the aged. Apoplexy may well be called the friend of

the thinker. Unfortunately, it is as yet beyond the pale of surgical intervention. Medical hemorrhage is more common than the surgical form.

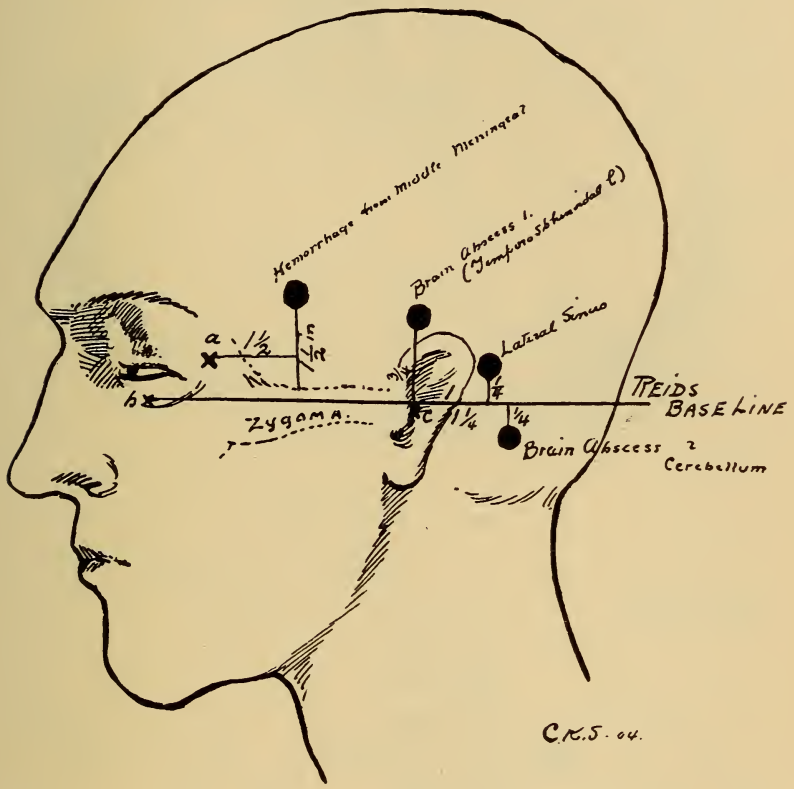


FIG. 19

SOME TREPHINE AREAS.

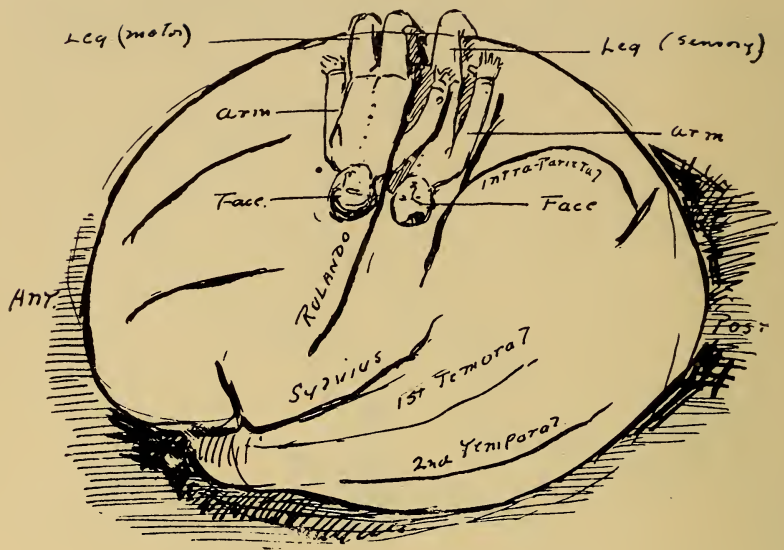
Reid's Base Line—Lower margin Orbit to External Auditory Meatus.

Trephine for Middle Meningeal.—1½ in. above Zygoma; 1½ in. back from external angular process.

Trephine for Brain Abscess.—¾ in. above External Audit. Meatcus;—if not there, 1¼ inches behind external audit. meatcus: ¼ in. below R. B. L. (Cerebellar Abscess)

Trephine for Lateral Sinus.—1 inch behind Auditory Meatus; ¼ in. above R. B. L.

FIG. 20


Leg (motor)
Leg (sensory)
Arm
Arm
Face
Face
Intra-Parietal
Rolando
Sylvius
1st Temporal
2nd Temporal
Ant.
Post.

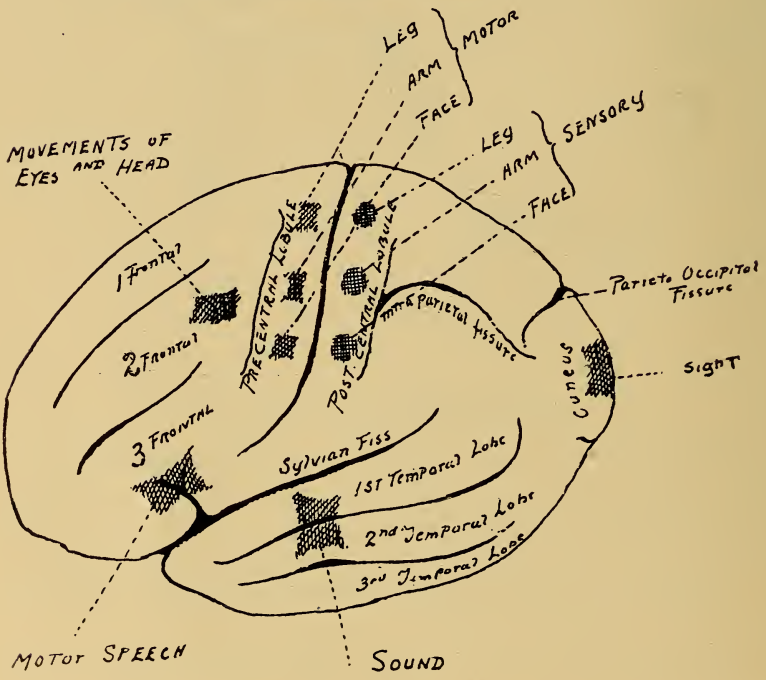

Leg
Arm
Face
Motor
Leg
Arm
Face
Sensory
Movements of Eyes and Head
1 Frontal
2 Frontal
3 Frontal
Precentral Lobule
Post. Central Lobule
Intra Parietal Fissure
Parieto Occipital Fissure
Cuneus
Sight
Sylvian Fiss
1st Temporal Lobe
2nd Temporal Lobe
3rd Temporal Lobe
Motor Speech
Sound

FIG. 21.

Surgical hemorrhage generally comes from the anterior branch of the **middle meningeal artery.** Its extent is determined by two factors, namely by the **degree of laceration** and by the **position** of the wound. Not infrequently the middle meningeal lies in somewhat more than a 180 degree channel on the skull case. This amounts virtually to a **canalization of the bone by the vessel,** and from it two interesting conclusions result. First, hemorrhage must take place from an artery which is enveloped by bone, but very slowly, if at all; and second, the artery must be injured in almost every case of simple linear fracture of the bone across its course. The relation of the dura to the tear is also a determining factor in blood extravasation. Hemorrhage will naturally take place very much more rapidly central, rather than peripheral, to this tough membrane. Cases of peripheral dural bleeding have been known to occupy a week or more before symptoms became marked. This is to be explained by the difficulty which the blood experiences under the limited cardiac pressure in tearing the dura from the bone.

The home-made method of remembering the position of the centers in a sensory motor area is shown in the accompanying figure. It demonstrates the body of a puppet upside down, which is the position taken by the centers, as shown by the companion figure. It demonstrates further that just posterior to the fissure the sensory and the motor areas overlap each other. This little scheme has long been used by Dr. Robert H. Dawbarn in demonstrating his lectures on the brain.

The position of the anterior branch of the middle meningeal is such that the first symptoms, after the recovery of the unconsciousness produced by the primary concussion, should, as shown by the puppets in the Figure be motor irritability of the face and arms.

BRAIN AND MEMBRANE INFLAMMATIONS.

There is no more favorable location for the growth of bacteria than within the brain case. There are various ways by which these germs obtain ingress. It may be convenient to use Sub-Scheme III to give the causes of intra-cranial infection. It may be brought about by T. I. D. M. of the parts.

Of tumors situated externally, **epitheliomata** may be taken

as representative. These, as nutritional advantages decrease, break down and become infected. The drainage from such ulcerating areas is apt to be by one of the **Emissory Veins.** This is more apt to be the case if the lesion under consideration is located upon the scalp, although the face, as shown by the figure, is not a region exempt from danger. Suppose drainage of the epithelioma to take place via the ophthalmic vein. It terminates in the cavernous sinus, and from this great blood lake infection travels into the brain by contiguity of tissue. (See Fig. 13)

It is important to know the difference between travelling by continuity and contiguity of tissue. It would be easy to understand the terms if the words "of tissue" were usually used, but they are not. If an inflammatory process begins in the stomach, as an ulcer and an abscess developes in the contiguous lobe of the liver, that infection is said to have reached its destination by contiguity. The tissues were near to each other, but they were not continuous. First, there were stomach cells, then interval connective tissue cells, then liver cells.

If, however, an abscess had formed in the wall of the stomach, those products would have reached their destination by so called "continuity of tissue," because they never were obliged to pass out of the stomach wall.

Consequently, by contiguity, a panencephalitis might be established in the case of the supposed ulcerated epithelioma.

Sarcoma of the Antrum is an example of a tumor in the wall of the brain case, which, on breaking down, may cause panencephalitis, localized intra-cranial abscess, or any form of inflammatory change.

Tumors on the inner wall of the brain case, which cause intra-cranial inflammation, are rare.

External Injuries.—Almost any injury which becomes infected, and which is situated in the neighborhood of an emissory vein, may cause the lesion under consideration.

Fractures are the next possibilities to consider, and after injuries come the diseases.

Lupus. This disease is prone to ulceration, and the manner of infection from it may be similar to that of epithelioma.

Otitis Media often affords an admirable illustration of

how infections travel by **contiguity of tissue.** From the middle ear, as has already been noted, the agents travel to the mastoid, thence to the lateral sinus, producing typical phlebitis of the internal jugular; thence, if the patient lives, to the dura, producing pachymeningitis; thence to the pia (always supposing the patient to stand it), producing lepto-meningitis; thence to the cortex, producing cortical abscess; thence to the encephalon, producing pan-encephalitis.

Cerebral Abscess, then, may arise in a variety of different ways. It is not unlike abscesses elsewhere. It, therefore, posseses the general characteristic that it may be due to a **pure** or a **mixed** culture infection.

The best example of pure culture cerebral abscess is the tubercular. About this abscess an interesting point of difference has arisen. The chronic, slowly developing, often multiple, frequently secondary, pure culture tuberculous abscess causes typically a sub-normal temperature. Its antithesis, the single, acute, rapidly growing mixed infection abscess which bears no practical relation to the tuberculous form at all, certainly in its early stages, is characterized by a temperature of from 103 to 105.

Park states that the temperature when raised is in proportion to the degree of meningeal involvement. He says further that a particular characteristic of the cerebral abscess is its tendency to form about itself a **pyophylactic membrane** by which the abscess becomes entirely capsulated. In fact unless this membrane forms, the patient is almost certain to succumb in the acute stages of the abscess. Thus, **"walling off"** is of vital importance in the brain.

It is not known why abscess tends to produce a **sub-normal temperature.** If it were a usual accompaniment of intra-cerebral pressure, one would expect to find it a manifestation of tumor; but such is not the case. There can be little doubt that whatever the cause of the subnormal temperature acute abscesses, which undergo the encapsulation process, become practically the same as pure culture tubercle abscess. They are in other words "cold" and should naturally not be expected to produce the symptom of elevated temperature. The **conclusion** then is, that although probably a number of cases of abscess

which in the past were described as mixed culture abscesses, have in reality been pure culture tubercular formations. In this case, a subnormal temperature has erroneously been ascribed to them.

One of the most frequently asked as well as the most confusing differentials, is between cerebral tumor, abscess, tuberculous meningitis and typhoid. It is obviously of the gravest importance for the patient that correct conclusions should be reached early because of the fundamental difference in the modes of treatment. In this differential, as in others, no attempt is made to give all the smallest details which are intended to be filled in by the reader. Furthermore, here as elsewhere, it is not possible to be dogmatic without opening a free path for justly unfavorable criticism. Whatever flavor of dogmatism is present has been extracted from the most recent text books on the subject.

DIFFERENTIAL BETWEEN

Cerebral Tumor.	Cerebral Abscess.	Tuberculous Meningitis.	Typhoid Fever.
	History of Injury.		
Not rare, especially in sarcomata.	Frequently follows fracture of skull.	Absent.	Absent.
	Disease.		
Onset fairly rapid	Onset slow. Chill.	Onset slow. T.B. elsewhere.	Onset slow. Anorexia. Nosebleed common.
	Age.		
Before 20 if tubercle; 20 to 40 if sarcoma.	Active adult life.	Childhood.	15 to 30.
	Pain.		
Very severe. Constant. Sometimes located over lesion. Worse in early morning.	Severe. May be localized.	Often worse at night.	Headache often absent.

DIFFERENTIAL BETWEEN.—Continued.

Cerebral Tumor	Cerebral Abscess	Tuberculous Meningitis.	Typhoid Fever
		Disability.	
Depends on position. May be anywhere.	Because of frequency in cerebellum, often disturbances of gait.	Stiff neck.	Dysalimentation.
		Vomiting.	
If protectile or distinctly "cerebral" in type very important.	Not infrequent, but nausea rare.	Not characteristic	If present, of distinctly "gastric" type.
		Bladder and Rectum.	
Negative.	Negative.	May be secondary to enteric T. B. If so, diarrhea.	Constipation or diarrhea.
		Temperature.	
Normal.	96.5 to 100.	100 to 102. Evening rise.	100 to 102.5. "Step-ladder".
		Pulse.	
Strong, 50, regular.	Strong, 40 to 50, regular.	Strong, 60 to 70, regular.	Weak, 100 to 110, may be irregular.
		NERVOUS SYMPTOMS.	
		Vertigo.	
Not common unless in cerebellum.	Very common.	Absent.	Absent, except from gut or due to weakness.
		Delirium.	
Late, if at all.	Apt to be earlier.	Early.	Early, late or absent.
		Unconsciousness.	
If present, absolute.	Absolute.	Less profound.	Less profound. Often intermittent.
		Convulsions.	
Usually general and early.	Not so common as in tumor.	Common.	Very rare.

DIFFERENTIAL BETWEEN.—CONTINUED.

CEREBRAL TUMOR	CEREBRAL ABSCESS	TUBERCULOUS MENINGITIS.	TYPHOID FEVER
	AMNESIC APHASIA.		
Word-deafness, common.	Not so common.	Absent.	Absent.
	MOTOR APHASIA.		
Rare.	If in tempero-sphenoidal, common.	Absent.	Absent.
	ALEXIA.		
Word-blindness, common.	Less common.	Absent.	Absent.
	AGRAPHIA.		
Often cannot write. (Second or third left frontal)	Rare.	Absent.	Absent.
	APRAXIA.		
	(LOSS OF PERCEPTION OF OBJECTS)		
Frequently present.	Occasionally present.	Absent.	Absent.
	PARESIS OR PALSIES.		
Frequent.	Occasional.	Absent.	Absent.
	SPECIAL SENSE.		
Optic neuritis common and often double.	Not so common and apt to be single.	Absent.	Absent.
	LOCAL PHYSICAL.		
	PALPATION.		
Negative.	Occasional local increase in temperature.	Negative.	Negative.
	PERCUSSION.		
Very rarely local tenderness.	Not infrequently local tenderness	Absent.	Absent.

DIFFERENTIAL BETWEEN—CONTINUED.

CEREBRAL TUMOR	CEREBRAL ABSCESS	TUBERCULOUS MENINGITIS.	TYPHOID FEVER
	EXPLORATORY INCISION.		
Found to be operable in only 5 to 10% of cases.	In temporo-sphenoidal lobe or cerebellum. Localized pus.	Pin-point tubercles on membranes. Exudate.	Negative.
	BLOOD.		
	LEUCOCYTOSIS.		
Unaltered.	10,000 to 15,000.	9000.	5000
	WIDAL AND OTHER TESTS.		
Negative.	Negative.	Positive to tuberculin.	Positive to Widal.
	EFFECT OF K. I.		
If gumma, marked.	Negative.	Negative.	Negative.

It will thus clearly be seen that a differential between these four diseases, particularly if they are taken at a reasonably early period of their development, is extremely difficult. The value of the laboratory findings cannot be over estimated, for clinically there may be a very grave and discouraging absence of facts.

THE SPINE.

If difficulty has been experienced in localizing cerebral injuries, it has been much greater in the case of the cord. This is obviously because the cord is concerned only with reflex action and with transmission. These functions, are extremely difficult to localize with any degree of accuracy. Precisely similar lesions arise in the cord as in the brain and their causes are in a measure identical with those affecting the higher centers. It often becomes necessary to establish a differential between a supposed case of spinal hemorrhage, of bone pres-

sure of transverse lesion of the cord, or of certain very rapidly growing tumors. In theory this may be possible, but in practice most unfortunately it is too true that a positive conclusion can be reached only after exploratory incision. There are, however, points of academic interest and these have been arranged as concisely as conflicting opinions of authorities allow.

DIFFERENTIAL BETWEEN

Spinal Hemorrhage.	Bone Pressure.	Transverse Myelitis. (Traumatic)	Sarcoma.
History of Injury.			
Always present.	Always present.	Always present.	Absent.
History of Disease.			
Onset may be slow. Symptoms increase.	Onset immediate. Symptoms stationary.	Same.	Relatively very slow. Symptoms increase.
Previous Disease.			
Atheroma.	Negative.	Negative.	Involvement elsewhere.
Sex.			
Negative.	Negative.	Negative.	30 to 40. (McCosh)
Temperature.			
100 to 102.	Normal.	98 to 100.	Normal.
Paresis and Paralysis.			
Appear late. Moderately slow increase.	Immediate.	Immediate.	Appear late. Slow increase.
LOCAL PHYSICAL.			
Inspection.			
Often irregularity of spine.	Same.	Same.	Negative.

It will be seen that there are very few available data upon which to base a differential of the spinal lesions. **Brewer** says that a recognition of extra-dural and subdural hemorrhage is **surgically unimportant** even if they do occur unassociated with fracture or dislocation, because they **cannot be clinically recognized.**

Laminectomy is the term used to designate the technic which is used in reaching the cord. The danger of this operation increases very rapidly as it approaches the brain. The chief matter of importance concerning it is that **if indicated at all it should be performed immediately.** It is interesting that this rule, which was formerly supposed to hold good for injured nerves, has recently been demonstrated, as already cited, to be fallacious. (See chapter on nerves.) That this does not hold true in the case of the cord is undoubted, for degenerative processes of a destructive nature are pretty definitely proven to be well under way thirty-six to forty-eight hours after the cord has been injured, and by some authorities before then.

CHAPTER X.

THORAX.

FIG. 22

The *Complemental Sinus* is shown as the higher of the two areas mapped out on the lower region of the Thorax. It is that space intervening between the lower border of the lung and the line of Reflection of the Pleura and is filled with Pus in non-encysted empyema.

The *Costo Phrenic Sinus* lies just below the complemental and its inner and outer boundaries are formed respectively by Diaphragm and Thoracic wall. This Sinus is the seat of Costo Phrenic Abscess.

The following table, in part compiled according to Huntington will be found useful.

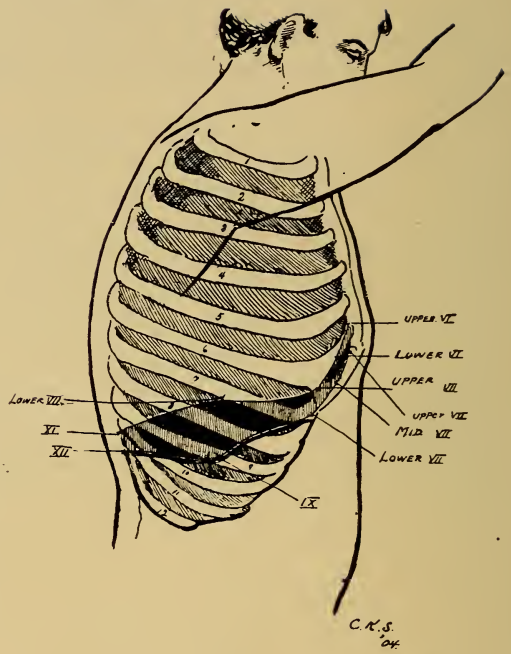
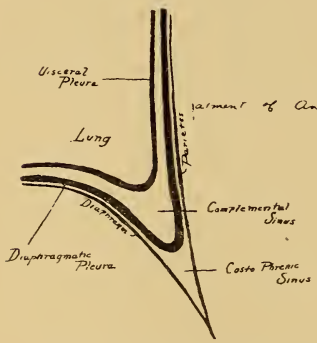


FIG. 23



This shows a longitudinal elevation through the centre of Fig. 22. Consult Deaver's anatomy for further data.

COMPLEMENTAL AND SUPPLEMENTAL SINUS.

Line.	*Lower Pleural Limit.*	*Lung.*	*Complemental Sinus.*
Sternal—	Upper VII. Rib.	Upper VI.	2 cm.
Parasternal —	Middle VII. "	Lower VI.	2 cm.
Mammary—	Lower VII. "	Upper VII.	2 cm.
Axillary—	IX. "	Lower VII.	6 cm.
Vertebral—	XII. "	" XI.	2.53 cm.

Note thal the greatest depth of the Complemental Sinus is in the axillary line.

The Costo Phrenic Sinus naturally is bounded above by the Lower Pleural limit and below by the attachment of the diaphragm to the Ribs and Rib-Cartilages, (See cut of diaphragm in chapter on hernia.)

The surgery of the thorax has been stimulated very much by the perfection of methods for **artificial respiration** pending the opening of the chest cavity. Prominent among these is one devised by **Matas** of New Orleans. It is so constructed that it automatically supplies the required amount of air. This obviates the danger of the variable dosage which the excitement of a major operation was almost certain to engender when the old instruments were used.

The Esophagus, partly because of its great importance and its unfortunate liability to disease, besides the fortunate fact, that although passing through the thorax, its whole extent can be reached without opening that cavity, has been the object of more surgical intervention than any other organ in the chest.

One of the most interesting lesions which can befall this tube is the formation in it of **Diverticulae.** The causes of these diverticulae can easily be enumerated by reference to Subscheme III. They arise as a result of twelve possible conditions, viz.—**Tumor. Injury, Disease or Malformation within the** lumen, in the wall of the lumen and without the lumen, or in other words in **twelve possible positions.** The accompanying **radiogram,** which was recently made by Dr. Cole at Roosevelt Hospital, shows the nature of these diverticulae very beautifully. The outline was made clear by causing the patient to swallow about two ounces of **carbonate of bismuth.** The esophagus, on account of its being, collapsed antero-posteriorly, appears in this side view as a line.

These diverticulae are often the result of **stricture.**

Dunham has recently shown that almost every stricture which is of such nature that the patient is not prevented by it from swallowing water, **can be passed** by allowing a **thread** to float in the water and by then **swallowing the liquid and the** line. In strictures of the deep esophagus, which are beyond the reach of external esophagotomy, and as a preparatory to **Abbe's Fish Line Treatment,** this demonstration is of great importance.

The Italians have been the pioneers in **Cardiorrhaphy.** Astonishing success has met efforts to suture the heart wall. It depends upon the introduction of interrupted sutures which are tied during diastole.

FIG. 24

ESOPHAGEAL DIVERTICULUM.

(AUTHOR'S CASE)

Given off opposite the 6th cervical vertebra. (The patient coughed up bismuth for two weeks after this radiogram was made.)

Of operations which necessitate a trans-pleural route, by far the most frequent are those for the relief of **empyema.** They may be enumerated as follows: (1) **Paracentesis,** (2) **Resection of One or More Ribs,** (3) **Estlander's Operation,** (4) **Schede's Operation.** (This last might be spelled "Shady" for it is highly doubtful if the patient survive it), (5) **Fowler's Operation.**

If the collection of fluid in the pleura be **localized** and of such extent as to produce a bulging; a condition uncommon but not by any means unknown, the needle should, after most scrupulous sterilization, be driven in over the most prominent part of the swelling. If, however, as is more frequently the case, the exudate is not loculated, a point of election for paracentesis is just below the scapula. This of course is a very movable point, but it is usually understood that the arm is in a position past full abduction from the body. This raises the lower scapular angle somewhat and carries it toward the axilla. The **needle should not enter lower than the eighth** intercostal space, and when it is withdrawn, a piece of zinc oxide adhesive plaster should be clapped over the wound before the patient has time to suck air in through it by making a respiratory effort.

Now suppose the pumped out fluid to have been a simple straw-colored liquid, which is shown by laboratory examination, to have the characteristics of an **exudate.** This treatment will, in a very large percentage of cases, be curative. Occasionally, however, either because of infection introduced at the time of operation, or because of a contamination of the exudate through internal sources, the patient's condition will not improve except in so far as he becomes more comfortable at once from the relief of pressure. The **temperature,** instead of remaining normal or falling from the slight rise which occasionally accompanies simple pleuritic exudation, either maintains that slight rise regularly, or else **creeps slowly upward.** What is to be done in the face of these conditions?

Obviously drainage is indicated. Some very excellent authorities have said that adequate drainage is to be had through an intercostal space. Dr. A. A. Moore has devised an ingenious little instrument for so draining these pus cavities, partic-

ularly in little children. The general consensus of opinion, however, is that it is better surgery in every case to **resect a rib,** rather than to attempt intercostal drainage. Ribs regenerate very rapidly and, the resection entails a remarkably small amount of shock. On a "stiff" it is demonstrably impossible to do a sub-periostial resection, but this is simply because the membrane in the "stiff" is normal. In the case of a **chronic empyema**, however, the **periostium** is very apt to have become somewhat **thickened** on account of contiguous productive inflammatory change. The section of rib, consequently, in these cases, shells out with comparative ease from its enveloping membrane. The intercostal vessels and nerve, below, are not seen if the periostium be split directly over the anterior long axis of the bone, nor are the smaller vessels, which are located at the upper margin.

Now suppose the rib resection and the introduction of the usual drainage tube to have failed. What is the next step to be taken? Obviously it is necessary to establish freer drainage. The condition will now have become decidedly chronic, a greater or lesser area of the lung having retracted. The mechanics of the proposition therefore become simple. A constantly discharging abscess is in one respect like nephritis in that the body in each condition loses highly nutritive albuminous fluids. The cavity has to be obliterated, in order to stop this steady drain of pus. It resolves itself into either **bringing the lung out to meet the chest cavity** or of **dropping the chest wall upon the permanently collapsed lung.** Obviously it is better for the patient if the lung can be forced out, but this cannot be done in all cases.

Estlander's Operation is based upon an acknowledgment of defeat. It is therefore not indicated until every means, such as blowing water into **James' Bottles** and other attempts at producing artificial emphysema have been tried. Furthermore, it is not likely that any serious attempt to collapse the chest wall will in future be made until **Fowler's technic,** shortly to be spoken of, has been tried. If employed as thoroughly as is recommended by its distinguished inventor, there must be very few cases in which it will fail to obviate the necessity of doing either an Estlander or a Schede. Suppose, however, Fowler's

technic to have been unsuccessfully employed. One should not at this stage think of doing a Schede, but would naturally turn to the more conservative Estlander technic. He advises **(Brewer)** "the removal of portions of several ribs according to the size and shape of the underlying cavity, but without disturbing the thickened parietal pleura."

Schede's Operation (Brewer) "consists not only of removing the **ribs but also the parietal pleura.** He advises 'a large **U** shaped incision, beginning near the junction of the second rib and costal cartilage, extending downward and backward to the tenth rib, then upward to the axillary border of the scapula.' "

Fowler's Operation. It was noted some time ago that if, during the execution of one of these throracoplastic operations, the visceral pleura was cut, the lung promptly expanded beneath it, so that the simple line of incision could, as one watched it, be seen to develop into an opening shaped like a bi-convex lens. It must be remembered that after the establishment of chronic empyema, the visceral pleura has promptly lost all its delicate physiological functions and, because of its extreme thickness (sometimes amounting to as much as a quarter centimeter) has begun to act as an ever tightening constrictor around the lung. The evil effects of a productively inflamed capsule of any organ cannot be overestimated; its agency in producing lesions of the kidney will be spoken of later.

Cutting the blanket-like pleura was destined to afford relief of a measurable but inconstant type. The technic somewhat resembled the subcutaneous section of the fascial bands in Dupuytren's contracture, which, although giving temporary relief, eventually made the contracture worse by the subsequent increase of the scar tissue.

Fowler was the first to note that the **treatment of the pleura** should be the same as the treatment of **Dupuytren's fascia,** viz.—that it should be removed as entirely as possible. He therefore advised that it be freely incised and ripped from the lungs. Obviously this should be done early, before dry productive inflammatory (sclerotic) changes have taken place in the lung. After the unfortunate establishment of this con-

dition, there is no relief for, nor means of obliteration of the pus cavity, save by dropping the chest wall in upon it as proposed by **Schede.**

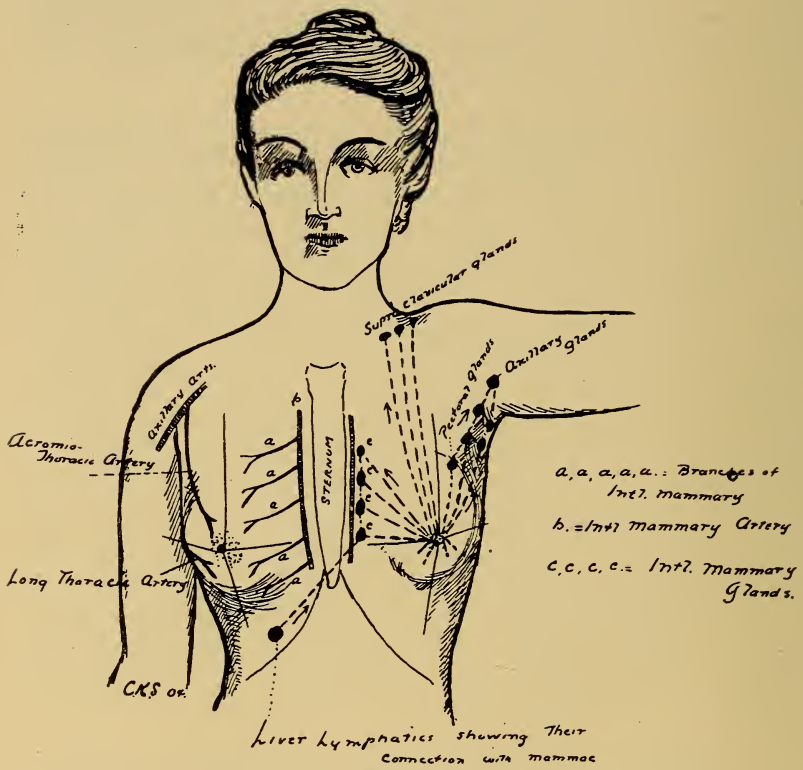


FIG. 25

This is an adaptation from a most beautiful cut in Eisendrath's Clinical Anatomy. It shows the breast quadrants and their lymphatic drainage. It also shows the very important relations of the internal mammary artery.

(Used by courtesy of DR. EISENDRATH)

THE BREAST.

Since a small fraction over one-half of all favorable cases of carcinoma of the breast can be permanently freed from the disease, it is indeed a pity that more do not reach the surgeon.

An eminent authority has divided women into three

classes. **Forty-five per cent.** of them are so frightened at the possibility of having a tumor in their breast that they are perpetually running to their physician, or at least to the person who poses as such—for confirmation or refutation of their suspicions.

Another **forty-five per cent.** are so badly frightened that when they find a tumor in their breast, they conceal it from everybody and not a soul knows of it until it is a rotten mass heralded by its stench.

The remaining **ten per cent.** are sensible about the matter. Immediately on discovering a small tumor they put themselves under the care of a competent surgeon.

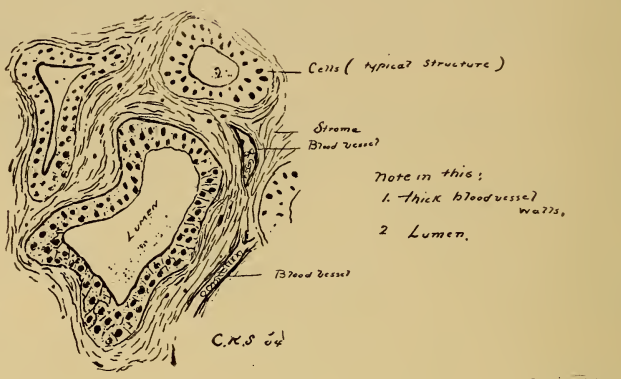
Of the first class, almost the entire number, because of their dread of the knife and their willingness to submit to every "ism" and "no-knife treatment," fall in discouragingly great numbers into the hands of the charletan and of the ignorant but well meaning practitioner of "isms." Thus it is that probably not over twenty per cent. of tumors of the breast of a malignant character are ever subjected to suitable treatment.

So hazy is the border line between an adenoma and a carcinoma of an inactive type, that it is impossible to say, when the one may fade into the other. The **changing of a benign into a malignant growth** may be likened to the peeling off from a sweating hand of a pair of moist kid gloves. The fingers turning inside out, **reverse their direction.** That is all, from morphological evidences in any event, which takes place when in a wart or mole, the fingers of which have been extended toward the surface and engaged in no malevolent work, some unknown agent suddenly reverses them and they reach out hungrily and malignantly into the subjacent tissue. So subtile is this change in these most simple, superficial little growths that Keen has gone so far as to counsel the **removal of every wart and mole from one's body.** If this be advised on the opinion of so high an authority, how great indeed must be the danger to which we are all exposed through these apparently harmless but very common growths. Furthermore, how much greater must be the danger of malignant degeneration taking place in the more complicated, more vascular and less freely observable tumors of the deeper parts.

The appended figures represent an effort to show graphi-

cally some of the major differences between an adenoma, a carcinoma and a sarcoma.

FIG. 26



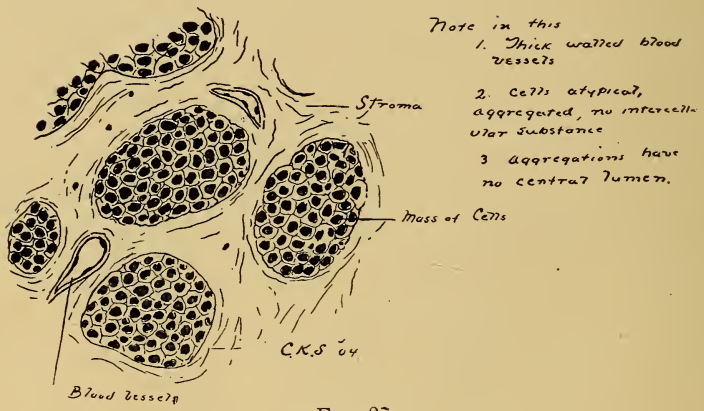


FIG. 27

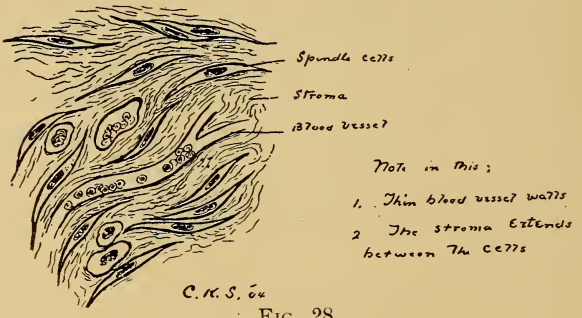


FIG. 28

Treatment of Carcinoma. The treatment of mammary carcinoma is determined absolutely by the distribution of the lymphatic drainage. The mortality rate from the radical operation would be very much lower were it not for the unfortunate fact that the upper inner quadrant drains largely into the anterior mediastinal glands and indirectly into the liver. Fortunately, however, the most extensive drainage is into the axillary and supra-clavicular groups. (See Fig. 25.)

Thus it is that the **position of the growth,** particularly if it be a small one, **determines the extent of the operative intervention.** If, for example, the outer upper quadrant alone is involved, it may be deemed conservative to remove no more than the axillary glands with pectoralis major and minor. If, however, as is too frequently the case, the growth when operated upon has invaded other quadrants of the breast, the **supra-clavicular** and in some cases even the **anterior mediastinal glands** are taken out. The first calls for a resection of the clavicle; the second, for a resection of a portion of the sternum. The immediate mortality of the operation is of course higher if the mediastinal glands are attacked, but the chances of permanent cure, if the patient survive the operation, are enhanced.

Prophylactic after-Treatment of Malignancy.

This is a convenient point at which to consider the after treatment of all forms of malignant disease after they have been removed. The argument in general is this, that if certain agents about to be described are curative, as they have positively been shown to be, of malignant growths, **when superficially situated** may these agents not have a protective power in preventing the secondary development of malignancy after the tumors have been removed by the knife? It is accordingly the custom of some surgeons to treat their cases according to the terms of this argument. Some of the treatments referred to are:

(1) **The X-Ray.** Both the curative and prophylactic power of this agent are generally recognized. The chief danger and difficulty has been the indiscriminate use of the rays by ignorant or unscrupulous operators. Such men yield to the temptation to advocate radio-active treatment in the case of deep growths, where the knife only is indicated.

(2) **Finsen's Light.** This was originally obtained by concentrating the sun's rays through huge water glass lenses, the circulation of the water cooling the rays sufficiently to prevent their burning. It is now obtained chiefly from electric lights. Action depends on the unknown power of the violet and **ultra-violet** portions of the light. The work done by these rays is accomplished by vibrations which do not appear to us as color, because of their being situated ultra or beyond the violet side of the spectrum. They are too rapid for sight-perception. The chief function of the Finsen rays probably is in the treatment of **Lupus.**

(3) **Static Spray.** This is simply the discharge from a powerful static machine applied to the part from a metal point. The erythema produced is similar to that of the X, and the Finsen Rays, but the curative properties are more limited.

(4) **Radium.** This remarkable element possesses **curative powers** similar to those of the X Ray. They are stated by **Abbe** to be **ten times less potent.** It has, in addition to its therapeutic properties the remarkable ability to retard developmental processes. Abbe has shown that **seeds, if exposed to radium radiations,** are retarded in their growth proportionately to the time of exposure, and he has further demonstrated that **meal worms,** which ordinarily complete their cycle of development in about three months, if exposed to radium, remain meal worms; refusing for an indefinite period to manufacture their cocoons.

(5) **Starvation.** This treatment has been elaborately worked out by **Dawbarn,** and he has conclusively shown that in certain forms of **sarcoma** it is of distinct value and possibly so in the case of other malignant growths. The principle is to cut off as much nutrition as possible without causing the healthy parts to slough. Its most favorite site for employment is after the removal of sarcomatous growths from the region of the **antrum or lower face.** The technic consists not in ligation but in actual excision of the great bulk of the arterial and venous supply.

The treatment then of malignant disease as exemplified in the breast, consists of early removal, followed by prophylactic treatment. This may be by prolonged exposure to **Radio-activity** or by **Starvation.**

CHAPTER XI.

STOMACH AND GUT.

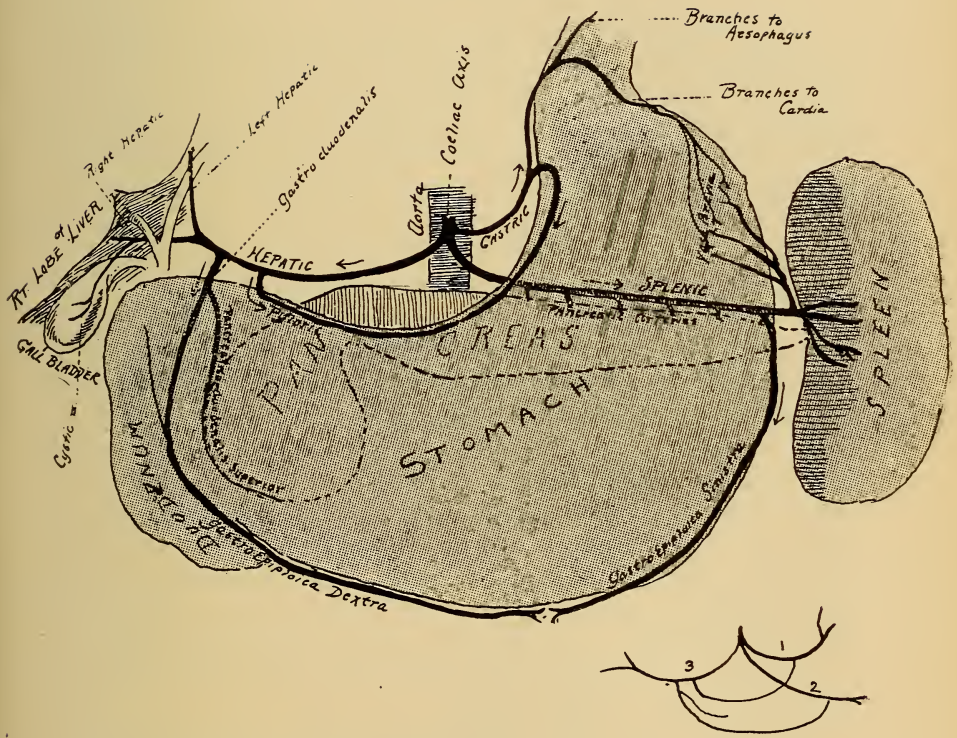


FIG. 29

CELIAC AXIS.

This drawing represents the stomach as a transparent body through which can be seen the pancreas and its arteries. To draw the Celiac Axis draw the lines 1, 2 and 3 (see small cut to right and below the main one.) Then join 1 to 3 and 2 to 3 in the manner shown. Subdivide the terminations of the lines 1, 2 and 3 and compare the result with the large sketch.

It is Utopian to look for the last days of proprietary digestants, but it is conservative to say that in future there will be more stomach lesions treated by the knife than by purgative pills and predigesting powders.

We eat well but not wisely hence the stomach has many minor woes. Aside from these, the most interesting and most vitally important, because of its relation to carcinoma, is

GASTRIC ULCER.

The **etiology** of the condition is unknown, but it probably has much to do with repeated traumata of the mucosa. The **pathology** presents characteristic phenomena. The ulcer is typically, a punched out area in the mucous membrane which may sometimes be seen through the serosa as a **whitish region.** It is white, partly because of anemia—the nutrient vessel which can usually be found leading to the center of the ulcerated region, is very often thrombosed or plugged—partly because of the formation of scar tissue, which is here made with unusual rapidity.

W. J. Mayo states that probably **fifty per cent.** of cases of **gastric ulceration** are **complicated by a similar duodenal lesion.** Until quite recently duodenal ulcers were supposed to have a rather constant relation to burns and other skin lesions. The ulcer bearing area of the stomach is rather strictly (80 per cent.) localized on the posterior gastric surface, near the pylorus; the ulcer bearing region of the duodenum is limited to the first portion of that gut. It would therefore seem that there is some physiologic or anatomic factor which renders this four or five inches of what is **practically a funnel** particularly prone to ulceration. This, though ignorance of its true cause, must at present be termed spontaneous.

There are other regions of the alimentary canal which are prone to ulceration, but these ulcers are of a distinctly different type, **tubercular, typhoid** and the like. There is no other region in the entire gut so liable to **idiopathic ulceration** as this **short pyloric funnel.** Before attempting to give any differential tables, it should be stated that a positive diagnosis in most lesions of the abdomen is possible only after exploratory incision and often not even then. On account of the juxtaposi-

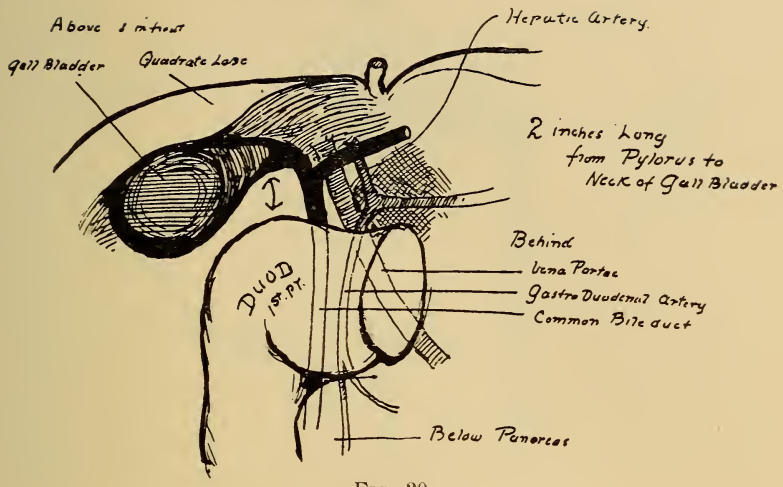


FIG. 30

Relations of 1st part of Duodenum.

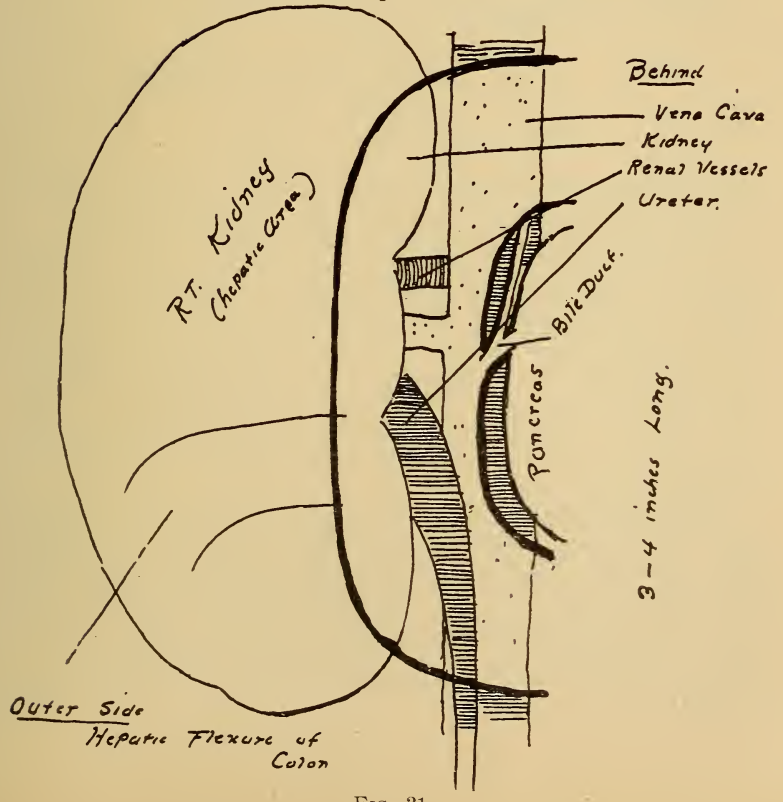


FIG. 31

Relations of 2nd part of Duodenum.

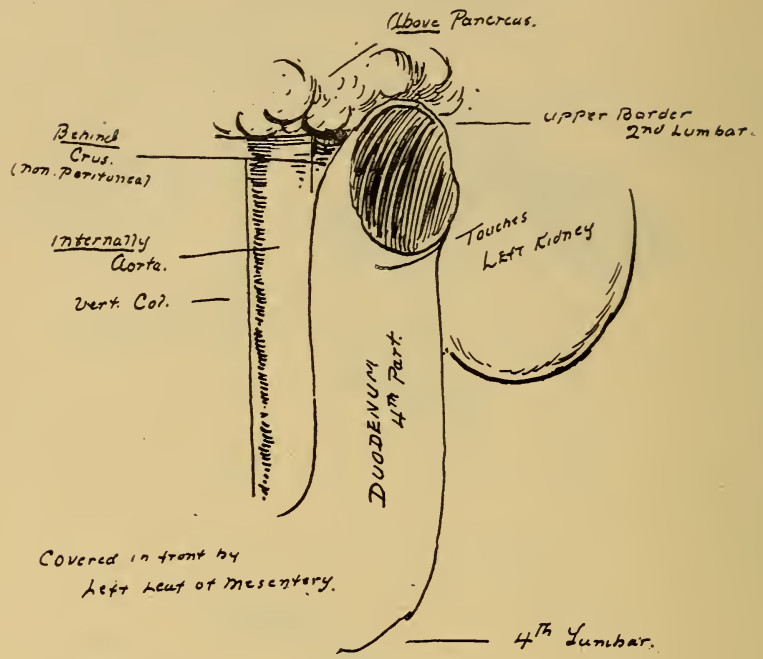


FIG. 32

Relations of 4th part of Duodenum.

tion of the gall bladder and its ducts to the duodenum and the stomach, lesions of these parts are apt to be confounded.

Duodenal Ulcer because of these studies is coming into great prominence and the time probably is not distant, when, instead of reference being made to gastric or to duodenal ulcer, separate and apart from each other, efforts will centre on the demonstration of ulceration in the **ulcer bearing pyloric funnel** already referred to. Nevertheless, it is still stated that duodenal ulcers have certain distinguishing characteristics. They are so vague, however, that **Brewer** states it to be impossible to differentiate the pyloric ulcer. No attempt will therefore be made to do it.

Duodenal ulcers are said to occur in two per cent. of bad burns. This percentage was much higher in the pre-antiseptic days. They may also follow frost bite, erysipelas, pemphygus, septicemia and eczema. Their **possible exciting etiology** may be (1) Septic emboli; (2) Destruction of blood cells; (3) Absorption of toxins from cellular degeneration; (4) Nerve irritation. They may appear from four to six days after the burn or injury.

DIFFERENTIAL BETWEEN

Carcinoma of Pylorus.	Ulcer of Pyloric Funnel.	Gall Stones of Common Duct.	Chronic Cholecystitis.
History of Tumor.			
Absent in early stage.	Rarely present.	Absent.	Frequent.
History of Disease.			
Onset always slow. Progressively worse. Cachexia.	Onset more rapid. Characterized by exacerbations.	Onset abrupt. Acute exacerbations.	Onset slow. Chronic course with exacerbations.
Previous Disease.			
Gastric ulcer or primary carcinoma elsewhere	Chlorosis.	Typhoid fever.	Chronic duodenitis.
Age.			
Over forty.	Under forty.	Mid-adult life.	Mid-adult life.
Sex.			
Male.	Female.	Female.	Female.
Occupation.			
Negative.	Change from an active out-door to a sedentary one, as seen in the case of emigrant servant girls.	Commonly ascribed to indolence and over-eating but by a recent continental writer thought to be due to the opposite.	Negative.
Pain.			
2 to 3 hours after eating. Characteristic. Grinding. Rarely begins at night.	Characteristic. Acute. Relation to eating, direct and immediate. Rarely begins at night.	Remittent. Severe. Shoulder. No relation to eating. Typically begins at night.	Intermittent. Less severe. Only with exacerbations. Usually begins at night.
Disability.			
Chronic dyspepsia Progressive weakness.	Intermittent dyspepsia. Acid eructations.	Low grade chronic dyspepsia, frequent.	Dyspepsia, intermittent. "Bilious".

DIFFERENTIAL BETWEEN.—CONTINUED.

CARCINOMA OF PYLORUS.	ULCER OF PYLORIC FUNNEL.	GALL STONES OF COMMON DUCT.	CHRONIC CHOLECYSTITIS.
		BOWELS.	
Negative.	Occasional "tarry" movements.	Constipation. May be "clay" movements.	Constipated.
		JAUNDICE.	
Uncommon, except in extensive involvement producing pressure on the duct.	Absent, except under similar conditions, which are rarer than in carcinoma.	A very characteristic symptom.	Frequent during exacerbations.
		TEMPERATURE.	
Normal.	Variable.	Characteristically intermittent. Chills and sweats, 98 to 103	Present during exacerbations. Irregular: 98–103.
		NERVOUS SYMPTOMS.	
		DELIRIUM.	
Absent.	Absent.	Not infrequent.	Occasionally during exacerbations.
		PARESTHESIAE.	
Absent.	Absent.	Itching of skin.	Occasional itching.
		URINE.	
Negative.	Negative.	High-colored and stains linen.	Same during exacerbations.
		GENERAL PHYSICAL.	
		INSPECTION.	
Evidence of cachexia.	Pallor and pronounced anemia.	Yellow.	May be yellow.
		LOCAL PHYSICAL.	
		INSPECTION.	
Possible tumor.	Probably no tumor.	No tumor.	Probable tumor.

DIFFERENTIAL BETWEEN—CONTINUED.

CARCINOMA OF PYLORUS.	ULCER OF PYLORIC FUNNEL.	GALL STONES OF COMMON DUCT.	CHRONIC CHOLECYSTITIS.
		PALPATION.	
May feel tumor on deep respiration Tenderness near mid-line.	Same.	No tumor. Tenderness at "Robson's" point.	Tumor.
		BLOOD.	
		LEUCOCYTOSIS.	
About 60%, 8,000. About 20%, 10-000 to 12,000. About 20%, 20-000 to 40,000. (Cabot)	About 20%, 10,000 to 12,000.	Usually absent.	May be marked during exacerbation.
		HEMOGLOBIN.	
Depends on degree of cachexia	One-half have less than 50% (Cabot)	70 to 80%	70 to 80%
		URINE.	
		INDICAN.	
Very frequent.	Absent.	Absent.	Absent.
		FECES.	
Undigested food particles.	Evidences of blood.	Absence of coloring matter.	Coloring matter may be absent during exacerbation.
		EXPLORATORY INCISION.	
Tumor usually at pylorus or on lesser curvature	Ulcer 50% in first part of duodenum remainder on posterior pyloro-gastric wall	Stone often lodged im ampulla of Vater.	Dilated or atrophied diseased gall-bladder.

As in the case of the breast, probably the most interesting as well as the most vital, question in the surgery of the stomach is the problem which bears on the **relation of a carcinoma to a gastric ulcer.** In the breast it is frequently a benign tumor, that is to say, a growth not traumatic in origin, which under-

goes the degenerative malignant change. There are, however, many examples to show that the **chronic irritation** arising from mild, low grade infection, as often occurs in frequently fissured nipples and similar apparently insignificant lesions have a very important bearing upon malignant degeneration. In the stomach, benign tumors are rare, the source of malignancy taking its origin almost entirely in the bed of old inflammatory lesions (ulcers). **Chronic irritation** then plays a most important part in the stomach and this is further exemplified by the very fact that carcinoma of the stomach is much more frequent in men than in women. Men eat too much and eat too indigestable substances. There is probably some connection between these two facts.

Pain, dyspepsia, acid eructations, loss of weight, vomiting; these are some of the symptoms which, singly or in combination, bring the patient to the surgeon's observation. Every one of these sufferers has been subjected to all conceivable and to many inconceivable forms of treatment. They have been bathed in boiling and sprayed in ice cold water. They have, for hours at a time, knelt with their buttocks on high and their heads on low. They have suffered great iron balls to be rolled and tumbled over their tender belly walls. They have consumed thousands of dollars worth of drugs. They are at last coming to their own! ,

The **symptoms** above referred to arise directly from the inflammation of nerve terminations as in the case of ulcer, or **indirectly,** as in the case of carcinoma and other diseases which produce pyloric obstruction, through a stretching of the parts and a necessity arising for them to do work for which they were not built.

Surgery applies to the stomach the simple common sense methods that she utilizes elsewhere. She **puts inflated parts at rest** and **establishes drainage.**

The surgery of the stomach is easy to understand and there can be no possible misconception about it if these two simple facts are remembered.

What, for example, is the **surgical treatment of ulcer** of the stomach? Put the part at rest. Since the ulcer is usually located near the pylorus, if this funnel be put out of use, the

ulcer will heal. Consequently one of the most frequently employed technics for the treatment of ulcer (Robson, Moynihan and others) is **Gastro-enterostomy.**

FIG. 33

Gastro-enterostomy made by the twine-triangular stitch.

(Columbia Surgical Laboratory)

This deservedly popular operation serves the second indication, viz.—that of establishing drainage just as admirably as it does the first. For this reason, it is employed in the **treatment** (palliative in the case of carcinoma, as are many surgical operations) of **Pyloric stenosis.** All the great and little evils from which a case of pyloric carcinoma suffers are done away with as though by magic through the execution of gastro-enterostomy. The technic is simple. The jejunum and the stomach may be brought into communication by ligature and section: by Murphy Button; by the the Twine-triangular stitch (see Report from Columbia Surgical Laboratory, 1904.)

Other methods are used for the relief of these lesions of the stomach, but they must always be based on the simple proposition of rest and drainage. **Finney's pyloroplasty** is acknowledged to be the best of these. See Brewer's text book.

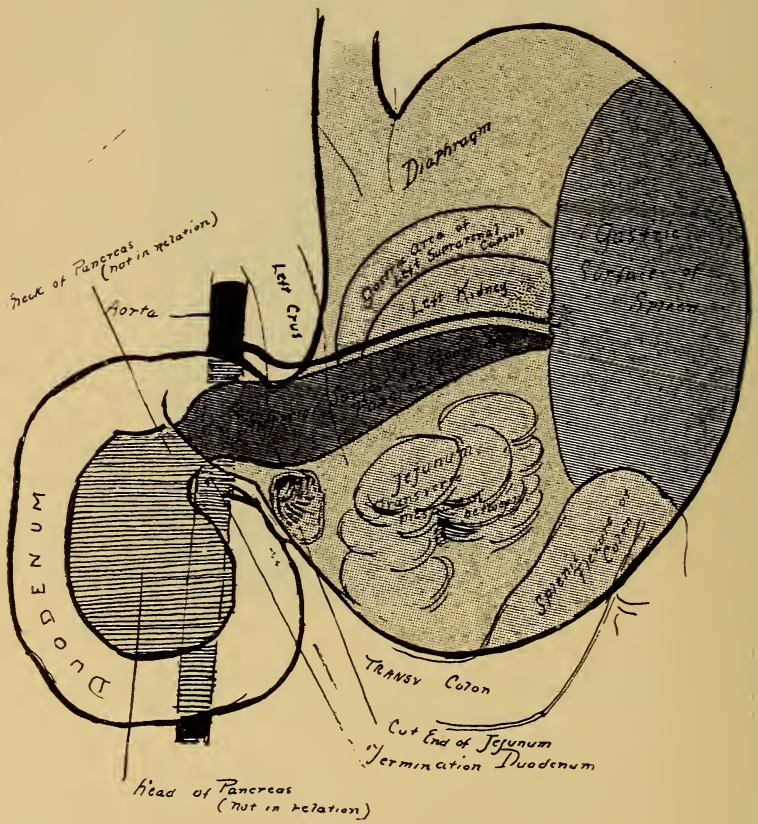


FIG. 34

POSTERIOR RELATIONS OF STOMACH.

The Greater Curvature has been lifted upward and to the left. This accounts for distorted (diagrammatic) shape of the stomach. Note that head of pancreas is not in relation.

Gastrostomy.—Occasionally because of impassible stricture of the esophagus, a permanent opening has to be made in the stomach through which the patient may be fed. A similar

opening occasionally has to be made in the colon through which the patient may in case of permanent obstruction or destruction of the rectum evacuate his bowels. There is no truer example than that found in a study of **Gastrostomy and Colostomy,** of the axiom that to succeed, an operation must **imitate nature as closely as possible.** She has passed through the abdominal wall a tube which for all practical purposes is similar to the rubber tube used in gastrostomy. It is the spermatic cord. It traverses the abdominal wall by an **intermuscular course.** The length of the canal is constant and the relation of the muscles to it is always the same. The most effectual means of establishing a permanent opening into the stomach or the colon is based upon the principle that it should be made as nearly **like the inguinal canal** as possible. That is all there is to these so called **valve or telescoping** operations; they simply imitate nature.

Surgical treatment of typhoid ulcers. As about 8,000 people a year die in the United States alone of perforation or hemorrhage from typhoid fever, it is obviously an important matter to reach a means of treating this vital condition surgically.

In a very high percentage of cases the lesion takes place **within the last 24 inches of the ilium.** The **symptoms of perforation** classically are pain, sudden and sharp attended by collapse, but unfortunately there are too few cases that follow the classical picture. It has been suggested as a palliative method that some coagulable jelly-like material should be injected into the gut somewhat as engineers sometimes put oatmeal into a leaking boiler. Increased assurance in the opening of the abdomen under local anesthesia will undoubtedly do a great deal to help this rather discouraging situation.

APPENDICITIS.

There is not an unmixed joy in being a new woman. She has appendicitis just about as often as her brother. Formerly he had it **four times to her once,** but now that she bicycles centuries, plays golf and basket ball, she has in more than one sense become his equal. This seems to be rather convin-

cing that violent exercise has a good deal to do with the etiology of appendicitis.

It has been noticed that prolonged and violent bicycle riding, for instance, has in an unusual number of cases been followed by an acute attack. This suggests that overaction of the psoas in the case of an appendix which droops down into the pelvis by bringing it thousands of times in harsh contact with the pelvic brim gives the disease its first start.

The suggestion that women are usually so less liable to appendicitis than men because of the greater blood supply to the organ in the female has probably been shown to be erroneous by the facts already cited. **Vascularity** it is now believed has little or nothing to do with the etiology.

Stricture of the organ is usually present. It is easy to conceive that stricture here will act just as it does elsewhere, viz.—for example in the urethra. Some variation in temperature, some unusual germ activity, or some unknown conditions may be supposed to start the elements of a **simple exudative inflammation.** It is known that the **bacillus coli** is practically ubiquitous. It has been found in the gut of birds killed far out at sea. It is therefore in most cases a resident of the appendix throughout the length of its lumen. What happens after the inflammation begins? The stricture swells and distal to it there is shut in by the obliteration of the lumen, a little lake-like area which, if not already full of fluid, rapidly fills after its closure. The fluid is rich in food stuffs and it is at 98.6, the temperature most favorable for the development of pathogenic germs. It is inevitable that the colon bacilli propagate. Among the products of their metabolism are gases. These together with other metabolic outputs are created more rapidly than the dilated and engorged vessels of the part can carry away. **Pressure** in the little lake results. The **effect of growing germs under pressure** is a very constant one. Germs producing substances poisonous to man, when put under pressure are more dangerous than otherwise. Germs which, like the colon bacillus, are harmless to us under the usual conditions of pressure, become virulently poisonous when this is augmented. Thus is explained the great virulence and the remarkable local destructive power of the fluids contained within these appendicular sacs.

DIFFERENTIAL BETWEEN

Appendicitis.	Right Sided Salpingitis.	Right Ruptured Ectopic.	Acute Cholangitis.
History of Tumor.			
Very frequent.	Frequent.	Absent.	Absent.
History of Disease.			
Onset slow, belly-ache.	Onset slow; pelvic cramps.	Onset fulminating; very severe pelvic cramps.	Onset acute; belly-ache.
Previous Disease.			
Constipation and previous attacks.	Gonorrhea.	Often previous pregnancies.	Typhoid.
Sex.			
Male, 3 to 1.	Female.	Female.	More frequent in female.
Social State.			
Single.	Prostitutes.	Married.	Negative.
Pain.			
Begins at navel and radiates to McBurney's point.	Begins in pelvis. May be referred down right leg.	Most severe of all. Localized in pelvis or referred.	Severe. Often referred to Robson's point.
Vomiting.			
Very frequent.	Infrequent.	Very rare.	Frequent.
Jaundice.			
Absent.	Absent.	Absent.	Frequent.
Temperature.			
101 to 103.	101 to 103.	96.5 to 99.	101 to 103.
Pulse.			
Full, 120 usually regular.	Same.	Weak, 140 to 160, irregular deficient, short and compressible.	Full 120 regular.

DIFFERENTIAL BETWEEN—Continued.

Appendicitis.	Right Sided Salpingitis.	Right Ruptured Ectopic.	Acute Cholangitis.
GENERAL PHYSICAL.			
Inspection.			
Flushed, anxious asthenic, febrile look.	Same but often to a less degree.	Pale, sweaty, prostrated, asthenic look.	Same as salpingitis.
LOCAL PHYSICAL.			
Inspection.			
Often tumor.	Possibly tumor.	Absent.	Absent.
Palpation.			
"Board like" abdomen. Vaginal negative. Pressure pain at McBurney's point.	Rigid right side but less marked than in appendicitis. Vaginal tumor. Pain in lower right abdominal segment.	Diffuse moderate rigidity. Vaginal; boggy, severe pressure pain. Abdomen filled with fluid.	Moderate rigidity, tenderness in upper right abdominal segment.
Percussion.			
Very limited area of flatness.	Often negative.	Flatness in flanks disappears on turning patient on side.	Limited flatness tip of ninth rib.
BLOOD.			
Leucocyte Count.			
8,000 to 11,000 means (A) mild case. (B) very severe case. (C) Abscess walled off. Increasing leucocytosis may be only evidence of disease. (Cabot) 20,000 to 30,000 not uncommon.	Same as appendicitis, but less marked.	16,000 to 18,000.	20,000 to 30,000.
Color Index.			
0.9	0.9	0.5 to 0.6	0.9
Exploratory Incision.			
Abscess found at caput coli.	Abscess of right tube.	Free blood in periteneal cavity.	Dilated gall bladder.

The blood has come to be a most efficient aid in diagnosing appendicitis and in differentiating it from certain other conditions. It is readily seen that the appendix, the tube and the gall bladder are organs, which although occupying different positions in the abdominal cavity, have nevertheless almost identical anatomical structure. It is probable that no disease develops either in the tube or in the gall bladder except by **stricture formation.** As in the case of the appendix drainage is interfered with and the distal parts of the organ become shut off so as to form practically a culture tube for germs. These will not make trouble so long as there is no pressure and in the presence of unrestricted circulation. In the face of such resemblances it is natural that the blood should not give much differential information between *these* three conditions. It should be remembered that it is **not** so much a question of the **amount of pus,** but the **degree of tension** under which it is pent up which determines the amount of leucocytosis. A gum boil under pressure will often give a count of 20,000.

Whereas the **presence of leucocytosis** is, in many cases very variable, there is a list of diseases which are definitely and constantly characterized by its **absence.** They are as follows: (Cabot) (1) **Typhoid,** (2) **Malaria,** (3) **Grip,** (4) **Measles,** (5) **Rotheln,** (6) **Mumps,** (7) **Cystitis,** (8) **Tuberculosis—all forms,** including miliary and tuberclous peritonitis.

In typhoid and miliary tuberculosis the leucocytes are often diminished.

Leucopenia is a diminution of the number of **white cells.** It is present not alone in **tuberculosis** and **typhoid,** but to a less degree during stages of most of those infectious diseases which are not characterized by leucocytosis.

The treatment of appendicitis is the most difficult of the usual problems presented to the surgeon. There are two distinct schools, the one advocates operating **when the diagnosis is made;** the other, except in chosen cases, advises subjecting the patient to a **special form of treatment prior to operation.**

This is known as **Ochsner's Treatment.** It consists in giving the patient absolutely nothing by mouth, not even water; in administering enough morphine to relieve pain; in never giving any form of purgation whatsoever. The object is to

apply the surgical principle of putting the inflamed part at rest and of allowing nature to **"wall off" the abscess.** It is said that so successful has this treatment been in some cases that abscess formation has even been prevented by it. Its use is justified, however, as distinctly insisted upon by Ochsner, **only after a thorough understanding of its contra-indications.**

Probably the most popular method of removing the appendix is by that first suggested by **Dawbarn.** He has always thought that the hole left after removal of the organ is exactly similar to that created by a bullet and should in all common sense be subjected to similar treatment. It is therefore more surgical to throw a purse string suture around the stump prior to cutting off the organ and to invert it into the gut by traction than to use pure carbolic or the actual cautery to destroy the mucous membrane that the parts may heal.

THE COLON.

The colon has recently become the subject of special surgical interest, because of the necessity of treating some of the chronic diarrheas and dysenteries (particularly the amebic form) by surgical intervention. These forms of colon inflammation were first brought prominently into notice by soldiers who came home from Cuba and the Philippines. No form of internal medication served to relieve the condition and many of them died. Thirty to forty movements a day were not uncommon, and that, in spite of the most active medicinal treatment. In these desperate cases it was suggested to do a right sided colostomy with adequate **spur-formation.**

The **advantage of the spur** is that it turns every particle of fecal material on to the surface and thus allows the distal portion of the gut to be sterilized and kept clean. Its **disadvantage** is that, unless established by some procedure as recommended by **Bodine,** in which case it can be broken through with a Paquelin cautery, it necessitates a secondary and often a very severe operation. The spur then is indicated in all conditions where radical treatment has to be applied distally to it. It is not indicated in those cases where an opening is made, as for instance in strangulated hernia, simply for the relief of in-

tra-enteric pressure. The importance of the inter-muscular operation in this connection has already been discussed.

Weir, when the pertinence of the surgical treatment of the colon became manifest, suggested with customary ingeniousness, that instead of bringing the colon to the surface and thus doing an ordinary colostomy, the appendix should be utilized to connect the colon with the outer world. Twelve to twenty-four hours after the appendix had been made fast in the abdominal wall, its tip was to be nipped off and disinfecting irrigation fluids squirted through it into the colon and rectum. This technic will not shunt the gut contents to the surface as in the case of the spur operation, but for amebic dysentery it serves the purpose equally well. When the enteritis is cured presto! a hot iron shall be thrust into the lumen of the appendix, thus closing the colostomy and incidentally doing away with the appendix. This method has been widely used and has been called **Weir's Marsupialization.** (The marsupial has a pouch in which its young are carried. The term and principle are sometimes used in surgery.)

THE RECTUM.

Fissure, Fistula and Hemorrhoids are the three most common lesions of the rectum. They cause untold suffering and unless relieved are the very **type of chronic injury which is liable to malignant degeneration.** It is therefore of very great importance, not only for the relief of immediate pain and discomfort which they cause, but for the more far reaching danger to which they subject the patient, that they should be intelligently treated. One of the most favorite differentials is between these three ills. It will be noted that the most important differential point is the time of occurrence and the character of the pain. It is usually possible to make a differential on the history alone and this is often convenient.

DIFFERENTIAL BETWEEN

Fissure in Ano.	Fistula in Ano.	Hemorrhoids.	Early Malignancy.
		History of Tumor.	
Absent.	Absent.	Present.	Present.
		Disease.	
Onset sudden.	Onset slow.	Onset slow.	Onset very slow.
		Previous Operation.	
Negative.	Not infrequent.	Injections.	May follow hemorrhoid removal
		Pain.	
Intermittent. Sudden, knife-like. Last only 10 seconds after bowels move.	Discomfort only.	Remittent. Heavy, dragging. Severe for two hours after bowels move.	Not characteristic
		Disability.	
Afraid to have a movement.	Cannot hold gas and fluid.	Weak from loss of blood.	Weak from beginning cachexia.

INTESTINAL OBSTRUCTION.

This is probably the most frequently asked of all hospital questions. It is therefore worth while to condense it into as short a space as possible. It is

Acute: Chronic.

Causes Acute.

Intussusception (acute). Bands. Volvulus. Foreign bodies, gall stones and enteroliths. Internal hernia (Meckels diverticulum and abdominal fossae.)

Causes Chronic.

Impacted feces, strictures (benign and malignant). Intussusception (chronic.)

Pathology Acute.

Above obstruction equals gas.
Below obstruction equals empty.
At obstruction equals ulceration, perforation, peritonitis.

Pathology of Chronic.

In and above equals hypertrophy.
Below equals empty and atrophy.
At obstruction equals same as acute.

Symptoms of Acute.

Same as acute strangulated hernia.
Pain, sudden and diffuse.
Collapse.
Tenderness, little or none.
Vomiting { High—early, billious. / Low—late, fecal.
Constipation absolute (obstipation.)
Tympanites.
Hiccough.
Peristalsis (if walls thin).
Increasing dysuresia.
Pulse rapid and feeble.
Temperature and tenderness from peritonitis only.
Great prostration and emaciation if last long enough.

DIFFERENTIAL.

Does Obstuction Exist?

History of Hernia in unusual places.
History of feces or foreign body.
Save and inspect urine, feces and vomit.
Examine for concretion, bile, bloody and mucous discharge.
Examine for external hernia; uneven abdominal distention.
Rectal examination for invagination, feces or stricture.
Palpate and percuss abdomen for tumor, tenderness, tympanites. (Do not put hand sound or measured enema in rectum).

Differentiate from Gastro-enteritis.
Early state Meningitis.
Biliary and renal colic.
Peritonitis.
Appendicitis.
Pyosalpinx.
Gastric ulcer.
Acute Cholecystitis.

Where is Obstruction?

SMALL GUT.

Obstruction High—Symptoms.
Violent onset.
Early collapse.
Early and persistent vomiting, bilious rarely fecal.
Tympanites absent or limited to epigastrium.
More or less dysuresia.

LARGE GUT.

Obstruction Low—Symptoms.
Onset slow and mild.
Increase in violence of symptoms.
Collapse late (except in volvulus).
Tympanites first in colon, then
Vomiting.
Abdomen more bulging on side than center.

Obstruction in Jejunum or Ilium—Symptoms.
Eliminate duodenum, colon and rectum.
Course moderately rapid.
Vomiting fairly early.
Tympanites later.
Abdomen more distended at center than at side.

What is Obstruction?

Acute Invagination—Symptoms.
Child.
Elongate tumor on left side felt via anus.
Tenesmus and bloody discharge.
Local pain.
Sudden onset.

Bands—Symptoms.

History of previous peritonitis.
Tuberculosis elsewhere.
Local pain.

Volvulus—Symptoms.

Old males.
Localized tympanites.
" tumor.
" pain.
Usually left iliac fossa in sigmoid. Note. Worst of all.

Foreign Bodies—Symptoms.

History false teeth.
Biliary colic.
Constipation.
Palpation.

Internal Hernia—Symptoms.

Local pain and tenderness over the abdominal fossae.

Chronic Obstruction—Symptoms.

Includes symptoms of impacted feces.
Tumefaction in colon.
Rectal examination for feces.
Old people.
Young girls.

Stricture—Symptoms.

History of dysentery.
Symptoms of visceral malignancy.
Old people.

Chronic Invagination—Symptoms.

History stricture or tumor.
Tumefied colon, not compressible.
Mucous and bloody stools.
Tenesmus.

Treatment of all Forms.

Lavage.
Opii.
No cathartics.
Enemata.
Spoon out rectum.
No tubage of colon.
No puncture of intestine.
Uniform and continuous abdominal pressure.
Laparotomy.
Enterotomy.
Enterectomy.
Enterrorhaphy and anastomosis.
Colostomy.

CHAPTER XII.

LIVER, SPLEEN AND PANCREAS.

The surgery of the liver centers on the relief of disorders of its **secretory passages.** So called gall stone colic is probably **(Brewer)** not due to gall stones at all, but to spasmodic contraction of the inflamed ducts pressing on the nerves.

The **Gall Bladder is directly connected with the surface of the body and so is the liver.** They are therefore, in common with other organs situated upon the surface of the body, subject, first, to superficial invasions by **germs and animal parasites,** and second to the particular form of malignant degeneration to which the surface is liable, viz.—Carcinoma. Bacteriologically speaking, the inner and outer body surfaces are dirty. As the liver and pancreas are the most deeply situated of these superficial organs, it is appropriate here to show a diagram which proves this somewhat surprising hypothesis.

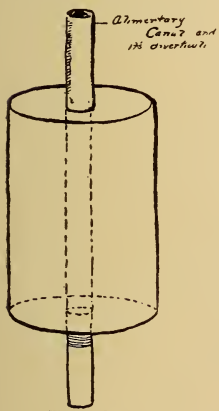


FIG. 35

Figure of barrel showing inner and outer surface.

It is simply a question of remembering that there are two surfaces, an outer and an inner, and these organs together with the parotid gland, the hepatic gland and certain others, are located on the inner surface.

The **Liver** is occasionally the seat of **abscess.** It has to be differentiated from subphrenic abscess, which is a collection of pus immediately beneath the diaphram, due usually to gastric ulcer; from costo-phrenic abscess, which is a collection of pus in the costo-phrenic sinus, a sketch of which is shown in Chapter X, and from empyema. Note that an important factor in this differential is the **effect of respiration upon the discharge of the pus after exploratory incision.**

DIFFERENTIAL BETWEEN

Liver Abscess.	Sub-Phrenic Abscess.	Costo-Phrenic Abscess.	Empyema.
	Previous Disease.		
Duct, cystic or duodenal infections.	Gastro-duodenal ulceration.	Thoracic infections.	Pneumonia or Pleurisy.
	Exploratory Puncture.		
Amebae.	Pyogenic organisms.	Pneumococcus; T. B.; Strepto- or Staphylococcus.	Same.
	Incision.		
Pus may flow faster during inspiration (diaphragm goes down.)	Same.	Pus may flow faster during expiration (diaphragm goes up)	Same.

The liver, on account of being on the surface, is occasionally, as already said, the subject of **parasitic invasion.** Liver abscess may be grossly divided according to the three zones in which it is most prone to occur.

Frigid Zone or Echinococcus Cyst. The Echinococcus as it occurs in man is the **asexual form** of the tenia echinococcus of the dog. It is a moderately small **tape worm.**

The **Laplanders** live in such intimate relations with their dogs that their food habitually becomes contaminated with the animal's feces. Consequently in Lapland and throughout the region where dogs are largely used for transportation purposes, man is very frequently the subject of echinococcus infection.

The cyst formed by this parasite is characterized by multilocular formation, having daughter and grand-daughter cysts.

Torrid Zone or Ameba Cyst. In the Torrid Zone, the ameba of dysentery abounds. Not infrequently it finds its way from the gut into the liver. The result is the amebic or dysenteric abscess characterized by being single and by a rather strict localization to the southern climes. (See Chapter XVI.)

Temperate Zone or Pyemic Cyst. The Temperate Zone is not exempt from its peculiar abscess. We do not live in close

communion with our dogs, or suffer from amebic invasion. Amebae are frail and require the bad hygiene and torrid heat of the tropics. We have with us, however, as steady companions, many pyogenic bacteria. Any one of these may make the characteristic Temperate Zone or pyemic abscess.

These abscesses or cysts of the liver suggest a **classification of cysts.** Cysts may be conveniently divided into

(1) **Retention.**
(2) **Distention.**
(3) **Tubular.**
(4) **Glandular.**
(5) **Parasitic.**
(6) **Dermoid.**

The only way to get hold of this classification is to **apply it.** It will be noted that a cyst is often to be described by using a combination of these terms. For example, it is either retention-tubular or retention-glandular, as the case may be. Take a **Glactiferous Cyst** for instance. That is caused by pent up milk in the milk ducts. Now the mammary gland secretes a fluid which is intended to come to the surface. Cysts of it are therefore retention cysts. This is because what was intended to come out, is retained. The Glactiferous Cyst therefore, because the milk is retained in tubes, is a **retention-tubular** cyst. **Distention cysts,** on the other hand, occur in regions where the **secretion is not intended to come to the surface,** as for example in the case of a bursa. Cystic change in this is called **bursitis.** It is a **distention cyst.** These occur also in the ductless glands, as in the ovary or thyroid. They may therefore, as in these two latter cases, be called distention-glandular cysts. A distention-tubular cyst obviously cannot well exist. The echinococcus cyst is an excellent example of the parasitic cyst, which is here meant to mean an animal parasite.

Some of the more common animal parasites of man in addition to the echinococcus are described in Chapter XVI.

SPLEEN.

On account of the vascularity of this organ, practically all that can be done to it is **puncture or removal.** Puncture is confined to obtaining from it specimens of central blood in which

certain forms of parasites, unwilling to circulate in the peripheral blood, are resident.

Excision or **Splenectomy,** while a formidable operation, is the only possible chance for patients suffering from **splenic pseudo-leukemia.** Splenectomy is also the only possible means of treating **idiopathic splenic enlargement.**

Banti's disease, a condition of splenic enlargement, associated with hepatic cirrhosis, is another condition for which splenectomy is undoubtedly indicated. Other conditions which may call for removal are: rupture, wandering spleen, cysts, tumors and malarial hypertrophy.

PANCREAS.

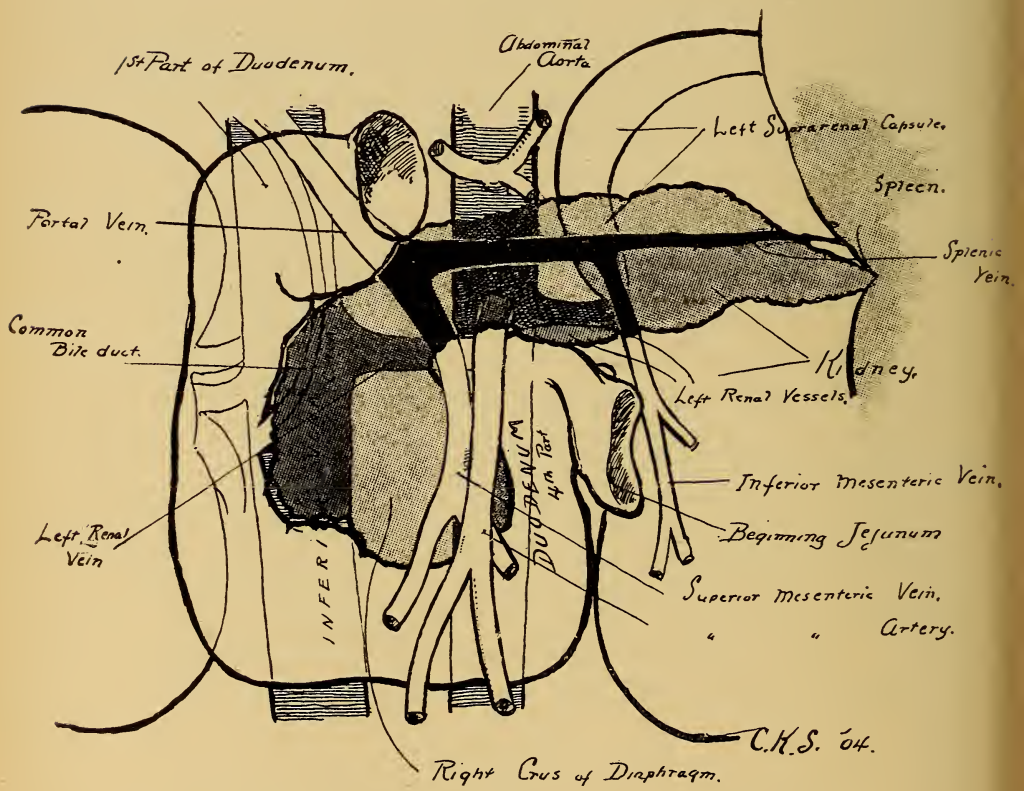


FIG. 36

RELATIONS OF PANCREAS.

(Seen from the front)

Much of the recent surgery of the abdomen centers upon the pancreas. The diseases of this organ have a very intimate relation to those of the liver and bile duct. **Acute pancreatitis,** both **hemorrhagic, suppurative and gangrenous,** is one of the least understood abdominal lesions. It may arise from ordinary germ infection, just as in the case of other organs, but there is a rather constant relation of biliary duct disease to it, which makes it seem probable that in many cases, at least, this is a powerful predisposing, if not actually an indispensable cause.

Acute hemorrhagic pancreatitis is characterized by the usual evidences of intra-abdominal inflammation; rigidity, tenderness, distention and very severe pain. On account of the depth of the organ a definite tumor rarely appears. The condition cannot be diagnosed except on exploratory incision. In its later stages it is differentiated by exclusion—because of the appearance of their characteristic symptoms—from perforated duodeno-pyloric ulcer; from appendicitis; from acute intestinal obstruction; from peritonitis; from acute cholecystitis; from pyonephrosis. The difficulty, however, of waiting for differential points to arise is that unless relieved in its early stages, acute hemorrhagic pancreatitis usually kills in a very few hours. The **recognition** then of acute hemorrhagic pancreatitis depends only upon **exploratory incision.** The moment the abdomen is opened, **white patches** are seen throughout the omentum and in the mesentery. They vary from the size of a pin's head to large irregular masses. They are the so-called **areas of fat necrosis.** The origin of this fat necrosis is not yet understood but it is supposed by some to be due to the liberation in the abdominal civity of the **fat splitting ferment** of the pancreas. The **objection,** however, to this theory is that fat necrosis has been seen in these cases occuring in fatty areas where it seems improbable that the ferment could have reached it. The subject is therefore **subjudice.** The gland when exposed is found to be spachelous and as the shock of removal would certainly kill the patient, all that can be done is to see that adequate drainage is established.

Chronic pancreatitis or the development in the organ of **dry productive inflammation,** is an interesting and not infre-

quent disorder. Even more than the acute form it has a relation to interference of the gall duct circulation. **Opie** has shown that in many cases there exists in the **ampulla of Vater** a gall stone which, too large to pass out through the papilla, is yet large enough to act within the ampulla as a ball valve.

It is clear that when the ampulla is blocked, the bile must pass directly up through the pancreatic duct into the pancreas.

The patency of the accessory ducts (Santorini) of the pancreas are of obvious importance in safeguarding the individual from chronic pancreatitis arising in this way. If present they maintain adequate pancreatic drainage.

DIFFERENTIAL BETWEEN

Chronic Pancreatitis.	Chronic Gastro-Duodenal Ulceration.	Chronic Cholecystitis.	Liver Carcinoma
History of Tumor.			
Rare.	Possible.	Frequent.	Unusual.
Disease.			
Onset characterized by rapid loss of weight.	Onset follows symptoms of acute ulcer.	Onset often characterized by attacks of colic.	Onset slow and marked by increasing cachexia.
LOCAL PHYSICAL.			
Palpation.			
May be feeling of deep resistance	Tumor near pylorus.	Tumor tip of 9th rib.	Liver below cartilages and may be nodular.
LABORATORY.			
Chemical of Stomach Contents.			
Negative.	Excess of HCl and blood.	Usually excess of Carbon Compound Acids.	Same.
Feces.			
"Clay" stools due to exeess of fat.	"Tar" stools.	'Clay' stools due to absence of coloring matter.	Normal.
Exploratory Incision.			
Tumor of head of pancreas grossly indistinguishable from Carcinoma.	Tumor of pylorus of similar type.	Dilated gall bladder usually filled with stones..	Usually multiple

CHAPTER XIII.

GENITO-URINARY.

Custom has more or less extensively welded these widely differing branches. There is less reason for their union in the light of to-day than there was in the past. They are furthermore badly confused with the term "venereal."

THE KIDNEYS.

These organs are reached by one of **three general incisions.** Probably, the most common extends along the outer border of the erector-spinae, from a point half an inch distal to the last rib (to avoid wounding the diaphragm, see Fig. of this muscle under hernia) to a point at the level of the iliac crest. The incision may then turn (Konig) and sweep transversly around the trunk in the direction of the umbilicus as far as may be necessary. This incision affords the best view obtainable of the kidney and is indicated for the major operations as well as (the first part of it) for minor.

The **second incision** starts at the same point and runs parallel to the twelfth rib one-half inch from it (diaphragm) for a distance of eight or ten centimeters.* This incision is a useful one for minor work and has the advantage of lying in the direction of the spinal nerves which are therefore much less likely to be injured than if its course lay across them.

The kidney is also reached by a **transperitoneal route.** A ten centimeter opening is made at the outer border of the rectus, having its lower limit about on a line with the umbilicus. When the small guts are cleared away a right angle triangle is seen, bounded above by the transverse colon, externally by the ascending or descending colon, according to the side operated, and internally by a retracted mass of small guts. On deep retraction, the **floor** of this **triangle** will be seen to be **white.** This is the **perinephritic fat.** The retro-peritoneum is

* The two systems are purposely confused.

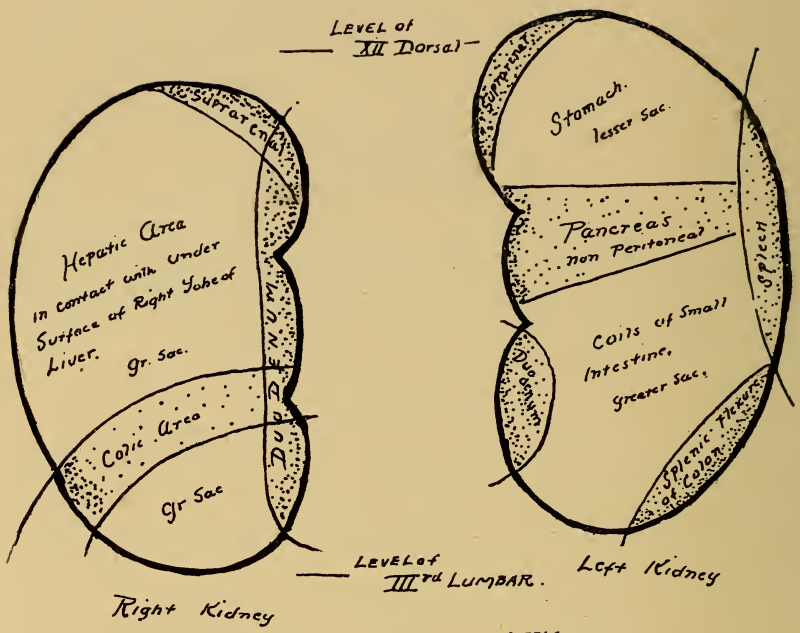


FIG. 37—Anterior Relations of Kidneys.

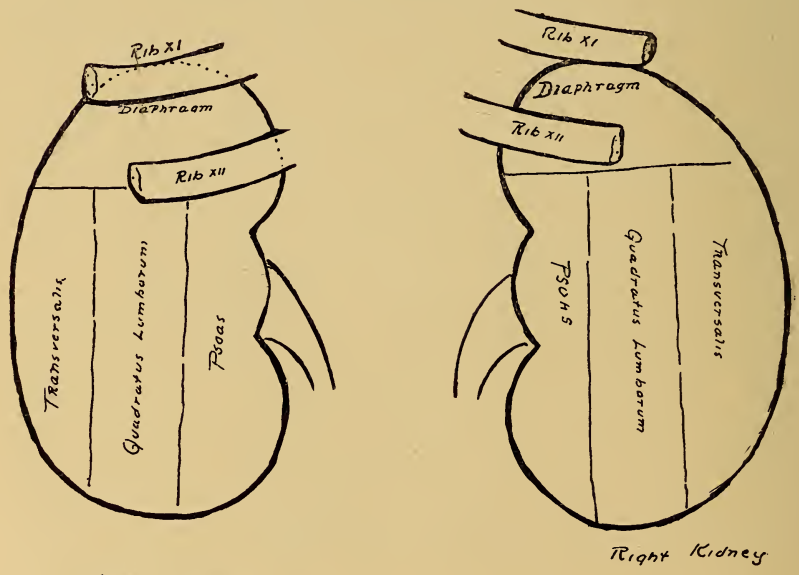


FIG. 38—Posterior relations of Kidneys.

incised in the line of the original skin cut and the kidney capsule is brought into view. This incision has certain advantages claimed for it, but it is objectionable because of the danger of **soiling the peritoneum if pus be found.** It, furthermore produces greater shock than the posterior incisions.

Nephropexy. This is a sewing of the kidney to the posterior abdominal wall. It is for the relief of **floating kidney.**

This disorder is characterized by a prolapse of the organ **distal to the umbilical plane of the body.** A great many kidneys are so relaxed in their attachment, due presumably to congenital over-development of the fatty capsule, that they wander at will as far down, at times, as the pelvis. This does not signify anything **except in the presence of symptoms** and unless these exist to a constant and incapacitating degree, the case should not be operated upon. The symptoms referred to are often of a vague and indeterminate character, making a positive diagnosis of the condition, except for the ability to feel the organ, a difficult one. It has to be differentiated from recurring appendicitis, nephralgia and nephrolithiasis. It may well be said that in order to do this, all that is necessary to do is to palpate the patient's side. This is true, but there are numerous people walking around to-day supposed to have gastritis and innumerable other diseases, who really have a floating kidney, and on the contrary, many who actually have such a lesion as recurrent appendicitis, are prowling around with kidney pads on their back. This shows the value of following some carefully planned scheme for differentiation.

DIFFERENTIAL BETWEEN

Prolapsed Kidney	Recurrent Appendicitis.	Gastritis.	Nephrolithiasis.
	History of Tumor.		
Often present.	Possibly present.	Absent.	Absent.
	Pain.		
Intermittent, often severe, referred.	Intermittent, always severe, localized.	Remittent, less severe, localized	Intermittent, very severe referred to genitals.
	Disability.		
Generally dyspepsia or dysuresia.	Interval period grows shorter.	Chronic dyspepsia	Complete during attack.

PROLAPSED KIDNEY	RECURRENT APPENDICTIS.	GASTRITIS.	NEPHROLITHIASIS.
		VOMITING.	
Very frequent.	Frequent.	Typical in the morning.	Rare. Nausea from pain.
		LOCAL PHYSICAL.	
		PALPATION.	
Bi-manual, feel organ below navel. Little or no tenderness.	Right sided rigidity,—may be tumor. Pressure pain.	Diffuse pressure pain only. No tumor.	No tumor. May be localized pressure pain along course of ureter.
		LABORATORY.	
		MOTOR POWER OF STOMACH.	
K. I. appears in urine late.	Normal.	Very late.	Normal.
		CRYOSCOPY.	
Blood freezes at normal temperature.	Normal.	Normal.	Apt to be raised.
		X RAY.	
Negative.	Negative.	Negative.	Positive.

CRYOSCOPY.

Among numerous other aids to diagnosis which have recently been developed in the study of renal disease, one of the most interesting is **cryoscopy**. In the normal individual, the blood freezes at a very constant temperature.

This point varies so little, in the absence of renal involvement, that it may, for clinical purposes be considered constant. The function of the kidney is to separate from the blood certain solid products of metabolism. These are removed at the same rate at which they are manufactured and thus the saline elements of the blood, which are the factors determining its freezing point, are kept in constant relation to the plasma. If, however, the function of the kidney is impaired,

this relation changes. One of the most convenient methods of determining the degree of change which has taken place is to test the **freezing point of the blood.** Of course if the kidneys are diseased and there are more salts in the blood than there normally should be, the freezing point will be lower, because, as is well known, salt water requires a lower temperature to freeze it than fresh.

One would expect the converse to be true, viz.—that the diminished amount of solids in the urine should show in the same constant manner and by the same cryoscopic method as in the case of the blood. In the opinion of **Bevan,** however, who with his assistant has probably done more of this work than anybody else, the **cryoscopic testing of the urine has no value whatsoever.** He looks upon this test as **applied to the blood,** however, as having very far reaching and **important significance.** His limits he states to be between 0.51 in a case of anemia and 0.78 in a case of aneuria.

The **X-Ray** has been used very widely in the diagnosis of nephro-lithiasis. The technic has been so far perfected that it is now stated (Bevan, Leonard, Blake and others) to be possible to establish a positive or a negative diagnosis of stone in the kidney, pelvis or ureter **more certainly by this means** than by any other. It has largely superseded **Kelly's waxed tipped bougies,** which were ureteral probes dipped in wax and then passed without touching anything, directly into the ureter. The distance to which they could be shoved up determined the position of the impacted stone and a microscopic finding of scratches on the wax proved that it had come in contact with the stone.

Ureteral Catheterization has not taken such a prominent position as its early exploiters believed it would. This is probably because of **two reasons.** First, the great difficulty in catheterizing the male, second and all-important the fear of carrying infection up from the bladder. It is a means, however, of obtaining **urine from one kidney.**

Urinary Segregation is a method which, while probably more objectionable to the patient, is fraught with less danger to him.

Harris' Segregator is an instrument for obtaining the urine

of the two kidneys separately. It is an ingenious device by which a **tent-like structure** is inserted into and opened out **in the rectum.** The apex of the tent is directly under the trigone, which it lifts up. The ureteral openings then discharge into **two little lakes,** one on either side of this ridge in the floor of the bladder. Two fine separate tubes are carried by the instrument in such manner that the ends dip into the center of these **ponds of urine.** Separate bulbs pump these ponds dry, the urine being poured into separate bottles. Up to date this is the most satisfactory means of obtaining separate urine from the two kidneys. Moynihan reports that a new French instrument which unfolds a diaphragm in the median antero-posterior plane of the bladder is reliable.

The importance of positively separating the urine cannot well be overestimated. In the first place, it is probably the most practical method of determining that **more than one kidney exists.** Before removing a kidney for any reason whatsoever, the point must always be definitely settled that it is not the sole and solitary organ possessed by the patient. The accident of removing **the** kidney has happened to a large number of able operators. Formerly there existed good excuse on the ground that there was no way of assuring one's self except by making a counter-incision. This, the chance—one in a great many thousand—did not seem to justify. It is most interesting from a pathological standpoint that, contrary to what one would expect, these patients who have suffered **removal of their sole kidney** and therefore are destitute of any renal excretion whatsoever, **live usually from a week to ten days!**

Renal Sepsis. Infection of the kidney and its pelvis may occur in one of two ways. A frequent source of germ invasion is **from below.** This is sometimes known under the old term of **"surgical kidney."** The infection passes upward from the bladder or ureter and is distributed among the **tubular terminations.** The other method is by deposition of germs in or about the **glomerular tufts.** They are carried here by the blood. This is therefore a **pyemic process.**

Clinically these two methods of infection are indistinguishable for their manifestations are the same. Historically they may differ. On section of the kidney, however, if too much degenerative process has not taken place, they can readily be dif-

ferentiated by the presence of **round cell infiltration** and perhaps of germs in the regions already referred to. Whatever the source of the infection, the treatment is **free incision and drainage.**

More interest has recently centered in the results of **treating chronic parenchymatous nephritis** surgically than in the more fully understood cases of acute renal suppuration. Within the past year a large number of patients suffering from chronic parenchymatous degeneration of the kidneys have been subjected to the so-called **Decortication Operation.** This technic in itself is simple enough, consisting as it does in executing the first part of the technic usually employed for **nephropexy,** viz.—a longitudinal central **splitting of the inner capsule.**

The **effects** of this operation in a certain number of cases have unquestionably been, to say the least, remarkable. **Dr. A. H. Ferguson** showed such a case at the recent meeting of the American Surgical Association. The high standing of this operator and the unquestioned integrity of his pathological examinations, which were made by the ablest experts and upon which the pre-operative diagnosis was based, renders it **impossible to deny** that there is a place for the surgical treatment of chronic parenchymatous nephritis.

It has been claimed that the good accruing to the patient arises from a development of a new and a large **blood supply** to the organ. This, however, seems to have been an erroneous supposition for **Emerson,** as a result of extensive experimental observations made at the Columbia Physiological Laboratory, has been able definitely to prove that, in animals at least, renal decortication is not succeeded by the development of an adventitious blood supply to the kidney. It has been noticed that as much good may result from a **simple section of the capsule,** with or without an accompanying nephrotomy, as has been observed to arise from a thorough decortication. In the absence of proof that increased blood supply arises after this operation in man; in the presence of positive demonstration that such blood supply does **not** arise in animals, and on account of the fact that improvement is noted after a variety of operations in which the capsule is **not** torn off, it is probable that improvement results from an **increased nerve stimulation rather than from an increased blood supply.**

The **ureters** occasionally have to be **sectioned** and **re-united.** This operation is called **Uretero-ureterostomy.** Various devices have been employed, among others a small button and a diminutive hammer. The button, in a measure resembles Murphy's intestinal button and the hammer serves the purpose of juxtaposing the openings while suture of the serous coat is in progress. The union of this tube at any point is easy, so that throughout its length it enters more or less widely into operative technics. The treatment of the terminal extremity of the tube, however, is a very different consideration. It will be discussed under the bladder.

Robert F. Weir used to say that blood in the urine meant in a very large proportion of cases one of three things. **Stone, Tuberculosis or Malignancy.** This affords an admirable illustration of the easy applicability and the accuracy of the Sub-Scheme for giving "Causes of." Hematuria is necessarily not the only symptom of these three important diseases, but Weir ingrafted that teaching on thousands of students to the lasting good of the public. *

THE BLADDER.

The importance of this reservoir centers largely upon its close relation to other pelvic organs. In the female it is very apt to be involved secondarily and by contiguous infection processes in malignant diseases of the uterus. It is thus often necessary to **resect the bladder** very widely. It possesses a remarkable power of regeneration, excellent bladders having been created from a dilatation of an incredibly small portion of mucous membrane left behind and sewed into a bag at time of operation. This is an illustration that nature produces organs as they are needed, but it is rare indeed that she is able to do so in the adult human being.

Another important surgical consideration is the **point of entry of the ureters.** Just as in the case of the inguinal canal and the duodenal opening of the duct of Wirsung, so here nature has made use of the inter-muscular course. For from two to three centimeters the ureter passes between the coats of the bladder before it pierces the mucous membrane. It can readily be seen that malignant; tubercular disease or injury

* An important differential is between Nephro-lithiasis, Nephro-tuberculosis, Nephro-malignancy and Nephralgia.

might make necessary the removal of so much of the ureter that the ends could not be juxtaposed. The problem then arises what to do. Even in view of the very extensive work which has been done in an effort to answer this question more satisfactorily than it was formerly answered, it is safer for the patient that the entire kidney should be removed rather than that any attempt be made to leave it in. This necessitates caring for the secretion by **grafting the ureter** either to the **surface** of the body or into the **sigmoid.**

Madyl was the first to suggest the desirability of preserving the uretero-vesical valves. He advocates cutting out a **square of the bladder wall** of sufficient size to more than include these valves, and a **transplantation** of this segment directly **into the sigmoid** at such a position that a convenient uretero-ureterostomy can be made between the proximal and distal ureteral ends. Some cases operated upon by this technic have been surprisingly successful. It is astonishing how tolerant the sigmoid will soon become of urine, and the quantity which it will hold is so great that under favorable conditions, the individual need not void it more frequently than is habitual. This operation, it will be noted, **converts the patient into a bird** in that the urine and the feces are both disposed of through a common opening or **cloaca** (great sewer).

Unfortunately even with Madyl's technic, the uretero-vesical valve is usually so impaired that infection from the sigmoid soon passes it, ascends to the kidney and kills the patient. This is why it is probably more **conservative** surgery in such cases to do a **primary nephrectomy.** A third important relation to the **bladder** which has a definite bearing upon the surgery of the organ is that of the **prostate.** This gland if removed through the supra-pubic region can be reached only after anterior and posterior section of the bladder wall. The type of prostatic treatment instituted in a given case, therefore, has an important bearing on the bladder. As will be explained, however, in the chapter on the prostate, this relation is coming to have less importance every day.

Stones occasionally form in the bladder. A great majority of them **grow after the manner of a snow ball,** by rolling round and round in the bladder. There has to be a beginning or

center for the concretionary mass; this may arise from bodies introduced from **without** or may come down in the form of small agminations of crystals from the **kidney.**

Bladder stones **(Brewer)** may be composed of

Uric Acid; smooth, round, dark brown.

Ammonium Urate; lighter in color.

Calcium Oxalate; very hard, dark brown or black, nodular rough surface.

Phosphatic; white and friable.

Composite Stones.

Cystine } rare.
Xanthine }

Positive diagnosis of stone can be made only, either by touching it with a metal **sound**; by seeing it through the **cystoscope,** or by the **X-Ray.**

Blood in the urine, if not from the kidneys, frequently comes from the bladder. The most common cause of a bloody discharge from this organ is the so-called **papillomatous tumor.** It is a benign, pedunculated, highly vascular growth, not uncommon in young people and always to be thought of in connection with hematuria. The important differential point between this condition and the three renal causes of hematuria already cited is the — **presence or absence of vesical irritability.**

THE TESTICLES.

Syphilis and tuberculosis attack these organs with about equal frequency. The diseases, therefore occasionally have to be differentiated from each other as well as from the more common gonorrheal infection. Practically the testicle cannot be invaded without a certain amount of sympathetic involvement of the **epididymis.** This is fortunate, since without the epididymis as a guide, a clinical differential would be difficult to make. In **syphilitic** involvement the enlargement is almost always at the **globus major.** In **tuberculous** invasion the enlargement is in the **globus minor.** The **syphilitic** lesion therefore is proximal to the tuberculous. The **gonorrheal** lesion also usually occurs in the **globus minor,** differential between this disease and tuberculosis being based upon history rather than physical examination.

For those who have been sterilized by gonorrheal infection of the **vas deferens** and **epididimis** it will be comforting to know that the occluded vas has recently been cut proximal to the stricture and **grafted into the testicle** with **good functional result.**

THE PROSTATE.

If, as **Osler** says, pneumonia is the friend of old age, chronic prostatitis is its bitterest enemy. A very well-known authority on this subject recently stated that the **mortality from catheter life** should be placed at **one hundred per cent.** Even ardent advocates of this ancient method of treating the chronically enlarged, obstructing prostate, are obliged to confess that the average duration of life under the catheter is not more than four or five years.

Freyer (Lancet, July 23d, '04) states that the **prostate** is in reality composed of **twin organs** of apparently purely sexual function. This twin formation is seen typically among some of the lower vertebrates, and it is always found in man during the first four months of life.

It is evident from this that instead of calling the organ the "prostate" we should speak of the **prostates.**

There are two moot points in the gross pathology of these organs. First, as to the so-called **"capsule."** Second, as to the so-called **middle lobe.**

Freyer likens the two organs to an orange. He states that the analogy would be complete if an orange segmented into two halves, instead of into many small pieces. Imagining such an orange, the true prostatic capsule is analagous to the delicate coat which envelopes the edible portion of the **orange.** The "false" capsule, or what is usually known as the "capsule," corresponds to the thick rind of the fruit.

The **"middle lobe"** does not exist as a third division of a single organ, as it is usually described, but is in reality simply the over-folded, upward-protruding margins of the two lateral lobes or two prostates, as they evidently should now be considered.

More revolutionary work has been done on the subject of prostatectomy in the last year than in any other department

of surgery. There are consequently almost no text books thoroughly up to date on this new surgery. The contributions of **Young, Sims, Goodfellow** and **Tinker** presented in 1904, to the Surgical Section of the American Medical Association offer the matter in such a new light and withal in such an authoritative light, that it may be looked upon as almost entirely remade.

Together, they reported over one hundred and fifty cases of **perineal prostatectomy** in which there had occurred the astonishingly small mortality rate of less than **three per cent!** This is an utterly different teaching from that of recent text books, which quote mortality rates of from **fifteen** to **twenty-five per cent.**

Tinker's contribution to the subject is of the utmost importance. He has demonstrated that prostatectomy may actually henceforth be relegated to the **domain of minor surgery!** Old men, victims of advanced arterial sclerosis, often do not take kindly to a general anesthetic. **Tinker injects the long pudendal** and the **internal pudic nerve,** where they course around the tuberosity of the ischium, as shown in the figure, with massive infiltration anesthesia after the method of **Matas.** His patients suffer no pain whatsoever; they complain simply of being wearied by their cramped position on the table.

One of the most remarkable facts in connection with this subject of perineal prostatectomy is that the patients are allowed to **get up and walk** about their rooms in from **twelve to thirty-six hours.** They suffer no discomfort in so doing and prevent the possible development of hypostatic pneumonia.

The consensus of surgical opinion, as shown at this meeting, is that the perineal operation is the technic of choice; that the gland should be removed under local anesthesia, and that the operation should be done as early in the course of the disease as possible.

Bottini's Operation. This technic has been given rather wide attention here recently on account of the work of **Young** and others. Two years ago Young utilized it almost to the entire exclusion of any other technic and obtained very good results by so doing. He has, however, since that time done over fifty perineal prostatectomies.

Thus the man who was perhaps better able to judge the

advantages and limitations of the Bottini technic than any other in this country has given it up in favor of the perineal operation.

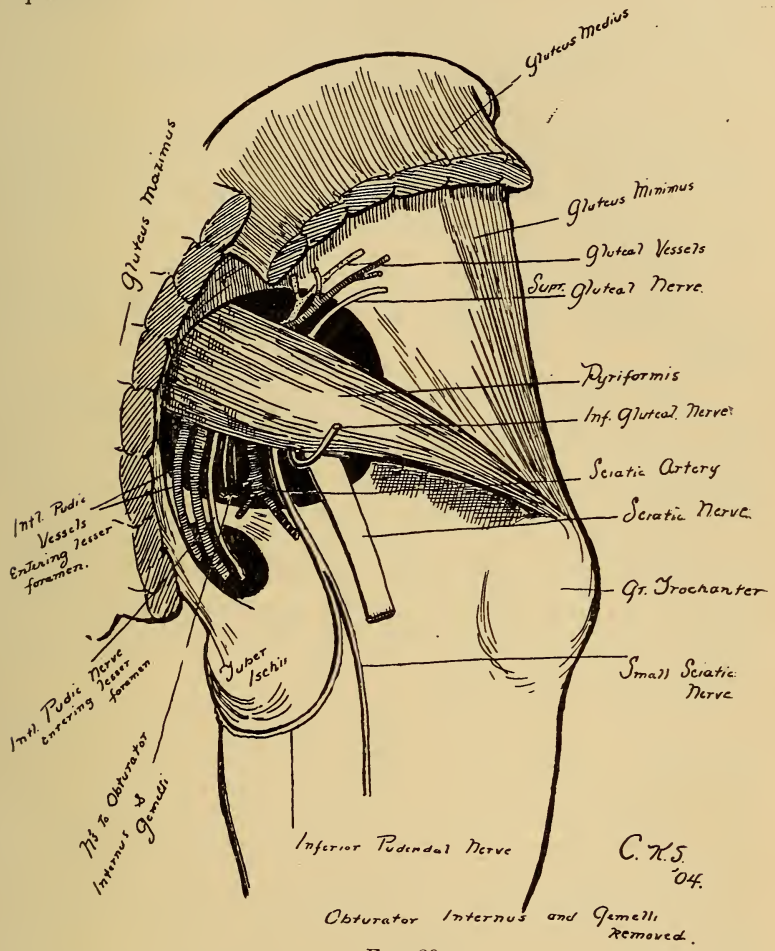


FIG. 39

This figure illustrates the relation of the Inferior Pudendal and the Internal Pudic Nerves to the Tuberosity of the Ischium. It shows the ease with which they may be anesthetized in this situation.

It also shows the structures emerging from the greater Sacro-Sciatic foramen above and below the pyriformis; viz.:

Above	Gluteal Vessels. Sup. Gluteal Nerve.	Below	Int. Pudic Vessels and Nerve. Nerves to Obturator Internus and Gemelli. Sciatic Vessels. Sciatic Nerve. Inferior Gluteal Nerve.

CHAPTER XIV.

FRACTURES AND DISLOCATIONS.

One of the differences between the treatment of fractures now and the former methods of treatment is that the fracture is set in a **permanent dressing** as soon as it is diagnosed. There are, of course, exceptions to this, but as a rule the "Fracture Box" has been **discarded.**

Fractures and dislocations, which were formerly spoken of as **compound** or as **simple,** are now referred to as **open** and **closed.**

Open fractures and dislocations are always to be kept as surgically clean as possible; they have, therefore, a certain distant relation to pathology. Especially slender has the thread become which unites the **art** of treating fractures to the **science** of medicine since the introduction of the X-ray.

A great many new and undoubtedly more comfortable dressings have been introduced, but in general any dressing is good if it successfully concludes the treatment of the case. The solitary indication is that a given dressing* must **reduce the deformity and hold it reduced.**

Fractures cannot be reduced and held reduced except the anatomy of the part be properly understood. One of the most interesting and instructive fractures, from a purely mechanical standpoint, is that of the **femur.** There are three planes in which force is exercised to produce the characteristic deformity. This fracture exemplifies so well the principle long taught by **Stimson** that the **distal-fragment should always be put in line with the proximal.** Leave the proximal fragment to take that position which the conflicting planes of muscle force will throw it into, and by as simple a contrivance as possible put the distal fragment in line with this. Hold it there, and the result will uniformly be **good.** Attempt, however, to force the proximal fragment into line with the distal, and the result will uniformly be **bad.**

* Dressing here is used in a general sense.

The position taken by the proximal fragment of the femur depends entirely upon the length of that fragment. This is easily explained. The three groups chiefly concerned are the **adductors, the flexors** and the **abductors or external rotators.** When the fragment is short, as for example, if the break occurs from five to seven centimeters distal to the lesser tuberosity, all the muscular attachment of the second and third group is inserted upon the proximal fragment. **Only a part of the adductor** insertion is upon this piece of bone, for it extends

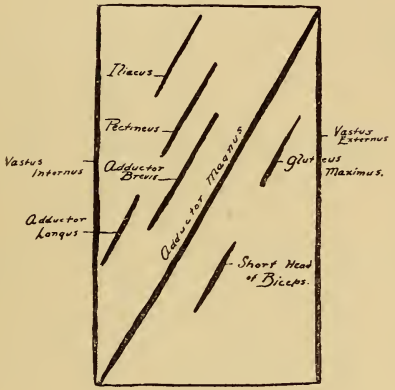


FIG. 40

This shows the linea aspera pulled out sideways.

throughout the entire linea aspera. (See cut of muscles.) In a fracture, then, situated at the point just mentioned, the position taken by the proximal fragment is that of **external rotation** and **abduction** with **flexion.** As the line of fracture occurs further and further distally, the pull of the adductors becomes greater and greater, for the reason already referred to, until at length the adductor and the abductor pulls balance. What effect upon the flexion of the fragment has its lengthening? Obviously the longer it is the more it is enshrouded by the heavy vasti muscles and the **leverage** of the lengthening piece rapidly becomes so great as to **obviate all evidence of flexion** in the fragment. This occurs at about the same time that abduction and adduction balance each other. It is at a point about midway on the thigh. This explains the figure, which, it

will be noted, calls for a Nathan R. Smith splint until the fracture reaches about the mid point of the bone.

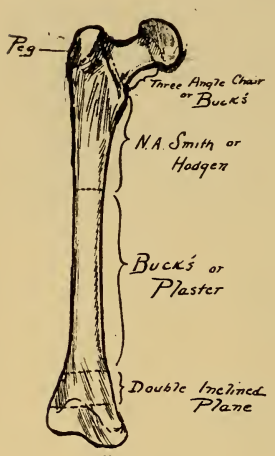


FIG. 41

Success follows a strict adherence to the principle that whatever the direction of the proximal fragment, the distal fragment must be made to follow it. The dressings suggested in the figure are by no means the only ones which will fulfill the required condition. They are only examples of dressings suited to the supposed conditions.

The Etiology of Fracture. Direct Force. This is the most frequent cause of fracture, particularly of **short bones** and of **flat bones.** An exemplification of it is fracture by a cart-wheel having passed over the part.

Indirect Force. This form of violence usually breaks the **long bones.** For example, the ribs are often broken, but they rarely give way at the point of application of violence. It is true that they may be crushed in by a very heavy blow upon the chest wall as of a hammer or a club, but the usual history of this fracture is that pressure was applied on two opposite sides of the body to such an extent that it was flattened until the ribs gave way at a point 90 degrees from the application of the pressure. Such forms of injury are often inflicted on brakemen **caught between cars.** Another example of this type of injury is seen in the bending and bursting or equatorial fractures of the skull which occur at 90 degrees from the point of application of the pressure.

Muscular Violence. Except in the olecranon and in the patella, which are really nothing more than sesamoid bones, this cause of fracture is rare. Baseball pitchers do, however, occasionally break a long bone.

The **Differential of Fracture** rests upon:

(1) History of **Injury,** (may be very slight indeed).
(2) **Pain.**
(3) **Disability:** Lost or limited power.

(4) **Local Inspection**
- *a*, Displacement and loss of contour.
- *b*, Angular deformity.
- *c*, Swelling, ecchymosis, blebs.

(5) **Palpation**
- *a*, Bony irregularity.
- *b*, False point of motion.
- *c*, Referred pain.
- *d*, Linear pain. (Important)
- *e*, Extension painless; compression painful.
- *f*, Rigidity.
- *g*, Crepitus
  - Bone.
  - Blood.
  - Tendon.

  (This sign is the least valuable of all)

(6) **Compare with opposite side.**

(7) **Mensuration.**

(8) **Tendency to recur.**

(9) **X-Ray.**

The details of these signs are as follows:

Probably the most important is

Pain. This is not peculiar to fracture at all, but, as already stated, is an invaluable diagnostic point in many diseases. For that reason, the giving of an **anesthetic,** while undoubtedly of great value, has **this limitation** upon it, that it takes from the surgeon this very important natural sign-post which points to something wrong. The importance of establishing a diagnosis without an anesthetic is well seen in the case of early inflammatory lesions of joints where pain is often the only symptom.

The **pain of fracture** has several important **characteristics.**

First, the ordinary subjective pain incident to the injury.

Second, the **referred pain.** This is, of course, an **objective** pain and is elicited by the surgeon pressing upon **uninjured** regions. For example, if a fractured rib is suspected, pressure over the two ends of the rib will often cause the patient to cry out. On being asked where it hurt, he will frequently point to the neighborhood of the axillary line. Another good example of referred pain is occasionally to be seen in **Pott's Fracture,** where pressure on the fibula, ten or twelve centimeters above the ankle, or pressure on the tip of the outer malleolus will cause the patient to cry out. He will refer the pain to the

usual point of fracture, viz.: four or five centimeters above the malleolus. This objective referred pain of **bones** is entirely different from the "referred pain" of **nerves,** which is entirely subjective.

Third, and very important, is **linear pain.** This is considered by many surgeons as a pathognomonic sign of fracture. It is well elicited by pressure along the course of the bone with the butt end of a pencil. The zone of tenderness will be found in typical cases not to be broader than a pencil butt. This pain is very sharp, and, when present, is of the greatest value. It is always present when bones near the surface are fractured.

Fourth, **compression pain.** This form of objective pain is of value in differentiating fracture from dislocation. If the distal extremity be pulled from the proximal, in the case of fracture, the two sharp ends of bone which grind into each other and into the neighboring soft parts will be separated and the injury that they are causing will be stopped. Consequently the patient will at once experience relief. If, on the other hand, the proximal and distal portions are pressed together, the injury done will be increased with a corresponding increase in the patient's pain. **Dislocation** is just the reverse of this. In it the soft parts are torn and the hard parts are intact. If you pull upon the distal fragment, it stretches the torn soft parts and it hurts the patient. Pressing the fragments together, however, has a negative effect.

Ecchymosis and Blebs, when present, if they can be positively shown not to have been caused directly by the primary injury, are of pathognomonic importance. If, for instance, a person is thrown from an automobile and lands upon his shoulder, it hurts more or less for a number of days, but no further positive evidence may be forthcoming. Perhaps after three or four days there will appear a little subcutaneous hemorrhage in the neighborhood of, usually somewhat internal to, the acromion. The fact that this was not there before shows that it is not the black and blue bruise of the primary injury, but that it is due to blood which has escaped from a broken bone and which is slowly finding its way to the surface. These **blood extravasations** follow the **fascial muscular boundaries**

more or less and are widely **influenced by gravity.** Thus it happens that the ecchymosis of a Pott's fracture is often found over the calcaneum just distal to the tip of the external malleolus. Probably in some cases the direction of the blood extravasation is more or less determined by the periostium. It would be safe in the supposed case of automobile accident referred to above, to say, upon the appearance of an ecchymosis as described, that the patient had a fractured bone.

Blebs usually form somewhat later than ecchymosis. They are an equally important sign of fracture.

Because the X-rays are not by any means always available, as, for example, in country practice, **Blake** considers that they should be held in secondary importance for the diagnosis of fracture.

Fracture of the Neck of the Femur. Nothing can be done with this condition until one is familiar with the landmarks. In a child or in a slender patient, it is easy to get one's fingers upon the great trochanter. In a big fat woman, however, it is no easy matter unless the exact position of the trochanter in its relation to a prominence which cannot be covered with fat is known. This is the anterior superior iliac spine, and the following method is a handy one to enable the surgeon to place

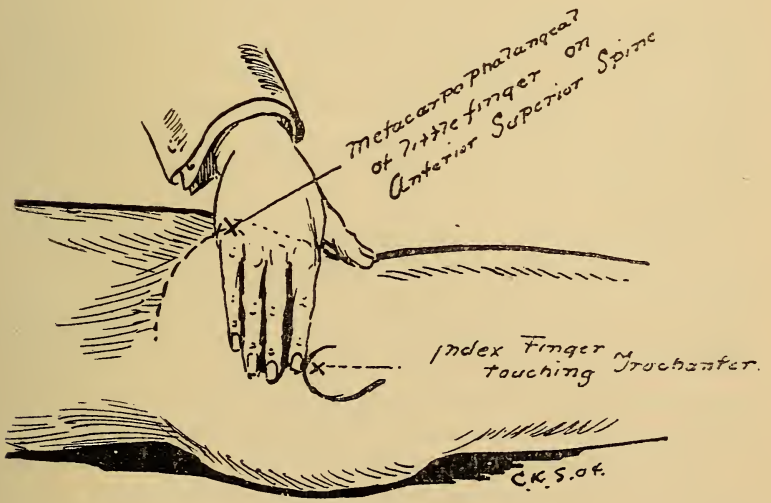


FIG. 42

the tip of his index finger upon the tip of the great trochanter, or rather to place it **where it ought to be** without reference to the fatness or the leanness of the patient.

Put the patient flat upon his back. Stand by the side opposite to the injury. Place the fifth metacarpo-phalangeal joint of the hand which is nearer the patient's head upon the anterior superior spine of the injured side. Put the hand in a transverse plane of the body, and if the patient be an adult and the surgeon's hand be of usual size, the tip of the index finger will be found to lie directly upon the tip of the great trochanter.

Very naturally it is not often necessary to resort to this method, but as the great trochanter is the all-important landmark in determining hip injuries, and since in very fat women with unusually small bones, it is sometimes difficult to find, the technic may occasionally be of service.

Bryant's Triangle. This is found by dropping a vertical line from the ant. sup. spine when the patient lies flat on his back. The line passes to the table. A second line is drawn at right angles to it from the tip of the great trochanter. This it will be noticed is just about in the line of the **pants pocket,** and in an adult is about five centimeters in length. The hypotenuse of Bryant's Triangle extends from the tip of the great trochanter to the anterior superior spine. It is of no diagnostic value whatsoever, and there is no practical use of completing the triangle, the important side of the triangle being as already stated, the one which lies where the **seam of the pants** ought to be. When the length of this line is determined, it should be compared with the length of the corresponding line on the well side before any significance can properly be attcahed to it. **Comparison with the sound side is very important in this and in every other fracture.** Individuals may vary very widely from the standard, but they are usually bilaterally symmetrical. In other words, the standard for the patient is not the hypothetical one in the examiner's mind, but the actual one, represented by the patient's uninjured side.

Obviously, if there be a fracture of the neck of the femur, this side of Bryant's triangle will either be very much reduced in length, or else it will actually be a negative quantity the

tip of the trochanter having passed **above** the line dropped from the anterior superior spine.

Nelaton's Line. This is a somewhat more difficult measure to make because one has to find the most prominent part of the **ischiatic tuberosity.** In very fat people this is difficult or almost impossible to do. Nelaton noted that a line drawn from the anterior superior spine to the great tuberosity of the ischium should normally pass through the top of the great trochanter. If the tip of the trochanter lies proximal to this line, there is a fracture, unless, owing to the peculiar construction of the individual, a similar condition exists on the uninjured side.

Colles' Fracture. This is called the "back door fracture." In the old days of New England, the housewives used to throw their dish water out the back door on the path to the outhouses. Walking on the same path an hour after, when the dish water had frozen, they frequently slipped and fell. They usually fell backwards, and putting their hand behind them to save their buttocks, they broke a wrist. Passengers attempting to walk on board ship during a storm often fall in the same way. Banana peels on city pavements often cause this fracture.

There are two interesting points to remember about Colle's fracture. First, almost any form of treatment seems to work well if **thorough reduction be accomplished at the start.** Unless this be done, and it is surely most certainly accomplished under an anesthetic, **no form** of treatment will give a good result. The disability arising from improper reduction consists in the patient not being able to close the fingers. This is due to an inclusion of the **extensor tendons in the callus.** The second point of interest about the fracture is that it is the **only one** at which **pressure at the point of fracture** is permissible. A pad is usually placed in this position to aid in preventing recurrence of the deformity.

Fracture of the Clavicle. The most successful mechanical contrivances are those which follow nature's mechanisms as closely as possible.

Erricson, who invented the marine propeller, is said to have had the idea suggested to him while lying on his back

one fall day under a maple tree. He saw that the seeds, as they fell, spun slowly round and round. He conceived the notion that if a piece of metal were fashioned in the shape of the seed and its wings, it would drive a boat.

One of the most remarkable characteristics of medieval architecture was the flying buttress. Shooting off from the sides of the main building, these delicate structures seem so frail as to be for decorative purposes only. Yet they are so proportioned that they support enormous weights. The pelvic and the shoulder girdles of man are interesting examples of flying buttresses. In the pelvis, adaptation to the upright position and other factors favoring ossification have caused that greater girdle morphologically to depart widely from the buttress, but the principle of transmission of the body weight through the pelvic bones remains the same. In the shoulder, a more perfect resemblance to the flying buttress has been morphologically preserved. The **clavicle and the scapula are the integral portions of the buttress.**

Fracture of the clavicle, therefore, is of particular interest since its successful treatment depends upon a recognition of its function, which is to hold the upper extremity out from the body against the pull of the **torso-humeral muscles** and against **gravity.** After clavicular fracture these forces throw the distal fragment (shoulder) **downward, forward** and **inward.** The proximal fragment by muscular traction is displaced **upward.** Any form of **treatment** is satisfactory for this fracture if it holds the distal fragment in a position directly opposed to this, viz.: **upward, backward** and **outward.**

Fractures of the Skull. Breaks in the bone-case of the cranium are always confusing. They may for convenience of description be divided, first, into those which are distinguishable by their **appearance.** They may be **depressed** or **linear.** The first is caused by the application of blunt force, and is therefore direct. The second may be **direct** or **indirect.**

If the fissures are multiple and radiate from a common center, the fracture is sometimes called **stellate.**

Depressed fractures have to be differentiated from the circumscribed swelling which often accompanies severe localized **scalp injuries.** This is done by palpation. The examining

finger in case of the **bone** injury is felt to pass over a **sharp edge** which is **not raised** at all into a depression. In the case of the **scalp** injury, there is a similar depression and a similar ring around it, but the **finger is felt to rise** as it passes over the ring before it enters the depression. This rise is the differential between the two.

Indirect Fractures of the skull are not thoroughly understood. They are the so-called **Bending and Bursting fractures and fractures by Conte Coup.**

To understand these, even if imperfectly, it must be remembered that when a blow is applied to the side of the head, it is, mechanically, as though an almost corresponding force had been applied directly at the opposite pole. This force is furnished in obedience to Newton's law that bodies in motion tend to stay in motion and bodies at rest tend to stay at rest. Given a skull, then, struck on one side, the opposite side of the skull being still, has a very decided tendency to remain still. The necessity of overcoming this tendency not to move puts pressure upon the brain-case. You then have a condition just exactly the same as if you had put the head between the jaws of a vice.

From this point on it is not so difficult to understand how the **bending** and **bursting** or **equatorial fractures,** as they may be called, and the **contra coup** or **polar fractures** may occur.

Squeeze the jaws of the vice together and fracture will very likely occur along the line of the equator, or in other words at 90 degrees from the points of application of the pressure. These are the poles. In a vice, the pressure applied on one side is entirely counterbalanced by the resistance of the opposite jaw. It does not move at all. The side of the skull which corresponds to the resisting side of the vice does move just as soon as the inertia is overcome. Perhaps it is for this reason that equatorial fracture does not always occur, but that the break is sometimes found to be at a point 180 instead of 90 degrees from the pole where the force was applied. For further explanation of these fractures see Stimson's "Fractures and Dislocations."

It is important for legal reasons to remember that a skull-case may be very widely broken without exhibiting any grave

early manifestations. It is **not the broken bone, but the resulting brain injury or infection which may cause death.**

Fracture of the Anterior Fossa is often characterized by sub-conjunctival hemorrhage, by bleeding from the throat and by paresthesia of the first nerve.

Fracture of the Middle Fossa is characterized by a discharge through the ear of cerebro-spinal fluid. That a given discharge from the ear is **cerebro-spinal fluid** and **not blood serum**, is determined in two ways. First, its **quantity.** This is often incredible. It may, in 24 hours, saturate a pillow; run through a mattress and drip to the floor. Second, by its power to reduce such a mixture as **Fehling's solution.**

Fracture of the Posterior Fossa. The signs in this case are not distinctive and they appear late. There may be swelling and ecchymosis over the region, but the presence of symptoms of cerebral injury, with an exclusion of anterior and middle fossa involvements, are more important features than the local ones.

Trephining or Bone Flap Operations are two methods frequently employed, either to reach the brain and its membranes or to treat fractures and their complications. The indications for trephining are:

(1) For disinfection of bending and bursting fractures.

(2) Disinfection of circumscribed fracture with splintering of inner table.

(3) Clear cases of local pressure in simple fracture.

(4) Removal of foreign bodies.

(5) Arrest of bleeding (middle meningeal) and removal of extravasated blood.

(6) Occasionally in simple depression. (There is a discussion as to this point.)

(7) Disinfection and evacuation of pus which appears after injury.

(8) Cerebral abscess.

(9) Occasionally in traumatic neuroses.

(10) Tumors and neuralgias of the fifth nerve. (From Stimson's lectures.)

Pott's Fracture. An interesting characteristic of this break is that it is often mistaken both by the surgeon and by

the patient for a **sprain.** It is not uncommon to see men whose rough work renders them more or less indifferent to minor injuries, walking around with a well-developed **Pott's.**

The history of such cases is as follows: By jumping from their truck, or in some similar exercise of their usual duties, they "twist their ankle." The pain may be severe, but they continue to work. What is the **gross pathology** of the part at this stage? There is a fracture of the fibula four or five centimeters above the external malleolus and there is a beginning tear at the lower extremity of the tibio-fibular ligament. The tibia transmits a considerable portion of the weight of the body to the fibula. Part of this weight reaches the fibula at the tibio-fibular articulation above, and part of it is transmitted by the interosseous ligament. As soon as the fibula is broken, all the weight that is transmitted normally to the bone by **two** agents has now to be carried by **one.** The natural result of this unusual strain on the tibio-fibular ligament is that it tears and that a separation of the two bones results.

As soon as this is accomplished, whether or not the deltoid ligament has ruptured, or the tip of the internal malleolus has broken, as often happens in place of the ligamentous tear, the injury may be denominated a **Pott's fracture.** This is based upon an acceptance of the holding (Stimson) that the existence of **any two** of the three characteristic lesions, **fibula break, interosseous ligament tear** and **deltoid tear** shall constitute a **Pott's fracture.**

The patient furnishing this pathological picture usually finds his way into a hospital about this time. He says he has a "badly sprained ankle." Upon what data is it possible to prove that it is not sprained, but broken?

Inspection.—Foot is "spayed;" in other words, a position of extreme plano-valgus. There may be (late) **ecchymosis** over the calcanium on the outer side of the foot.

Palpation—False point of motion is a very important and characteristic sign of Pott's. It is obtained by putting the thumb and finger in the position of a stirrup and determining whether the astragalus moves back and forth in its mortice. Eliminate normal motion between the tarsal joints.

By pressure on the tip of the external malleolus the frag-

ment may sometimes be made to rock. **Referred pain** may sometimes be obtained by pressing on the shaft of the fibula high up. **Linear pain** is usually very sharply marked. It is sometimes localized almost to a line. Find it with pencil butt.

The **treatment** is **dorsal flexion with plantar inversion.** The reasons for this are obvious. The ankle is often so much involved that it becomes permanently stiff. While walking, at the termination of a tread, dorsal flexion is marked. Therefore, unless the patient is to certainly develop a **flat foot** afterwards, there **must be marked dorsal flexion.** Flat foot is the most dangerous sequel of Pott's. The disability suffered from it is often complete. It arises from constant thump during walking on the ball of the foot. This was never intended to bear such weights, and the inferior calcaneo-navicular ligament soon gives way under the strain. This, of course, only if the ankle becomes stiff.

Blake has shown that the **treatment** of **patellar fracture** is best accomplished by a careful stitching, with an absorbable suture, of the lateral ligaments of the patella. The important point is to place the stitches very close to the bone, in a line extending from it. This method gives much better results than the older one of utilizing silver wire, which inflicts dangerous traumatism on the parts at the time of operation. Such traumatism is an undoubted factor in favoring infection, and should therefore be avoided.

DISLOCATIONS.

Thumb dislocations are of **three types.** Stimson lays special stress upon their importance.

Incomplete dislocations are really subluxations. They can be produced and reduced at will.

Complete dislocations are those such as are commonly seen on the baseball field.

Complex dislocations are generally produced by attempts to **reduce the complete form.** They are characterized by a button-holing of the head of the metatarsal bone between the tendons of the flexor brevis. It can be relieved only by **open treatment.**

The **law** for the treatment of dislocations is that **the de-**

formity should be increased and the head of the bone be carried back over the same course through which it made its exit from the socket. The object of increasing the deformity is to relieve the muscular tension and relax the part. That explains in large measure the complicated steps of Bigelow's method. **Allis** has shown that, given a knowledge of the gross pathology, the reduction of any ordinary dislocation should not be attended by difficulty. Essential conditions to success are, first, **complete anesthesia**, and second, **absolute immobilization** of the proximal part.

Dislocations of the hip and shoulder resemble each other in that the head of the bone in each case almost always tears the capsule at its lower boundary. It is weaker here than above, undoubtedly because it is not necessary for it to give as much support to the head of the bone.

If, as is rarely the case, the head of the humerus simply slips through a tear in the capsule and journeys no further, this dislocation is **sub-glenoid.** If, however, as is usually the case, it does make an excursion in the tissues, it almost always migrates toward the coracoid process. This **sub-coracoid dislocation** is the common one. Under the **impetus of extraordinary pressure** the head sometimes journeys past the coracoid to a position beneath the clavicle. This is known as the **sub-clavicular form.** It is rare. Occasionally the head, instead of coming forward, is forced backward, but this also is rare.

The differential scheme for fractures should be applied to every variety of bone-break. It cannot be done here.

CHAPTER XV.

TUMORS, HERNIA AND MALFORMATIONS.

A tumor is a solid swelling not the immediate result of inflammation.

Cysts are swellings not the result of inflammation, but they are not solid. In the case of certain malignant growths such as epitheliomata, there can be little doubt that they are occasionally the indirect result of an inflammatory process. This frequently arises from chronic injury.

Benign tumors owe their interest chiefly to two conditions. First, they often cause inconvenience and occasionally death from **simple pressure.** Second, they tend constantly to undergo **malignant degeneration.**

The borderland between benignancy and malignancy is vague. This must continue so long as we remain ignorant of the causes of malignancy. All benign tumors are not so far removed from the malignant forms as others, and on the other hand some of the malignant tumors, also near to the zone which separates the two groups, are not far removed from the benign.

Bland-Sutton's charming book deals most interestingly with this question, as with the entire problem of tumors, in a wonderfully interesting and simple manner. He approaches the subject by the only standpoint from which it can possibly be understood, viz.: that of **comparative pathology.**

Granting, then, that there are certain tumors on both sides of the fence, about which nothing positive can be said, it may be justifiable, first, to give the **general characteristics of malignancy,** and, second, to attempt to differentiate between a benign and a malignant tumor, always remembering that the differential may fall flat because of the benign tumors having assumed malignant characteristics.

CLINICAL SIGNS OF MALIGNANCY.

(1) **Rapid growth.**
(2) **Pain.**
(3) **Position.**
(4) **Adherence to skin.**
(5) **Ulceration.**
(6) **Redness and heat.**

MICROSCOPIC SIGNS OF MALIGNANCY.

(1) **Infiltration of surrounding tissues.**
(2) **Arrangement of cells.**
(3) **Arrangement of blood vessels.**
(4) **Character of blood vessels.**
(5) **Character of cells.**

The applications of these differentials are seen in Figs. 26 27 and 28.

Aberration from normal developmental lines gives rise to the so-called **terratomata** and to **congenital cysts.** The best description of the origin of these cysts which are relatively very common is to be found in Bland-Sutton's hand book.

Carcinomata occur on the **surface of the body.** There is an **inner** and an **outer** surface. Diverticulae of the alimentary canal such as the liver, the pancreas and the parotid gland lie upon the inner surface of the body. For this reason, and further because they are actively **functionating glands, sarcoma in them is rare.** They are characteristically attacked by carcinomatous degeneration. (See Fig. 35.)

Sarcomata occur **within the body.**

Sarcomata of **bone** are frequent and are interesting. They are of two types, the central and the periosteal. There is a very great deal of difference in the treatment of these two types. This is because the central **sarcomata** are probably (Bland-Sutton) to be ranked with **myelomata.** These are tumors on the border line between malignancy and benignancy, built of tissue identical with the red marrow of young bone. It is thus of great importance to the patient whether the tumor be centrally or peripherally located, for whereas in the first case cure almost certainly results from a simple curettage, life

in the second case can only be occasionally prolonged by disarticulation of the bone.

McCosh (Annals of Surgery, Aug., '04) states that contrary to the usual belief Sarcoma is most common between the 30th and 40th year. This is based on a careful study of ninety-eight cases, and is at interesting variance with the generally-accepted teaching that sarcomatosis is a disease of early life.

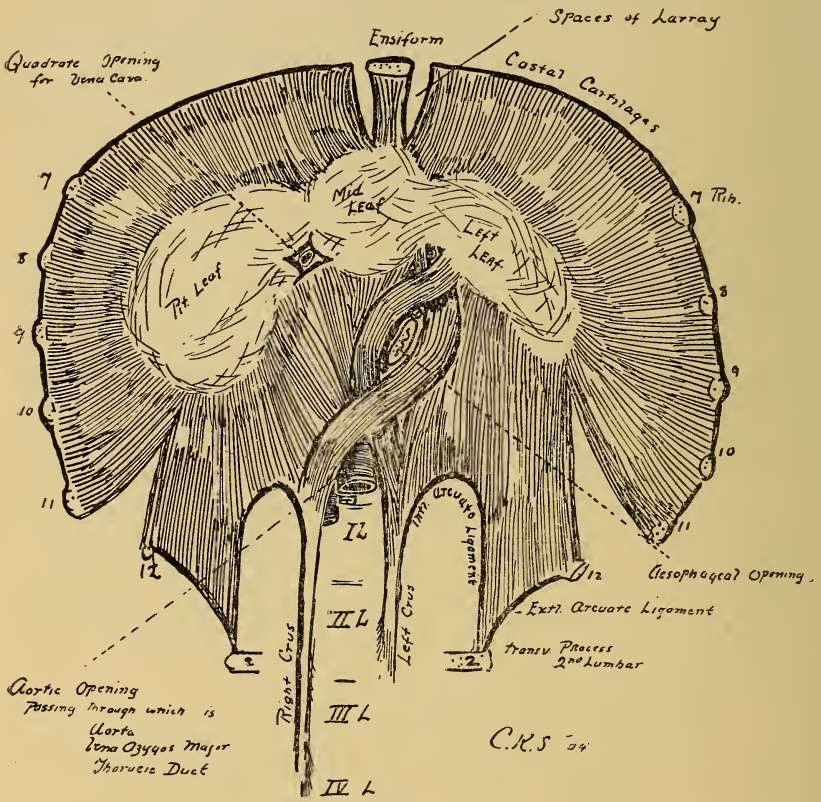


FIG. 44

DIAPHRAGM.

Arises
1. Ensiform
2. Last 6 Ribs and their Cartilages.
3. Arcuate Ligaments.
4. Lumbar Vertebrae.

Internal Arcuate Ligament.—Continuous with outer side of corresponding crus and from outer side of body of 1st Lumbar, arching over the Psoas, to front of transverse process of 2nd Lumbar.

External Arcuate Ligament.—Front of transverse process of 2nd (with slip from 1st lumbar vertebra), to apex of last rib, arching over quadratus lumborum.

Right Crus.—From bodies and intervertebral substance of 3 or 4 upper lumbar vertebrae.

Left Crus.—From bodies, etc., of upper two lumbar vertebrae. The tendinous portions of the crustae converge in the mid-line to form an arch (for *Aorta, Vena Azygos Major* and *Thoracic Duct*). The Fibres from the right pass in front of those from the left—they cross—open out—and recross after forming opening for esophagus, finally uniting with central tendon.

Right Crus transmits { Sympathetic. / Greater and lesser Sphlanchnics.

Left Crus transmits { Left Sphlanchnic. / Vena Azygos Minor.

Central Tendon.—Situated immediately below the pericardium is trifoil in shape. Right leaf the larger.

Aortic Opening.—In mid-line in front of bodies of vertebrae and hence behind diaphragm. Transmits *Aorta—Vena Azygos Major* and *Thoracic Duct.*

Esophageal Opening.—Formed by double decussation of the Crura.

Transmits { *Esophagus.* / *Pneumogastric Nerves*, (left in front)

Foramen Quadratum.—Placed at junction of right and middle leaflets.

Transmits *Inferior Vena Cava.*

Points of Deficiency.—Spaces of Larrey: One on either side of slip to Ensiform. (Pus or Diaph. hernia)

Another between attachments to 11th and 12th Ribs.

Brewer defines hernia as a "protrusion of an organ from the cavity in which it is normally contained." By far the most frequent form of hernia occurs through the potential opening of the inguinal canal. The saphenous region is also a frequent site for **external hernia.**

Internal hernia, while uncommon, occurs with sufficient frequency to make a differential of the utmost importance. It has already been touched upon while considering intestinal obstruction. The usual sites for internal hernia are as follows:

(1) **Foramen of Winslow.**

(2) **Aortic, esophageal** and other openings and weak places of the **diaphragm.** See figure showing this muscle.

(3) **Duodeno-Jejunal.**

(4) **Cecal fossae.**

(5) **Sigmoid.**

(6) **Properitoneal hernia.**

There are two important points in the technic of repairing external herniae. The first is the use of **absorbable sutures** and the second is **imbrication.** This latter is the most recent advance which has been made in the treatment of **hernia** and is well exemplified in **Mayo's** technic for the treatment of ventral **hernia** and in **Andrew's** modification of the **Bassini. Andrews** accomplishes what Halsted endeavored to do. **Halsted's** operation, by which the cord and its appendages were placed on the outer surface of the external oblique, did not work well because the skin gave insufficient protection to the cord. It is obvious that a stronger abdominal wall may be made by uniting the three muscles rather than by having them split by the cord. Andrews accomplishes this tighter union, and, in addition, successfully protects the cord. He transplants it to the outer surface of the wound just as in the Halsted technic and then **imbricates** or folds fibres of the **external oblique** over it.

In a large direct hernia, **Blake** sews the rectus to Poupart's and closes the internal oblique over it.

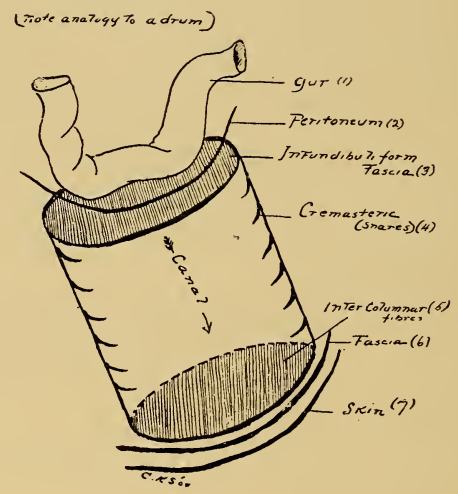


FIG. 43.

The fanciful resemblance of the Inguinal Canal to a drum helps one to remember the coverings.

MALFORMATIONS.

It is interesting to notice that most malformations occur along the central line of the body. We should, in other words, suffer from very few malformations were it not that Nature tries to make us bilaterally symmetrical. She sometimes fails.

Starting in the mid-line of the face, one of the most frequent malformations met with is **hare lip.** This is rarely in the exact median line, being just to the right or left side of it. It may be single or double. It is rarely uncomplicated by a more extensive lesion, but it may exist alone. If this happily be the case, it is a relatively easy matter to freshen the surfaces and sew it up. Failure of the hard part to unite, however, usually accompanies it.

Cleft Palate. The teaching on the treatment of this important subject is destined soon to undergo very important modifications. This is due to the success which has attended a radical operation for the deformity. **Brophy** has operated in over **one thousand cases.** Some of his patients are now ten years of age and the perfect phonetic and deglutitional results can but eventually serve to bring the operation into general favor. Brophy has photographs of cases which show that, far from there being a deficiency of tissue, as is usually supposed to be the case, tissue is present in normal quantity. The **cleft,** therefore, is due, **not to an absence of tissue,** but to a **separation of the parts.** This separation renders impossible the normal relation of the upper to the lower gum, and this prevents the proper mastication of food when detentition is complete. Brophy therefore advises that in the **first few months of life,** and **never after the sixth,** the soft and easily molded bones should be crushed in and held in place with lead plates connected by powerful sutures. This operation is contra-indicated in a child over six months of age, because ossification has so far advanced that there is danger of breaking the ethmoid bone. This may result in cerebral infection and death. Brophy says that the mortality is almost zero if his technic be carefully followed.

The older teaching was that the operation of **uranoplasty** should be deferred until there was **evidence of impaired phonation,** the lip being sewed up earlier only if the baby could not

nurse. Brophy's teaching is the **reverse of this.** He believes that the operation is not one of grave severity and urges that, for the sake of additional room, the lips should never be closed until the bone deformity has been corrected.

Passing downward along the median line the next point of interest centers on the persistence of the thyroglossal duct; on cysts occurring in its course, and upon the vaguely understood branchial cysts and fistulae. These are most lucidly described and illustrated by Bland-Sutton. **Blake** considers it possible that non-traumatic esophageal diverticulae have a direct relation to branchial mal-development.

Further down, one reaches the umbilicus. Here most interesting abnormalities may occur. Through a persistence of the **omphalo-mesenteric duct,** it is possible for the contents of the ilium to be poured out at the umbilicus. (Patent Meckel's diverticulum.) If the **urachus** persists, there is left a free communication from the umbilicus to the bladder, and the patient's **urine,** instead of passing out through the urethra, may be **voided at the umbilicus.**

Further down the malformation highway, one reaches the bladder. **Extrophy** is one of the most difficult to cure of all surgical lesions. This is because plastic work is made fortuitous by the crystalization of the urinary salts upon the wound area.

Hypospadias and **epispadias,** which, as their names imply, signify deficiency of the lower and upper walls of the urethra, represent a lesion similar to, but of less degree than **extrophy.**

The **uterus** is a very favorite site for congenital malformations. **Women** occasionally retrograde to the **marsupials.** These anomalous vertebrates possess, among other very interesting organs, a bicornate or double uterus. Instead of the fallopian tubes ending as they normally do, they continue downward through the body of the uterus, thus forming two cavities.

The **Rectum** is not infrequently the scene of faulty or irregular development. The anus may be imperforate, due, simply to the drawing across it of a single fold of modified skin. This deformity is, of course, easily corrected by puncture. The normal rectal opening is brought about by a dimple on the

surface which gradually deepens as development proceeds until it reaches the end of the hind-gut. It is easy to understand that a very slight hit or miss on the part of Nature would either not carry the hind gut far enough down below the sacral promentary to allow of its coming in contact with the dimple, or the dimple might either not be placed in just the right position or be of the requisite depth. Further, the fusion of the dimple's bottom and the termination of the hind gut may not take place. **Imperforate anus**, therefore, is not uncommon. Fear of it is what makes it necessary in all the maternity hospitals for the medical students to record the baby's daily rectal temperature. Doing it once would suffice.

A recollection of the **fusion of this dimple with the gut** serves to keep in mind a **differential point** of great clinical importance. **Carcinoma** is known to be most apt to occur where there is a line of junction between skin and mucous membrane. This line of junction in the adult is from three to five centimeters within the rectum. That is why, if you can **feel with the finger** a **stricture** in the rectum, it is apt to be **malignant.** If you **cannot so feel it,** it is apt to be **syphilitic.** It is easier to remember this point because of its developmental relations than by brute memory.

Over the sacrum or indeed anywhere along the course of the spinal canal, but much more frequently low down than high up, one sometimes sees the lesion called **spina bifida.** This congenital defect is due to a failure of the laminae to develop sufficiently to enclose the cord. With or without its membranes, it escapes into the soft tissues. Radical treatment is to-day usually successful.

Wens occasionally occur along the sagittal line of the head. It is dangerous to operate upon them in this position, however, for fear that, instead being wens, the tumors may in reality be **meningeal encephaloceles,** the cerebral counterpart of the spina bifida of the cord.

CHAPTER XVI. *

ANIMAL PARASITES.

Comparatively few animal parasites cause diseases in man which necessitate surgical intervention. Due to improved methods of diagnosis, however, there have recently been reported an increased number of instances where certain animal organisms have so invaded various parts of the body as to compel active surgical treatment.

The platyhelminthes are the chief offenders, and of these the most important are **trematodes, cestodes** and certain of the **nematodes.**

Of the cestodes, the **Tenia Solium** (the common pork tape) and the **Tenia Echinococcus** (tape of the dog) are the most frequent causes of lesions which necessitate surgical intervention.

Or the nematodes, the **Ascaris lumbricoides** (the round worm); certain of the filariae, such as the **F. sanguinis hominis** and **F. humani oculi**; and one of the anguillulidae, the **anguillula-aciti,** or vinegar eel, merit mention.

The **Hematobium Bilharzia** is the single trematode of any human surgical importance.

As to the surgical significance of **Protozoa,** little is to be said. Some cases of amebic dysentery may ultimately require surgical treatment. (See colostomy.) Amebic liver abscess has also been referred to.

The **Tenia Solium,** unlike the T. mediocanalata, is capable of causing serious surgical lesions in man. This parasite gains entrance to the body through the patient's eating uncooked pork, infected with the **cysticercus.** This produces in the animal a so-called "measly" condition (cysticercus cellulosae). The cysticercus develops in the brain, eye, heart and other or-

* The subject matter of this chapter has been kindly furnished by Dr. William R. Stone. It is abstracted from his ms. of a text-book on Animal Parasites, which is in preparation for the press.

gans. It is only rarely seen in the liver and never in the bones. In the brain, the cysticerci are usually found in the membranes of the cortex more rarely in the brain substance. Von Graefe estimates that in the Berlin opthalmic practise the cysticercus is observed in the eye once in every thousand cases. In this organ it is most commonly located beneath the retina; about half as frequently it appears in the vitreous humor, and, rarer still, is met with in the anterior and posterior chambers. When in the aqueous or vitreous humors the movements of the parasite's head may readily be seen.

Cysticerci developed in the arachnoid or pia often have a peculiar branched appearance. This has given rise to the misleading name of cysticercus racemosus. Here the parasite may grow to great size (8-25 cm.) and have many branches and diverticulae. This peculiar shape is probably due to the pressure conditions under which it grows. In the brain ventricles the parasite may attain the size of a pigeon's egg.

Sometimes the cysticerci develop in the skin, beneath the cutis, where they produce small tumors the size of a pea. When present in the skin or eye, the diagnosis of obscure coincidental brain disease is made easy.

Unless early removed, cysticerci in the eye lead ultimately to the destruction of the organ, and, in some instances, to sympathetic involvement of the other eye.

In the brain the symptoms are those of any similarly placed brain tumor and the only treatment is surgical.

Tenia Echinococcus.—Von Siebold first described this tape worm. It is of comparatively small size and possesses only three or four segments. At maturity the terminal segment exceeds the rest of the worm in size. The parasite has about forty hooklets springing from a somewhat swollen rostellum. These worms are found, often in immense numbers, in the upper portion of the small gut of the dog. When the ripe terminal segment breaks off, it is carried out in the feces. Either during transit through the dog or after reaching the outer world it bursts and liberates the contained ova. They are enclosed in a tough chitinous envelope. After finding their way into the stomach of man, this covering is dissolved by the combined action of the body heat and the gastric juices. The

embryo, being set free, trecks through the tissues of the gut into other organs. Here they begin **asexual development.**

In the earliest stages at which they have been observed, the ova consist of solid spherical bodies measuring 0.25 to 0.35 mm. in diameter and have a striking resemblance to a mammalian egg. Their development (ontogenetic) follows the early stages of mammalian development (phylogenetic), but is not completed as in the higher forms. This developmental relationship is thought by many to show that vermes are not so far removed from ourselves as the differences in the adult forms would lead one to think.

The **"brood capsules"** and **scolices** arise from the germinal layer as minute elevations by proliferation of the cells of the layer. The **head, or scolex,** first appears as a discoidal thickening in the wall of the brood capsule; on the tip of this discoidal thickening, the **hooklets** and **suckers** of the head are formed.

Some hydatids contain no scolices, and the absence of scolices is frequently associated with the absence of daughter-bladders. This condition is known as a **sterile hydatid.**

Hydatid disease occurs in many countries. Iceland and Australia are its chief homes. In Iceland it is estimated that 1-16 to 1-58 of the entire population is affected by this disease. Leuckart says that in central and northern Germany the disease is not infrequent. In China it is extremely rare. Osler, in 1882, was able to record only sixty-one cases for the whole of the United States and Canada. In England, however, it is not so uncommon.

Symptoms of Hydatid disease. These vary in different portions of the body, but when the hydatid cyst is situated in an organ, interference with the functions of that organ varies inversely with the ability of the organ to expand at the same rate as the slow-growing cyst.

After a hydatid **cyst** has been **punctured** for purposes of diagnosis or treatment, an **urticarial rash** often makes its appearance within a short time. This is usually general, and lasts from a few hours to one or two days. It has been noticed after the spontaneous rupture of the cyst into one of the large serous cavities. With infection of the cyst, the symptoms are those of abscess and concomitant pyemia.

Diagnosis is often easy; at times it is difficult, or even impossible. The tumor is usually rounded, firm, smooth and elastic without antecedent or present symptoms other than those due to its size. It is yielding and imparts a **thrill** on percussion. A hypodermic syringe should be used to draw off a small quantity of fluid, and if this fluid is found to contain **scolices, hooklets** or a **piece of the cyst wall,** the diagnosis is final. If these are not present, the **character of the fluid** must be depended upon to differentiate it. It resembles two other fluids found in the body; the cerebro-spinal and that of some forms of hydronephrosis. An absence of symptoms referable to these regions will differentiate the diseases.

Treatment.—This is always **surgical** and should have for its final aim either (A) Palliative measures which look to the death of the parasite, e. g. (1) Internal administration of drugs, (2) Acupuncture. (3) Electrolysis. (4) Injection of fluids into the cyst after the removal of some of its contents. (5) Aspiratory puncture and withdrawal of the fluid.

Or (B) Radical measures which aim at the complete removal of the parasite: (1) **Recamier's** method: opening is made with caustics. (2) Long-continued drainage and evacaution through a permanent canula. (3) **Simon's** method: double puncture with small trochars, followed by incision. (4) Various forms of direct incision with immediate or delayed removal of the parasite.

Distribution of hydatid in the body.—Thomas, in 1,900 cases from various countries, finds that the frequency with which the different organs are attacked is expressed in the following percentages: Liver, 57 per cent; lungs, 11.6-10 per cent; kidney, 4.7-10 per cent; brain, 4.4-10 per cent; spleen, 2.1-10 per cent; heart, 1.8-10 per cent; peritoneum, omentum and mesentery, 1.4-10 per cent.

THE TREMATODES.

Ascaris Lumbricoides. Some time ago Dr. Robert T. Morris made a diagnosis of the presence of one of these parasites in the vermiform appendix. Operation confirmed the diagnosis.

In the pathological laboratory of the University of Penn-

sylvania there is a specimen of a liver and gall bladder which shows the bile passage to be completely blocked by this organism. In this case, the symptoms previous to death were those of gall stones. These worms have also been known to enter the eustachian tubes or nasal ducts, and through these to have found their way to the external world. Kidney, spleen, pleura and urinary passages have sheltered stray specimens of these parasites at times; they have even been known to escape by the urethra.

Filaria oculi humani. Under this name are included several minute flariae, which, from time to time, have been found either in the crystalline lens, in the vitreous, or aqueous humors. These filariae are identical with those found in some lower vertebrates.

Filaria Sanguinis hominis. The organism is the cause of **chyluria** and lymph-scrotum; varicose groin glands, chylocele; certain varieties of lymphorrhagia, endemic lymphangitis, orchitis, and varieties of cellulitis. Endemic **elephantiasis arabrim** is probably dependent upon the same cause.

The Filariae Sanguinis hominis are long, slender, transparent, gracefully formed, snake-like organisms, which, when seen under the microscope in newly drawn blood, exhibit a remarkable activity. They coil and uncoil; wriggle and lash about with incessant movements among the blood corpuscles. The parasite in **parental** form inhabits the tissues, lymphatics, or blood vessels, while the parasite in **adolescent** form circulates in the blood-stream. There are **three chief varieties** of this parasite, but Patrick Manson has described five. Those most commonly met with are: **F. diurna**, which appears in the circulating blood **during the day**, disappearing during the night; **F. nocturna**, appearing during the night and disappearing during the day; **F. perstans**, which is present both day and night.

The filariae are to be found most often in tropical countries, such as Brazil, Mauritus, India, China and the West Indies; certain isolated cases have been recorded in individuals living in temperate climates and who have never visited tropical countries. Both sexes are liable to the disease. In women, its first appearance may date from a **pregnancy**; in men, very often from some unusual **physical effort.**

Symptoms.—The characteristic symptoms of **chyluria** appear suddenly. There may be retention of urine, which may pass off spontaneously. The urine is milk-white, pinkish or red, like blood. This condition may last for a few days, for weeks, months, or even years. The urine may then become normal, only to return at intervals to the same condition. In certain cases the glands of the groin are found to be prominent and the ducts varicose. The lymphatics of the scrotum may be similarly dilated.

The filariae may be found in the urinary sediment.

The presence of clots at once distinguishes chyluria from such purulent conditions of the urine as are associated with pyelitis, abscess rupturing into the urinary tract, and cystitis; from phosphaturia, etc. In the case of chyluria complicated by endemic hematuria, the presence of **Bilharzia ova** along with the **filariae** will clear up the diagnosis.

Lymph-scrotum is almost a certain indication of the presence, actual or past, of F. nocturna in the lymphatics. On inspecting such a scrotum, it is found to be more or less enlarged, thickened, and covered in places by lines or groups of non-inflammatory vesicles. The contents of these vesicles may include living filariae.

Orchitis is a common complication. The condition known as **chylocele** may be met with. Here the tunica vaginalis may contain a milky fluid, exactly similar in character to that found in lymph scrotum. Chylous fluids are also found in certain cases, in the peritoneum and pleurae, as well as in other portions of the body.

Elephantiasis Arabum implies an elephantoid condition of the integument, in any portion of the body. (See chapter on Lymphatics.)

Treatment.—In the vast majority of instances this is medical. In certain cases, however, of lymph-scrotum and orchitis, the parasite having been found to be single, has been removed by incision.

ANGUILLULA ACITI.

This is the common vinegar eel. C. Wardwell Stiles, of the Bureau of Animal Industry, has reported the only case

in which this parasite has made man its host. This case occurred in a woman, and the organism was removed from the patient's bladder, where it had produced an acute cystitis. It was supposed that the parasite had gained entrance into the bladder by means of a douche containing vinegar. This is thought by some laymen to be a means of preventing conception.

Bilharzia hematobia. This parasite belongs to the distomata, and its chief interest surgically lies in its causation of cystitis. Its natural habitat is ethiopic. It is extremely abundant in Egypt, Axim, Acra and other places on the west coast of Africa. Within the past year a case has been discovered in the French Hospital of New York City, and was reported by Chas. H. Peck. The parasite is about 7 to 16 mm. long, and is covered with fine tubercles. It resembles threads of the finest white silk, and is usually unbranched. The ova and contained embryos are bright, translucent, flattened not unlike a **melon seed.** One end is blunt, but the other is provided with a sharp spine. The average length is 1-200 to 1-160 of an inch, and the breadth about one-half of this. The shell is hard and transparent. The embryo lying within this is covered with ciliae, which, when mature, may be seen to move.

The **Symptoms** are often sudden in onset and come on after a period of **incubation** of about **four months.**

Generally the urinary bladder is the first organ to show involvement, though sometimes a false dysentery may be the initial sign. If the posterior portion of the bladder alone be involved, there is but little pain. Most frequently, however, the neck of the bladder and the urethra is involved, in which case there is pain on micturition, tenesmus, irritation and supra-pubic pain. There may be priapism, perineal pain and seminal emissions if the prostate and seminal vessices are involved. General cystitis is rare.

The Urine. Haematuria does not usually come on at first. The gross examination may show nothing but small, brilliant, scarlet, pin point specks. Under the microscope there may be a few pus cells, blood corpuscles and ova. Later, the urine becomes smoky and sometimes bloody; especially in morning specimens. This is due to the presence of the organism, ova,

blood clots, corpuscles, pus and crystals of various salts. In course of time, as the disease progresses, the numbers of organisms and ova in the urine increase until they may be present in thousands.

Treatment.—This is medical, aiming at the support of the patient's strength. If, as is often the case, a calculus forms, it must be dealt with surgically.

LIST OF HOSPITAL EXAMINATIONS

For 1902.

BELLEVUE HOSPITAL (P. & S. Division)
BROOKLYN CITY HOSPITAL
FRENCH HOSPITAL
GERMAN HOSPITAL
HUDSON STREET HOSPITAL
J. HOOD WRIGHT HOSPITAL
MT. SINAI HOSPITAL
NEW YORK HOSPITAL
SENEY HOSPITAL, Brooklyn
ST. LUKE'S HOSPITAL
ST. JOHN'S HOSPITAL

EXAMINATION PAPERS FOR 1902.

BELLEVUE HOSPITAL (P. & S. Division.)

April 5th, 1902

QUESTIONS IN ANATOMY.

1—Draw a cross-section of the middle of the right arm, showing the relation of the various anatomical structures.

2—Name the veins of the neck which receive the blood from the head and face; give their origin and anastomoses.

3—Describe the origin, course and muscular distribution of the anterior crural nerve.

4—Name the viscera or portions of same contained in the following regions: Right hypochondriac, epigastric, hypogastric and left iliac.

SURGERY.

1—What swellings may occur around the wrist joint?

2—Give symptoms of:

(*a*) Sacculated Aneurism.
(*b*) Extra Dural Hemorrhage.

3—Give causes and treatment of retention of urine.

PRACTICE.

1—Write all you know about Malig. Endocarditis.

2—Treatment of Pericarditis beginning as dry pericarditis and passing on to large pericardial effusion.

MATERIA MEDICA.

1—Describe symptoms and treatment of carbolic acid toxemia taken with suicidal intention.

2—Write prescription and directions in full for treatment of tape-worm.

3—Enumerate the official prescriptions of Hyoscyamus, aconite and digitalis and alcaloids of each, and give strength and dose of each preparation.

BROOKLYN CITY HOSPITAL.

1—Causes of albuminuria and some of the conditions and diseases in which it may occur. Treatment of acute dysentery.

2—Describe microscopically and macroscopically the large white kidney.

3—What are the important clinical differences in course, prognosis between compound fracture of a limb, by direct and indirect violence.

4—Briefly give treatment of Hallux Valgus.

5—Give treatment of Pelvic Peritonitis.

6—Describe the Internal Oblique Muscle. Describe Ureters,

7—Give evidences of pregnancy as they exist at the end of the third month.

Describe the conduct of the first stage of labor.

GERMAN HOSPITAL.

Brooklyn.

ANATOMY.

1—Describe tonsils and give blood supply.

2—What muscles move the fingers and what nerves supply these muscles.

PHYSIOLOGY.

1—What is the chemical action of the bile in the alimentary tract.

2—Describe the mechanism of the heart's action, particularly how the refilling of the auricle in diastole takes place.

MATERIA MEDICA.

1—Give the physical and chemical properties of atropine, derivation and therapeutic properties.

2—Give the remedial action on colds, the various methods of its application and indications therefor.

GENERAL MEDICINE.

1—Give the causes and treatment of hemoptysis.

2—Give the diagnosis of variola.

GENERAL SURGERY.

1—Give the differential diagnosis between benign and malignant stricture of the oesophagus.

2—Give the clinical signs and symptoms demanding trephining following head injury.

OBSTETRICS.

1—State the preventative treatment of eclampsia.

2—State the possible termination in the mechanism of a face presentation.

GYNECOLOGY.

1—State the differential diagnosis of a small ovarian tumor and extra uterine pregnancy at the tenth week.

2—State the etiology and symptoms of endometritis.

HUDSON STREET HOSPITAL.

MEDICINE.

1—Give the differential diagnosis between cerebral hemorrhage and uremia.

2—Give the characteristics of sputum in:

(1) Lobar Pneumonia.
(2) Acute Bronchitis.
(3) Bronchial Asthma.
(4) Pulmonary Gangrene.
(5) Pulmonary Actinomycosis.

3—Give the physical signs of Mitral Stenosis.

4—Describe the lesions found in fatal cases of malaria.

5—Mention the causes and give the symptoms of embolism of the pulmonary artery or its branches.

MATERIA MEDICA AND THERAPEUTICS.

1—Give symptoms of acute poisoning by Nux Vomica.

2—Write, without abbreviations, a prescription for an adult with acute bronchitis.

3—Give the full official name and dosage for administration in

solution by mouth, of a preparation of an alkaloid of each of the following drugs:

Nux Vomica.
Cinchona.
Coffee.
Opium.
Belladonna.

4—Give antidotes, stating whether physiological or chemical, of the following poisons:

Opium.
Sulphuric Acid.
Carbolic Acid.
Nux Vomica.
Bichloride of Mercury.

SURGERY.

1—Define concussion of the brain.

2—Give the symptoms of compression of the brain following injury of the middle meningeal and hemorrhage between the dura and the skull.

3—State the conditions possibly underlying cellular emphysema after injuries of the thorax.

4—Give the diagnostic features of strangulated scrotal hernia.

5—Give the treatment of popliteal aneurysm.

ANATOMY.

1—Indicate by diagram the guides to and positions of the fissures of Rolando and of Sylvius.

2—Give the relations of the cervical portion of the esophagus.

3—Describe the acromio-clavicular joint.

4—Describe the collateral circulation developed after ligation of the superficial femoral at the apex of Scarpa's triangle.

5—Name the structures in relation with the ankle joint, indicating their relations with each other.

FRENCH HOSPITAL.

1—Give diagnosis of acute pneumonia.

2—Give the diagnosis of Hemoptysis and its treatment.

3—Give a prescription for acute articular rheumatism.

4—What is the diagnostic significance of leucocytosis?

5—What is the significance and value of Widals reaction?

6—Describe the management of a case of chronic dysentery.

7—Describe the axillary space, giving boundries, contents and relations.

8—Give the relations of the right kidney.

9—(*a*) Give the differential diagnosis of irreducible inguinal and femoral hernia,
(*b*) Describe Bassini's operation for inguinal hernia.

10—Describe fibro-myoma of the uterus; indications for surgical treatment and the various methods for meeting them.

J. HOOD WRIGHT HOSPITAL.

ORAL.

1—Tell what you see in specimen of urine.

1—How would you treat hemorrhage from mouth.

2—What is the significance of a headache?

1—What is the nerve supply of skin on back of hand?

2—What is the action and nerve supply of tibialis anticus?

3—What muscle is crossed by the Phrenic?

4—What are the complications of fracture of the arch of the pelvis?

5—What are the objective signs of subcoracoid dislocation of humerus!

6—How would you treat retention of urine?

ANATOMY.

1—Describe the deep epigastric artery and give principal surgical relations.

2—Name different ways by which lesser peritoneal cavity may be entered and name structures and organs covered by lesser peritoneal sac.

PATHOLOGY.

1—What causes influence the number of polymorpho-neuclear, neutrophilic leucocytes.

SURGERY,

1—Give symptoms of perforation of ulcer of stomach, principal conditions from which it may be differentiated and outline of surgical treatment.

MATERIA MEDICA,

1—Digitalis, dose and physiological action.

PRACTICE.

1—Edema of lungs, causes, symptoms and treatment.

MT. SINAI HOSPITAL.

Questions by Dr. Howard Lilienthal.

ANATOMY.

1—The gall-bladder and its associated ducts.

2—Describe the prostate.

3—What is the usual deformity in complete fracture of the lower fourth of the femur and why does it occur?

SURGERY.

1—Describe briefly the method of inducing anesthesia by the inhalation of Nitrous Oxide Gas. Ether. Chloroform.

2—Describe the steps in an aseptic amputation of the thigh through its middle third, giving reasons for the methods which you would employ.

3—A man of fifty years of age, well nourished and with a negative past history is admitted to the hospital after suffering for forty-eight hours with acute general cramp-like abdominal pain which for the past few hours has become localized in the right lower iliac region. The man vomited several times during the first day and the bowels have not moved since the attack began. Urination is frequent and rather painful, but little high-colored non-albuminous urine being voided at a time. The tongue is dry and slightly brownish. The pulse rate is 110 and somewhat irregular. The temperature is 100° F. There is considerable abdominal rigidity and tenderness, on palpation the expressions of pain being more marked on the palpation

of the right iliac region. No mass can be felt. On percussion the greater part of the abdomen gives a tympanitic or intestinal resonance but there is an area of marked dullness or even flatness in the hypogastrium.

Discuss this case. Give diagnosis and treatment. What would you consider your duty as House Surgeon?

Questions by Dr. B. Sachs.

1—Give the symptoms of:

a, Tabes Dorsalis.
b, Disseminated Sclerosis.
c, Multiple Neuritis.
d, A tumor occupying the middle portion of the left anterior central convolution.

2—State the various forms of iritis and the treatment of each.

3—Give the exact drug treatment in cases of incipient tuberculosis of the lungs, of extreme anemia, of constitutional syphilis, of the early stage of typhoid fever.

Write a prescription calling for suppositories to be given for the relief of severe pelvic pain.

Questions by Dr. J. Rudisch.

1—Character of urine in contracted kidney, waxy kidney, and acute Nephritis.

2—Changes in the blood and urine in typhoid fever.

3—Differential diagnosis between typhus and typhoid.

4—Characteristics of influenza pneumonia.

5—In what acute diseases are joint inflammation particularly apt to occur.

6—Treatment of hemorrhage of the bowels in typhoid.

7—Ultimate results of gastric ulcer.

8—Causes of hypertrophy of the left ventricle of the heart.

9—Diagnostic features of variola.

NEW YORK HOSPITAL.

ANATOMY.

1—Describe the lymphatic system of the breast and the:

(*a*) Arrangement of axillary lymph nodes,
(*b*) Arrangement of sternal lymph nodes,
(*c*) Arrangement of anterior mediastinal lymph nodes.

2—Give the relations of the Prostate Gland. What is its function?

3—With what bones does the Os Magnum articulate!

THERAPEUTICS.

1—Discuss the therapeutic uses of and the indication for venesection.

2—Discuss Salicylic Acid and its derivatives.

(*a*) Indications for its use,
(*b*) Advantages and disadvantages of three preparations with dosage of each.

3—Name three drugs that may be used as intestinal antiseptics, with dosage of each when so used.

PRACTICE OF MEDICINE.

1—Cholelithiasis.

(*a*) State the usual composition of gall stones.
(*b*) State the general and local conditions which favor the formation of gall stones.
(*c*) State the lesions produced in the gall bladder, liver and adjacent parts.
(*d*) Describe the symptoms of biliary colic.
(*e*) Give the differential diagnosis between biliary colic and other morbid conditions that may simulate it.
(*f*) Give the preventative remedial and surgical treatment.

2—Hodgkin's Disease (synonyms, Lymphadenoma, Pseudoleukemia, etc.) Discuss the etiology, symptomatology and treatment.

SURGERY.

1—Retropharyngeal abscess.
Etiology, symptomatology, operative treatment.

2—Exophthalmic Goitre ('Graves' or Basedows's Disease').
Etiology, symptomatology.

METHODIST EPISCOPAL HOSPITAL. (SENEY)

Brooklyn, March 26th, 1898.

WRITTEN EXAMINATION FOR INTERNES.

ANATOMY.

1—Describe the esophagus and give its surgical relations.

2—In what respects do the hip and shoulder joints resemble each other and in what do they differ?

GENERAL SURGERY.

1—Mention six of the more important complications that may attend or follow fracture of an extremity,

2—State the varieties, predisposing and exciting causes, and treatment of inguinal hernia.

GENITO-URINARY SURGERY,

1—Describe the etiology and pathology of chronic ovaritis.

2—Give the causes and symptoms of kidney abscess.

PHYSIOLOGY.

1—How much carbon dioxide is normally excreted by the lungs under ordinary conditions of exercise, etc.?

2—Name the more important constituents of the gastric juice and briefly describe gastric digestion.

MATERIA MEDICA.

1—State the therapeutic uses of colchicum.

2—What is the derivation and therapy of guiacol?

OBSTETRICS.

1—State the treatment of transverse presentation.

2—State causes and treatment of retained placenta.

PATHOLOGY.

1—What are the pathological differences between Hodgkin's disease and leucocythemia?

GENERAL MEDICINE.

1—State the symptoms differential diagnosis and treatment of cancer of the stomach.

2—What are the symptoms and what is the treatment of infantile scurvy?

March 29th, 1902.

ANATOMY.

1—How would you apply a trephine to expose:
(*a*) the mastoid antrum,
(*b*) the lateral sinus?

2—Give the sensory nerve supply of the upper extremity.

GENERAL SURGERY.

1—Give the differential diagnosis between the different forms of intestinal obstruction.

2—Give the indications and contraindications for amputation in gangrene.

3—State the complications and sequelae of penetrating gunshot injuries of the chest.

GENITO-URINARY SURGERY.

1—Enumerate the causes of hematuria.

2—Give the symptoms of transperitoneal rupture of the urinary bladder.

3—Describe the symptoms and complications of floating kidney.

GENERAL MEDICINE.

1—Describe the symptoms and course of acute anterior poliomyelitis.

2—State the varieties, symptoms, and differential diagnosis of arthritis deformans.

OBSTETRICS.

1—Give the diagnosis and management of placenta previa.

2—State the differential diagnosis of ectopic gestation.

THERAPEUTICS.

1—Give the therapeutic action of:
(*a*) amyl nitrite,
(*b*) thyroid extract.

PHYSIOLOGY.

1—How do proteids differ from peptones?

2—Describe the more important functions of the spinal cord.

PATHOLOGY.

1—Give the differential diagnosis, as based on an examination of the blood, between typhoid fever and malignant endocarditis, and describe the post-mortem findings in both diseases.

ST. LUKE'S HOSPITAL.

INSTRUCTIONS FOR CANDIDATES.

April 7th and 8th, 1902.

1—Each candidate is furnished with questions on Materia Medica, Practice, Anatomy and Surgery, for written examination.

2—Assemble at Hospital again on Tuesday, April 8th, at 2.15 P.M , for practical examination, etc.

ANATOMY.

1—Triangle of Petit.

2—Nerve supply of trapezius.

3—Give articulations of tarsal bones.

4—Through what foramina of the skull do the following structures enter or leave the skull:

(*1*) Middle meningeal artery.
(*2*) Internal carotid artery.
(*3*) Facial nerve.
(*4*) 9th nerve.
(*5*) 10th nerve.
(*6*) 12th nerve.

MATERIA MEDICA.

1—Treatment of opium poisoning.

2—Medical uses of quinine.

3—Hydrotherapy in typhoid.

SURGERY.

1—Gall stones, varieties, symptoms, treatment.

2—Hydrocele, varieties, treatment.

3—Spina Bifida, varieties, treatment.

MEDICINE.

1—Mitral Stenosis, symptoms, diagnosis, treatment.

ST. JOHN'S HOSPITAL.

Brooklyn.

ANATOMY.

1--Give the arterial supply of the bladder.

2—Give the relations of the duodenum.

3--Give the structures divided in an amputation four inches below the knee joint.

SURGERY.

1--Give the symptoms of stone in the bladder.

2—Describe Pott's fracture.

3—Give the treatment of acute synovitis of the knee joint.

GYNECOLOGY.

1--Give the different varieties of fibroid.

2—Give pathological conditions giving rise to menorrhagia.

3—Give treatment of 1 and 2.

MATERIA MEDICA AND THERAPEUTICS.

1—What is Donovan's Sol.? Dose? When indicated?

2--Give relative strength of Pulv. Opii., Tr. Opii. and Codeine. Doses. Indications for use and therapeutic effect.

3--Veratrum Viride. Official preparation. Dose. Indications for use. Effect.

GENERAL MEDICINE.

1—Diphtheria. Complications. Treatment.

2--Bright's Disease. Varieties. Treatment.

3—Cerebro-spinal meningitis. Etiology. Symptoms.

OBSTETRICS.

1—Stages of labor and dangers attending each.

2--Extra uterine pregnancy, description and management.

3—Indications of the use of forceps. Describe high forceps operation.

LIST OF HOSPITAL EXAMINATIONS

For 1904.

BELLEVUE HOSPITAL (P. & S. Division)
BROOKLYN HOSPITAL
CHRIST HOSPITAL
GERMAN HOSPITAL
GERMAN HOSPITAL, Brooklyn.
KINGS COUNTY HOSPITAL
NEW YORK CITY HOSPITAL
NORWEGIAN HOSPITAL
NEWARK HOSPITAL
POST GRADUATE HOSPITAL
ROOSEVELT HOSPITAL
ST. FRANCIS HOSPITAL
ST. LUKE'S HOSPITAL
ST. VINCENT'S HOSPITAL
SENEY HOSPITAL, Brooklyn
SMITH INFIRMARY.

EXAMINATION PAPERS FOR 1904.

BELLEVUE HOSPITAL (P. & S. Division)

SURGERY.

1—Differentiate between, malignant and non-malignant tumors of breast.

2—Give varieties of club foot. Or else:

3—Give indications for ligation of ext. iliac.

ANATOMY.

1—Describe rectum in following order:

(*a*) Location and extent.
(*b*) Curves.
(*c*) Vessles.
(*d*) Nerves.
(*e*) Important surgical relations.

2—Describe circulation of mesentery, give one method of treating same after removing part of the gut.

PATHOLOGY.

1—Give one test for:

a, albumin in the urine.
b, Sugar " " "
c, Bile " " "

Give the ingredients used.

2—What are the pathological conditions for which tumor of the brain may be mistaken, and how would you differentiate each.

BROOKLYN HOSPITAL.

March 9, 1904.

1—Describe the symptoms and state the differential diagnosis of gall stone colic.

Describe the symptoms of lobar pneumonia.

State the action and uses of digitalis.

2—List the causes of uterine hemorrhage and describe one variety in full.

3—Give the differential diagnosis of two surgical lesions in the lower half of the right side of the abdomen.

What are the most common complications of strangulated hernia?

4—Give the motor and sensory nerve supply of the hand.

5—Give the symptoms of tubercular osteitis of the spine (Pott's disease.)

6—Give the mechanism of normal labor.

7—Describe the gross and miscroscopic changes in pulmonary tuberculosis from its incipiency to the early stage of cavity.

CHRIST HOSPITAL.

ANATOMY.

1—Describe a dorsal vertebra.

2—Name the triangles of the neck and give their boundaries.

3—Give the anatomy of the biliary duct.

SURGERY.

1—Describe purposes and technique of intravenous saline infusion.

2—Give the pathology of appendicitis.

3—What is tendo-sinovitis and its treatment, why is it more dangerous in the thumb and little finger than elswhere in the hand.

Oral Examination.

ANATOMY.

1—Describe knee joint.

2—Describe seventh cranial nerve.

3—Describe female uterus and give relations.

SURGERY.

1—Intestinal obstructions (acute) etiology, varieties, pathology symptoms, complications and treatment.

2—Differential diagnosis between backward dislocation of the head of the femur and fracture of the neck.

3—Osteomyelitis, etiology, symptoms, pathology and treatment.

GERMAN HOSPITAL.

Oral Examination.

Dr. Adler.

MEDICINE.

1—Causes of vomiting.

MATERIA MEDICA.

1—Derivatives, doses and preparations of Digitalis, Opium.

PHYSIOLOGY.

1—Causes of heart contraction.

PATHOLOGY.

1—Microscopic and macroscopic difference between Adenoma and Carcinoma.

Dr. Kiliani.

ANATOMY.

1—Peritoneum, anterior abdominal wall and surgical anatomy down through pelvis and up rectum.

2—Surgical anatomy space of Retzius, pouch of Douglas, uncovered rectum, etc.

3—Man lifts weight, feels sudden sharp pain in abdomen. Symptoms of shock. What would you examine for?

4—What is hernia. Most frequent contents?
Why most frequent in male adult ?
Treatment and operations.

5—Bottini's Operation. What is it superseded by? (Exercising of P.)

6—Man falls off house, lands on shoulder, most frequent lesion?

7—Chief complication of, directly induced f. of clavicle. (Brachial Palsy. Art. Vein and non-union.)

GYNECOLOGY.

1—Have you ever seen a curettage? What is a curette?

2—What is purpose of curettage?

3—What are the causes of endometritis?

GERMAN HOSPITAL (Brooklyn).

March 21st, 1904.

Written Examination.

ANATOMY.

1—Describe the course and distribution of the musculo-spiral nerve.

2—Describe the anatomical conditions which may render fracture of the femur near the thigh especially serious.

SURGICAL ANATOMY.

1—Give the surgical anatomy of inguinal hernia.

2—Give the names of all structures which are severed in an amputation through the middle third of the thigh.

SURGERY.

1—Give the differential diagnosis of the two most commonly observed tumors of the female breast.

2—Give the methods of examination, differential diagnosis, and treatment of an impacted fracture of the cervix femoris.

KINGS COUNTY HOSPITAL.

1—Symptoms, diagnose treatment of tuberculous meningitis.

2—Indications and methods of inducing premature labor.

3—Symptoms, physical signs and treatment of pulmonary edema.

4—What is the blood supply of the ureter?

5—Describe the peroneus longus muscle.

6—In what class of cases does intra-capsular fracture of the femur occur? For what may it be mistaken?

7—Give the differential diagnosis between a backward dislocation of the ulna and supra-condyloid fracture of the humerus.

8—Diagnosis and treatment of placenta previa.

9—Describe portal circulation.

NEW YORK CITY HOSPITAL.

April 5th, 1904.

MEDICINE AND THERAPEUTICS.

1—*a*, Name the infectious diseases of bacterial origin and the bacterium producing each.

b, Name the exanthemata and the sequels which may result from each.

c, Name those of doubtful bacteriology.

d, Name those transmitted by the mosquito.

2—State the differential features in the temperature charts of Typhoid, (second week), Pneumonia, Septicemia, Miliary Tuberculosis, Pulmonary Tuberculosis (chronic).

3—Name two drugs which can usually be depended on to produce sleep.

What is the smallest dose of each which is likely to be effective and the largest dose that may be safely given?

4—How would you treat acute gastritis from abuse of alcohol?

5—Write full orders for a nurse to carry out for one day's treatment of a severe case of typhoid fever in the third week.

SURGERY AND ANATOMY.

1—Fracture of skull. (Give treatment only of the following):

a, Simple, no depression.

b, Simple, with depression.

c, Compound, with no depression.

d, Compound, with depression.

2—Mention six different causes of enlargement of lymphatic glands above the left clavicle, and give the proper treatment.

3—What anatomical structures in the finger determine the location of pus in acute abscess. Indicate briefly the appropriate treatment in each case.

OBSTETRICS AND GYNEGOLOGY.

1—*a*, Describe the second stage of normal labor with head in position L. O. A.

b, How would you diagnose a face presentation from a breech?

c, What preparations and arrangements are necessary to secure an aseptic accouchment?

2—*a*, What are the normal supports of the uterus? Which of these is the most important ?

b, State etiology of Pelvic inflammation in woman.

PRACTICAL.

1—T. B. Joint: Pneumonia with pleurisy.

2—Hepatic cirrhosis.—A full and very difficult examination at the laboratory, including Indican, Diacetic acid, and formula of urea, etc.

NORWEGIAN HOSPITAL.

March 30th, 1904.

ANATOMY.

1—Give inervation and action of the Sterno-Mastoid Muscle.

2—Describe the course of the Lingual Artery.

3—Describe the Prostate Gland.

4—Give general course of the External and Internal Iliac arteries aud name their branches.

PATHOLOGY.

1—Give a list of the items to be noted in the examination of a twenty-four hour specimen of urine in hospital practice:

a, Chemical.

b, Microscopical.

2—Which items are the most important as an indication of renal insufficiency.

3—Describe briefly apparatus used for a white and red blood cell count.

4—What are the approximate number of red and white cells per cm. of normal human blood?

SURGERY.

1—How would you treat a compound fracture of the leg.

2—Name the causes of pus in the urine.

3—Give the varieties of Hernia. Describe one operation.

GYNECOLOGY.

1—Name the tumors of the Fallopian tubes and give the differential diagnosis.

NEWARK HOSPITAL.

SURGERY.

1—Symptoms and treatment of acute osteomyelitis.

2—Diagnosis and treatment of suppurative appendicitis.

POST GRADUATE HOSPITAL.

1—Where would an embolus from the mesentery of the appendix lodge? From a hemorrhoid?

2—What group of lymph glands would be likely to swell first from a focus of mixed infection at an incisor tooth? From t b c infection?

3—What bacteria live about the roots of the hair and escape ordinary disinfection?

4—Diagnose between gonoccus and acute rheumatic arthritis.

5—What structure is chiefly involved in a bunion?

1—Lobar pneumonia:—Definition, etiology, pathology, symptoms, physical signs, prophylaxis, treatment.

2—Dose of tr. digitalis, strych. sulphat, acetanilid, morph. sulphate and toxicology of each drug.

1—*a*, What is the relative indication for the cesarean section? *b*, What is the absolute indication for the cesarean section?

2—Where does the ovum imbed under normal conditions?

3—Termination of neglected tubal pregnancy?

4—Physiological position of the uterus, the bladder and rectum empty?

5—What form of cancer is most common in the body of the uterus?

ROOSEVELT HOSPITAL.

WRITTEN EXAMINATION.

DR. WEIR.

Surgical causes of bloody urine and how to distinguish source.

Possible courses of extravasated urine in trauma or stenosis of deep urethra.

Dr. James.

Describe best method of determining size of liver and conditions apt to lead to error.

Differential diagnosis of Hemoptysis.

Dr. Blake.

Describe common bile duct. How would you distinguish it during an operation from portal vein?

What position of appendix predispose to abscess formation and what positions to general peritonitis?

Dr. Tuttle.

Differentiate diagnosis appendicitis and acute pyosalp.

Relations of ureters in female.

ORAL EXAMINATION.

Dr. James.

Differential diagnosis between benign and malignant stenosis of pylorus.

Dr. Jackson.

What drugs produce cutaneous eruptions?

Dr. Blake.

Line of incision for an excision of shoulder joint, anatomy of circumflex nerve.

Differential diagnosis between benign and malignant tumor in breast of woman of 45.

Dr. Weir.

What is spermatocele? In what structure or structures does it arise?

Indications for tracheotomy.

Part of trachea selected for operation.

How would one enlarge the incision in a high treachetomy?

ST. LUKE'S HOSPITAL.

ANATOMY.

1—Describe the pectoralis major.

2—Give the nerve supply of the muscles of the orbit.

3—State essential difference between direct and indirect inguinal hernia.

SURGERY.

1—Aneurism, definition, varieties, surgical treatment of.

MEDICINE.

1—Symptoms of cirrhosis of liver, due to disturbance of the portal circulation.

2—Symptoms and signs of malignant endocardicitis.

ORAL EXAMINATION.

SURGERY.

1—Indications, temperature, strength of saline infusion. Colle's Fracture.

2—Differential appendicitis, gallstone colic, renal calculus.

ANATOMY.

1—Two vertebrae to diagnose, kind and number.

2—Ligation of lingual artery.

MEDICINE.

1—Complications and treatment of typhoid fever, third week.

MATERIA MEDICA.

1—When administering digitalis, what symptoms of poisoning should you watch for referable to the heart and blood-vessels?

2—What doses would you prescribe so be given three times a day of the following?

1, Tinctura nucis vomica.
2, Vinum Colchici Radicis.
3, Extractum Digitalis Fluidum.
4, Liquor Potassi Arsenitis.
5, Sodii Phosphas.
6, Acidium Hydrocyanicum Dilutum.
7, Extractum Belladonnae Radicis.
8, Potassi Acetas.

ST. VINCENT'S HOSPITAL.

MEDICINE.

1—Dysentery, varieties, etiology, pathology, complications, diagnosis and treatment.

GYNECOLOGY.

1—Describe varieties of fibromata uteri, give symptoms of each variety.

SURGERY.

1—Differential diagnosis between, subphrenic and hepatic abscess and empyema.

2—Between empyema of gall bladder and appendicitis.

ANATOMY.

1—Describe ligation of the internal iliac artery.

2—Answer one of the following:

a, Give relations of vessles in the pelvis of kidney.
b, Locate and describe the prostate gland.
c, " " " " seminal vesicles.

DR. ASPELL.

Treatment of Uterine hemorrhage, third stage.
Causes of uterine hemorrhage.
Third stage of labor.

DR. STEWART.

Suppression of urine.
Retention of urine, } Can they be confused?
Incontinence of urine, }
Give example.
Resection of knee, lines of incision.
Best method.
What is arthrectomy?
What is excision of a joint?
Discuss leucocytosis in various forms of appendicitis.

DR. BISSELL.

Coverings of the testicle.
Hydrocele define
Treatment.
Cystitis, treatment.
(He wants perineal section and drainage if any operative methods are used)
Diagnosis of sarcoma of testicle.

Dr. Ferrer.

Complications of typhoid fever.
Most frequent sequelae.
Treatment of internal hemorrhage.

Dr. Mandel.

Slides of malaria, leukemia, urine crystals, filaria, starch granules.
Value of Diazo, its occurrence and when.
Value of indican, drugs causing reactions similar to it.

METHODIST EPISCOPAL HOSPITAL (SENEY)

Brooklyn, N. Y.

ANATOMY.

1—How would you apply a trephine to exposé:
a, The mastoid antrum.
b, The lateral sinus.
2—Give sensory nerve supply of the upper extremity.

GENERAL SURGERY.

1—Give the differential diagnosis between the different forms of intestinal obstruction.
2—Give the indications and contraindications for amputation in gangrene.
3—State the complications and sequelae of penetrating gunshot injuries of the chest.

GENITO-URINARY SURGERY.

1—Enumerate the causes of hematuria.
2—Give the symptoms of trans-peritoneal ruptures of the urinary bladder.
3—Describe the symptoms and complications of floating kidney

GENERAL MEDICINE.

1—Describe the symptoms of and cause of acute anterior Poly-myelitis.
2—State varieties, symptoms and differential diagnosis of arthritis deformans.

OBSTETRICS.

1—Give the diagnosis and management of placenta previa.
2—State the differential diagnosis of ectopic gestation.

THERAPEUTICS.

1—Give the therapeutic action of:
a, Amyl nitrite.
b, Thyroid extract.

PHYSIOLOGY.

1—How do proteids differ from peptones?
2—Describe the more important functions of the spinal cord.

PATHOLOGY.

1—Give the differential diagnosis as based on an examination of the blood, between typhoid fever and malignant endocarditis, and describe the post-mortem findings in both diseases.

SMITH INFIRMARY.

SURGERY.

1—Describe the various steps in Pirogoff's amputation.
2—What is the most frequent site of fracture of the clavicle and describe a method of treatment.

ANATOMY.

1—Describe the Brachial artery.
2—Describe the head of the femur.

MEDICINE.

1—Of what are gall-stones composed?
2—When and where are they formed?
3—To what symptoms do they give rise?
4—Give medical treatment, prophylactic and otherwise.

MATERIA MEDICA.

1—Give the physiological action, the therapeutic use and administration of:

a, Veratrum Viridi and dosage;

b, Adrenalin.

OBSTETRICS AND GYNECOLOGY.

1—Give the diagnosis and management of an R. O. P.

2—Differentiate between acute, salpingitis and a ruptured ectopic.

CLINICAL PATHOLOGY.

1—Describe three tests for albumin in the urine.

2—Describe method of staining for tubercle bacilli in sputum. Give ingredients of all reagents used.

ORAL EXAMINATION.

SURGERY.

1—Varieties of dislocation of head of humerus.

2—In what position would you put up a fracture of the head of the radius.

ANATOMY.

1—Give the branches of the external carotid.

2—Describe the lumbar plexus.

MATERIA MEDICA.

1—Give dose of tincture and fluid extract and digitalis. Give its therapeutic use and contra indication.

2—Symptoms and treatment of opium poisoning.

MEDICINE.

1—Give treatment of uremia.

2—Give treatment of appendicitis and when would you call in surgeon.

3—Give symptoms of perforation in typhoid.

OBSTETRICS.

1—Give treatment of P. P. hemorrhage.

Practical Examination.

MEDICAL WARD.

1—Case of chronic lead poisoning to diagnose and give treatment. (Case showed lead line on gums and had wrist drop—no colic.)

SURGICAL WARD.

1—Colle's fracture to diagnose and put on dressing. Fracture had been reduced and was about two weeks old.

LABORATORY.

1—Two urines to examine: Tubercle bacilli.

2—Two slides to diagnose: Pneumococci.

ST. FRANCIS HOSPITAL.

Written Examination.

1—*a*, Describe the mastoid antrum.

b, What structures may be injured in operating in this region?

2—Describe the action of the heart in diastole and systole.

3—Mention some of the pathological processes leading to enlargement of the liver.

4—Give the chief symptoms of lobar pneumonia as differing from serous pleurisy.

5—Give the chief symptoms of typhoid fever as differing from those of malarial fever.

6—Give the symptoms and the treatment of fractures of the neck of the femur.

7—What are the causes of intestinal obstruction (acute and chronic)?

8—*a*, What are the effects of Belladona on the circulation, respiration, intestinal tract and eye?

b, Mention other drugs acting in a similar manner on these functions.

9—*a*, State the official preparations of digitalis and dose of each.

b, Discuss briefly the effect of this drug upon the circulation and kidney.

c, What symptoms or physical signs would indicate its use in heart disease?

Dr. Downing.

1—Causes of convulsions?

2—Causes of vomiting.

3—Causes of dyspnea.

4—Changes in blood in anemias and leukemias.

5—Symptoms of cerebro-spinal meningitis.

Dr. Lloyd.

1—Structures to be avoided in doing a pan-hysterectomy and and their relations to the uterus.

2—Relations of deep epigastric artery to external and internal abdominal rings.

3—Relation of axillary artery.

4—Femoral ring, describe.

Dr. Kammerer.

1—Causes of stricture of rectum.

2—Causes of swelling of lymph glands of neck.

3—Tumor of the breast, varieties.

4—Pathology of intestinal obstruction (gangrenous and non-gangrenous).

Dr. Seibert.

1—Given temperature of 104–106° F. What may it be. Ans. Pneumonia, follicular tonsilitis or malaria. Every year every man gets this question.

Dr. Switzer.

1—Digestion of meat, proteid and fat.

2—What food contains largest amount of glycogen?

3—In what disease is the glycogen storing functions of the liver disturbed?

4—Where is the glycogen then found?

5—Tests for same.

6—What drugs reduce Fehling's solution?

7—Causes of intestinal hemorrhage.

Dr. Warren.

1—Antidotes for arsenic, phosphorus and mercury.

2—Effects of strychnine. Causes of death from strychnine poisoning.

3—Hives Syrup.

4—Tartar Emetic.

5—Preparations of Iron.

6—Preparations of mercury.

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