STATED MEETING, HELD DECEMBER 6, 1909.

The President, Dr. William J. Taylor, in the Chair.

OPERATION FOR WRY-NECK.

Dr. James K. Young presented a boy, 11 years of age, upon whom he had operated, July 7, 1909, at the University Hospital, for torticollis of a severe type, due to injury in birth. There was a marked contraction of the sternocleido mastoid muscle with contraction of the platysma. An open operation was performed on account of the extensive amount of tissue involved in the contracted tissues. Two vertical straight incisions were used, one over the sternal and one over the clavicular portions instead of the transverse or flap method. The sternal and clavicular portions of both were divided by careful dissection. The deep jugular vein was exposed during the division of the clavicular portion. The deformity was corrected as fully as possible and fixed in plaster dressing for four weeks. Subsequently a special wry-neck dressing was applied.

SACRO-ILIAC DISPLACEMENT.

Dr. Young presented a man, aged 23 years, who entered the University Hospital, October 26, 1908. He had been injured in the sacrolumbar region two years before by being thrown upon a railroad track. He suffered from severe pains in the sacro-iliac region for two years and at the time of the first examination he had severe spasms of the rectospinal muscles; there was pain over the sacral region extending down toward the anus. An X-ray examination was negative for displacement, but the test which was applied indicated that there had been a displacement of the sacrum on both sides. A special spring fixation brace was designed and applied and he has been given the high frequency current by Dr. Pancoast in the X-ray department of the University Hospital. His improvement has been marked. The apparatus which he wears has some advantages over the spring appli-

ance used by French surgeons and by Dr. Goldthwaite, in that it extends around the sides of the pelvis and holds the pad more securely in an even position; the pressure can be increased in the upper and lower parts by the lateral straps which are attached to a stockinette abdominal belt.

Dr. John B. Shober said that sacro-iliac displacement was a much more frequent condition than was commonly supposed. The fact that these cases are very often reduced spontaneously is one of the reasons they are not more frequently recognized. The cause is almost invariably traumatism and the diagnosis not difficult in recent cases if one is familiar with the possibility. He had seen but two cases of sacro-iliac displacement. In one patient reduction was accomplished easily, a few hours after the accident. The other case was one which ran a longer course. He had never had to deal with a double displacement. As a rule, after the reduction the lameness disappears in a week or ten days. While the displacement is present the lameness is very marked.

Dr. Young, replying to inquiry in regard to the diagnosis and reduction in difficult cases of sacro-iliac displacement, said that the diagnosis had been very carefully given by Goldthwaite. The test consists in placing the patient for the anterior test on the back with, say, the right limb fixed on the bed; then the left leg is lifted from the bed without flexing the knee. If it does not go as high, if the extension or flexion of the limb when the knee is extended is not equal to the other side, and if the pain is acute, we suspect an anterior displacement of the sacrum. The posterior test can also be made by extending the limb upward with the patient lying on the face. The reduction of these displacements is generally difficult. There is a method of reducing these displacements varying in every case. In those patients who periodically have the displacement reduced there is frequently associated curvature or some other condition. He recalled one such case with a lateral curvature of the spine which he was able to correct by complete reduction and proper bandaging.

The pain is very acute in all cases, and many cases formerly considered lumbago and sciatica are really instances of sacro-iliac displacement.

ACUTE POTT'S DISEASE.

Dr. Young presented a girl, aged 13 years, who was seen by him July 10, 1909, at the Polyclinic Hospital. She was then suffering from an acute inflammation of the cervical vertebræ. The history was that on April 7, 1909, she laid all night on a lounge with her head hanging over the end. In the morning it was found that the head was drawn to one side and she experienced great pain which increased greatly and was not improved by medical treatment, especially massage and electricity, and she was referred to Dr. Young by Dr. Victor Loeb. For the correction of the torticollis she was placed in bed for ten days with head extension. The pain at this time and preceding the first examination was of a most acute character and the patient was prostrated. The X-ray revealed an inflammatory lesion of the third cervical vertebra. A special extension head brace designed by the reporter was applied, and subsequently she was sent to the seashore. The deformity has disappeared and her recovery is now complete.

PERINEPHRIC ABSCESS.

A CLINICAL CONTRIBUTION BASED ON THIRTY-SIX CASES.

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It is the purpose of this paper to report a series of thirty-six cases of perinephric abscess previously unreported, to call attention to certain factors in the etiology and diagnosis of this condition, and to emphasize the importance of clinically differentiating between two types of suppuration about the kidney,—that arising secondary to demonstrable renal infection and that having its origin elsewhere, or at least giving rise to no urinary phenomena.

As is well known the subject has received contributions from many writers and several collections have been made for the purpose of studying these abscesses from various standpoints. Compared to some of these, notably the two hundred and thirty cases of Küster, my series is a meagre one but it has the value of including a fair proportion of observations in the urine, blood and pus which may be of interest. However, before taking up practical considerations I want to call your attention to some anatomical factors which seem to have clinical significance and particularly to refer to certain conclusions which may be drawn from the observations of Zuckerkandl and Gerota on the renal fascia and of Stahr and Cunéo on the lymphatic distribution.

The parenchyma of the kidney is completely and closely covered by the fibrous capsule, a thin, translucent but comparatively strong membrane. From it pass into the cortex delicate connective tissue fibres which are easily torn in the normal state. When the fibrous capsule reaches the hilum it passes over the outer wall of the papillæ and the calices of

the pelvis and provides a thin layer to cover the renal blood-vessels to their respective sources. Posteriorly the extension of the fibrous capsule is much stronger and constitutes the so-called suspensory ligament of Englisch. Part of it merges with the sheath of the aorta and part is continuous with the fascia covering the lumbar origin of the diaphragm.

The subperitoneal tissue in the region of the kidney forms a distinct fascia, the fascia renalis, which divides at the convexity into an anterior and posterior layer. The anterior passes in front of the kidney, the renal vessels, and the ureter to the other side of the body in front of the great vessels. It is better developed over the left kidney. Above the upper pole it fuses with the posterior layer and the united fascia is lost over the diaphragm. The posterior layer passes behind the kidney and over the fascia covering the transversalis, quadratus lumborum, and psoas muscles to the vertebral fascia. At the inner margin of each of these muscles the attachments are quite strong, and this also serves as an important element in the support of the kidney. At all points the renal fascia is separated from the fibrous capsule by the fatty capsule, but scattered connective tissue bands pass through the fat from one to the other. Inferiorly, while the anterior and posterior layers of the renal fascia approach each other, they do not join but separately disappear in the loose areolar tissue of the iliac region.

The fatty capsule is an envelope of adipose tissue found between the renal fascia and the intimate fibrous capsule of the kidney. Its distribution is not even, since the fat is relatively thin about the upper half of the kidney, accumulates at the hilum, is fairly abundant about the lower end, and is thickest over the posterior aspect of the lower pole at a point nearest the surface of the body. As its purpose is presumably protective the reason for this arrangement is obvious. The fatty capsule is not found at birth and is more or less deficient until puberty; it varies somewhat in amount in different persons and largely disappears during emaciation. The blood-supply is derived from two arteries given off from

the renal artery just before or just after it divides, and from a branch of the first lumbar artery. All three are very small and surgeons are familiar with the slight bleeding encountered in the fatty capsule in operative procedures.

The lymphatic circulation is made up of three networks,—one in the cortical portion, one situated immediately beneath the fibrous capsule, and one beneath the peritoneum in the superficial portion of the adipose capsule. The efferents from the cortical network pass through the medullary substance and emerge at the hilum in several vessels which pass along the renal vein to the upper nodes of the lateral lumbar group. The network beneath the fibrous capsule communicates both with the cortical and subserous networks and drainage is probably by the two routes in equal degree. A few vessels also pass around the kidney beneath the capsule to the cortical terminals. The subserous network drains into the upper lateral lumbar nodes independently of the cortical efferents; it lies in the pathway of, and is a part of, the lateral lymph drainage system. The lumbar lymphatic nodes are from twenty to thirty in number and form three irregular longitudinal rows along the abdominal aorta. They extend from the second lumbar vertebra to the bifurcation of the aorta and with the communicating vessels form the lumbar plexus. Without describing in detail the arrangement and precise location of these nodes it is important to note two points. First, that the median row drains, either directly or through the mesocolic nodes, the entire lymphatic flow of the large intestine except the cæcum and appendix, which sends efferents to the mesenteric nodes. Second, that the lateral rows receive drainage from the kidneys, suprarenals and posterior abdominal walls,—from the iliac and through them the inguinal nodes,—from the bladder,—from the testicles, penis, and prostate gland in the male,—from the clitoris, and portions of the vagina and uterus in the female,—and from the adjacent subserous tissues.

From the foregoing hasty compilation of the known anatomy of the perinephrium, certain deductions may be

drawn. At once the fact presents itself that we are dealing with an area of fat which is bounded on all sides by connective tissue layers of relative imperviousness, viscerally by the fibrous capsule, externally by the renal fascia. The only lapse is below where the two layers of the renal fascia are lost separately in the iliac fascia. Adipose tissue generally throughout the body is indifferently nourished compared to other structures. Here this is particularly true since the circulation is dependent upon three tiny arteries, the largest of which is scarcely the size of a knitting-needle. And, furthermore, it is evident that the connective tissue coverings are not such as to readily permit of an emergency increase in blood-supply to combat infection. On the other hand, the lymphatic arrangement in this neighborhood is highly suggestive in offering explanations of perinephric suppuration. The cortical network probably does not concern the immediate subject, but the network beneath the fibrous capsule and the subserous group of lymph vessels undoubtedly provide channels through which infection passes to the perinephrium, and with these the relation of the lateral lumbar nodes and collateral vessels to the adipose capsule should be taken into consideration. Were it not for the fact that the communication between the subcapsular and subserous networks is free and abundant, it is likely that perinephric suppuration would never get its infective impetus from the kidney except in the rare instance of a calculus penetrating the parenchyma, or pelvic wall. As it is, the renal origin of perinephric abscess is well recognized, and pyelitis, pyelonephritis, pyonephrosis, and acute hematogenous infection of the kidney are all assigned important places in the causation of this disease. Undoubtedly the route taken by infection may be through the intercommunicating vessels between the two networks, but the phase of a quicker access to the adipose capsule through sudden small tears or rupture should be considered. To the writer the latter solution seems quite reasonable, at least in the chronic forms of renal infection, since the effect of inflammation upon the fibrous capsule is much the same as it is on

the peritoneal covering, namely, to cause thickening with hardening and thereby tending to block the lymph channels. Many pus kidneys are seen which never have given rise to extraneous suppuration and the contrary is the exception rather than the rule.

Admitting that some perinephric abscesses start from an adjacent diseased kidney, I want to call attention to what seems to me a far more frequent cause. The usual history in these cases is that a patient of about thirty years of age is taken ill with pain in the lumbar region, associated with some fever, with stiffness of the back, and occasionally with a tendency to flex the corresponding thigh. In a short time evidences of abscess appear in the deep structures about the kidney. On prompt evacuation of the pus the patient quickly gets well and returns to work none the worse for the experience. The urine is usually normal, or, at the most, only shows the changes incidental to fever from any cause, and the kidney at operation appears to be unaffected. What is there in this picture to make us assume that the responsible infection came through the kidney? Why ignore the recognized tendency of all infections to travel by the lymph channels, and to overlook the vast area below the kidney for portals of entry? Already attention has been directed to the anatomical reasons for an area of lessened resistance in the fatty capsule, and the intimate relation of the subserous network to the lateral lumbar nodes and to the contributing lymph channels has been mentioned. It seems fair to assume that any infection which affects the lateral nodes has potentially the power of creating perinephric abscess. Etiologically the bacterial invasion may occur at any point along the lymphatic drainage of certain defined areas. Of these probably the most important is the lower genito-urinary tract. A number of instances have been reported where there was an antecedent infection of the urethra or prostate, or where infections of the testes or the cord have been followed by perinephric suppuration. In women portions of the vagina and uterus may transmit bacteria to the adipose tissue through

the lymphatics. Horsley recently has reported in detail three cases occurring in women after parturition, and Hirst noted a case following infection after abortion. Furthermore, it should be borne in mind that bladder infections may be responsible without an ascending infection through the kidney. The posterior abdominal wall can be another direct source of infection, and, finally, any of the lymphatic vessels draining into the iliac nodes may serve to carry micro-organisms within the perinephric zone.

With this extensive drainage area there are opportunities for infection without recognition of the exact avenue through which it came, and a brief reference to the literature will show that many cases are assigned to unknown causes. When the difficulty of determining the source of infection in adenitis of the groin, axilla, neck, or elsewhere, is considered, and when it is realized that with these the point of invasion is often inconspicuous or not found, it seems reasonable to apply the analogy to the deeper lymphatics and to conclude that many perinephric abscesses of unrecognized source must have their origin from the lymphatic system below the kidney. That more of these abscesses are not observed is doubtless due to the well-known fact that the lymph nodes, generally speaking, destroy the micro-organisms in transit and it is only in the exceptional case that infective agents get near the perinephrium.

While it is unwise to state that any infection of the abdomino-pelvic cavity may not give rise to perinephric suppuration, yet there are a number of conditions which have been held responsible for which there is insufficient anatomical basis. I refer to such diseases as appendicitis, cholecystitis, abscess of the liver, spleen, or pancreas, and ulcerative colitis. Each and all of these may cause subphrenic or subdiaphragmatic abscess but hardly perinephric abscess. The reason is clear since the drainage from these tracts is into the median row of the lumbar nodes and hence traverses a route relatively remote from the adipose capsule. Of course an exception must be made where any of these diseases cause a suppuration

involving the posterior subperitoneal tissues, and possibly a special exception should be made to cover those portions of the colon which are in direct contact with the kidney, where the law of continuity would prevail. It has also been stated that abscess of the lung and empyema may occasion perinephric abscess. Nearly forty years ago Bowditch called attention to the rather decided tendency to secondary pulmonary involvement and his observations have been confirmed by other writers (this complication is well illustrated in the present series). The solution lies in the situation of the upper lateral lumbar nodes upon the crus of the diaphragm which is penetrated by their efferents passing to the thoracic duct. That pleurisy, pneumonia, and empyema may readily follow perinephric abscess is true, but the upward flow of drainage would render the reverse extremely questionable. Doubtless some perinephric cases are not recognized until there is an associated pleurisy or empyema and the result has been assumed to be the cause.

There is still a class of cases which do not fit in with those of renal origin or those having a more remote source through the drainage system. I refer to the few cases which are apparently due to hematogenous infection, such as those following typhoid, measles, influenza, or peripheral suppurations. We are familiar with the pathological proposition that the blood can carry micro-organisms under certain conditions, but the details of this proposition and the relation it may bear to perinephric abscess are still beyond our knowledge. The hypothesis has been advanced that by reason of the large amount of blood passing through the kidney and its peculiar structures, there is a tendency toward lodgment of bacteria and their escape into the perinephrium without renal lesion. I have not been greatly impressed by this theory since it would seem that the same doctrine might apply with equal force to the spleen or liver. Furthermore, it is of interest to recall that in conditions where we know the blood contains bacteria, such as tuberculosis, perinephric suppuration does not occur without prior involvement of the kidney; or again

in septicopyemia where often both blood and urine are loaded with bacteria perinephric abscess is unknown. There are as good or even better reasons why infection should pass directly to the adipose capsule by its own vessels, and therefore it is well to conclude that while a small percentage of cases apparently are hematogenous, yet the exact route the infection takes is unknown.

Cold, over-exertion, and trauma were considered prominently by the older writers among the causes. In the light of modern pathology we can afford to ignore the first two, but trauma would certainly seem to occupy a place as an important contributing factor. In many cases there is a clear history of injury to the back and inferentially the same conclusion may be reached in other ways. The greater proportion of men over women with the greater likelihood of injury to the former, the common occurrence during the years of greatest physical activity, the predominance of right-sided abscess over left-sided, due to the lower position of the right kidney, and the frequent early localization of the pus in the fat covering the lower pole posteriorly, all strongly suggest that external violence plays a contributing part. The rarity of the disease in children, who naturally are exposed to injuries, is doubtless explained by the absence or scanty development of the perinephric fat. Cumston thinks that children pay a severe penalty for the exemption in their greater predisposition to neoplasms. The relation of injury as well as the hematogenous source of the infection was shown experimentally many years ago by Albarran, who injected pyogenic bacteria into the ear of a rabbit, then bruised the perirenal tissues, and caused artificially an abscess.

The relative proportion of cases due to renal disease to those having an infectious source elsewhere is an interesting question and one which possesses practical importance. Of late there seems to be a tendency to emphasize the renal origin. Ransohoff in a recent admirable article on the surgery of the kidney, in speaking of perinephric abscess, says that "suppurations within the perirenal fat are for the most part

due to suppurative disease within the kidney resulting from calculous pyelitis, tuberculosis, or metastatic abscess," and later quotes Israel's series of forty-three cases, in twenty-one of which the disease was consequent upon stone, pyelitis, or tuberculosis, and in thirty-four of which the kidney was involved. Guiteras believes that nearly all cases are due to disease of the kidney and has reported fifteen cases, fourteen of which he assigns to renal causes. Upon these were done eight nephrotomies, four nephrectomies, and one partial nephrectomy with three deaths. I may say in passing that a critical analysis of his reports discloses six cases in which a reasonable doubt may be raised as to the source of infection. On the other hand the collections made by other writers and the general text-book teaching would tend to show that the cases of renal origin comprise not over a third of the total number. In Küster's comprehensive series of two hundred and thirty cases, fifty-nine, or about 26 per cent., were due to suppuration in the kidney. Among the cases herewith reported I have been able to include only four cases of renal origin, two of which are certain and two are probable. In making up this series I have collected from a majority of the largest hospitals in Philadelphia all the cases I could find (except two or three where the records were very inadequate) over a period of four or five years. It may be that a few cases were classified under the more dominant kidney lesion and hence overlooked in the search, but certain it is that from this collection there is no ground to conclude the proportion of cases due to renal infection to be greater than 20 per cent., if that high.

This question cannot be lightly dismissed on account of its bearing on treatment and prognosis. If we are to assume that perinephric suppuration spells renal disease in the great majority of cases, it naturally leads to a thorough search for the underlying renal cause. This is not warranted if these abscesses are, in the main, simple affairs requiring only early recognition, free evacuation, and drainage. It is beyond question that the type of abscess which occurs secondarily to

renal infection is a serious malady and has a high mortality, probably in the neighborhood of 40 per cent. Nephrotomy or nephrectomy is usually indicated, either at once or, if possible, at a later afebrile period with material lessening of the risk to life. My contention is that this form is not the ordinary one and does not comprise more than a fourth to a fifth of the total number. In the commoner type where the infection comes from the drainage area below the kidney, or from hematogenous sources, the mortality is comparatively low under modern surgical treatment, apparently approximating 10 per cent., and even this mortality is largely due to the pulmonary complications to which the disease is so prone.

It should be possible in most cases to differentiate between the two forms. The history of prior attacks of renal colic, or frequent alterations in the quantity or quality of the urine, or the detailing of symptoms indicative of chronic cystitis should arouse suspicion of the renal source of infection in any case of perinephric abscess. Some attention should be paid to the greater average age of patients suffering from this type of abscess. Further valuable data may be obtained by careful examinations of the whole urine and of separated specimens obtained by ureteral catheterization, even carrying the investigation to the point of learning the bacterial contents of the urine from each kidney. The skiagraph can be generally relied on to show stone, and the recent reactive tests for tuberculosis might be applied in any suspected case, guarding of course against an existing tubercular focus elsewhere in the body. Finally, if the case reaches the operating table without a definite diagnosis beyond that of perinephric abscess, the presence of a causative and material lesion in the kidney may be shown by the admixture of urine with the pus, the existence of sinuses leading into the cortex or pelvis, the occurrence of a free or partly free calculus in the abscess cavity, or the gross alteration in size and shape of the kidney.

It is not my intention to discuss the general symptomatology, since the important clinical phenomena associated with perinephric abscess are too well known to warrant repetition.

However, as it sometimes happens that the correct and prompt diagnosis is difficult, or perhaps not made until too obvious for error, I want to call your attention to two observations which may throw light upon the doubtful case. That such difficult cases occur is well shown in the present series where one case was treated as typhoid fever for nearly a month despite a rising leucocytosis before correctly interpreted; another was operated on for acute appendicitis and the mistake not rectified until the continuance and augmentation of the symptoms caused the surgeon to operate again; and in four cases the abdomen was opened transperitoneally in an evident hazy state of mind of the operator as to the true condition. And these cases occurred in the services of skilled and experienced surgeons whose examinations were doubtless checked by alert hospital internes.

The first observation which I wish to emphasize is the existence of a fixed point of greatest tenderness in cases of perinephric abscess over the fascial triangle of Grynfelt and Lesshaft, or as I prefer to call it the kidney triangle, bounded by the erector spinæ, the twelfth rib, and the internal oblique. Just as there is more or less muscle stiffness and referred pain in appendicitis but with a constant area of maximum tenderness at or near McBurney's point, so I believe we have in perinephric abscess the same phenomena with reference to the kidney triangle. This is the place where the kidney is nearest to the surface of the body and it makes no difference whether the abscess lies in its usual primary location, over the lower pole posteriorly, or whether it is affected indirectly through the substance of the kidney, the response to pressure at this point is instantaneous and characteristic. By reason of the relations to the lumbar plexus of nerves the reference of pain is exceedingly common in these cases, and as muscular rigidity may cover so wide an area it may be well to bear in mind this triangle in routine examinations. I do not wish to urge the phenomena as pathognomonic since a limited experience has taught me to regard it as of value in all inflammatory diseases of the kidney, but not to the same extent

as in perinephric abscess. Brewer speaks of tenderness in the costovertebral angle as a pathognomonic sign in acute hematogenous infection of the kidney, and doubtless some surgeons have noted it in relation to other surgical diseases of the kidney but the fact remains that its significance has not been generally recognized.

The second diagnostic point is one apparently of great interest and importance, but at this time I offer it more or less tentatively as to definite conclusions. I refer to the exceptionally high leucocytosis found in perinephric suppuration. In twenty-three cases of this series the blood count is recorded more or less completely, and at once it will be seen that without exception the number of white blood corpuscles is high—in the lowest 11,700, in the highest 48,800, with a general average of 24,700. It is generally known that the chronic infections of the kidney give a low leucocytosis, and I am under the impression that in the acute suppurations of the kidney proper the increase of white cells does not approach such a high average, but whether this factor is constant enough to be of positive value in differential diagnosis requires further investigation. The only reference so far found is that given by Emerson, who noted in five cases of perirenal abscess the leucocytes to range from 19,000 to 36,000, in four cases of pyelitis from 10,000 to 19,500, in two cases of pyelonephrosis from 18,000 to 28,500, and in two cases of hydronephrosis from 6,400 to 9,000.

CASE REPORTS.

Case I. Pennsylvania Hospital, 140 ('08).—G. L., aged 24, stone mason, native of Italy. Admitted March 6, 1908; discharged July 9, 1908. Family and previous history uninteresting, except that he had pneumonia on the left side two years before admission.

Present illness began 25 days ago with a hard cough and 15 days later he noticed a tumor in the abdomen which has not increased in size since he first found it. He has slight pain in the mass when he coughs. Bowel movements normal and not painful; urine seems normal in amount and no pain on micturition. No loss of weight or strength; no pain in walking; no pain in back except when he turns in bed.

In the lower left quadrant is a moderately large, tense, and smooth tumor. It is fixed and immovable, not influenced by respiration, not

connected with the spleen. Urine 1024, trace of albumin, a few hyaline casts, epithelial cells and debris. Leucocytes 16,600, hæmoglobin 77 per cent., no malarial organisms. March 17, 1908, leucocytes 11,150; repeated urine examinations show no change. March 20, 1908, cystoscopic examination was done and a ureteral catheter introduced into the pelvis of the left kidney. Urine secreted in 3.35 hours was 2½ ounces. Examination of this urine gave sp. gr. 1025, trace of albumin, no casts, no pus.

Operation, March 24, 1908, by abdominal incision and a large, fluctuating round tumor was found back of the peritoneum on the left side. It was not connected with the spleen or kidney. Abdominal contents were normal and the wound closed. By posterior incision the abscess was opened and about two pints of greenish-yellow pus were evacuated. The laboratory report shows no organisms of any kind by smears or cultures.

Practically the temperature was slightly subnormal throughout. Convalescence was prolonged by depth of sinus and slowness of healing, but he was discharged as well July 9, 1908.

Comment.—No urinary symptoms, no pain in walking; cough showed slight pulmonary involvement; temperature subnormal throughout; diagnosis not clear until operation which was first by anterior incision, then posterior for drainage.

Case II. Pennsylvania Hospital, 133 ('08).—S. A., aged 22, negress, domestic. Admitted March 25, 1908; discharged May 6, 1908. The history shows smallpox six years before admission, also syphilis three years ago. With present illness she has been sick two months and in bed two weeks, complaining of pain in both iliac regions, of fever but no chills, of pain and burning with urination, and of pain with bowel movements. Has had slight cough and expectoration. No history of injury and no evidence of pelvic infection except that suggested by a profuse vaginal discharge. Notes do not show results of physical examination except the presence of a secondary skin eruption.

April 6, 1908. Complained of pain in the right side about the lower chest and upper part of the lumbar region. Two days later a large, smooth swelling was slightly perceptible in the right lumbar region. This side of the abdomen was rigid, tender, and an indefinite mass could be made out. Leucocytes 44,550. Urine, sp. gr. 1030, faint trace of albumin, many white blood corpuscles, and a few granular and hyaline casts.

April 9, 1908. By lumbar incision a large quantity of foul smelling, dark colored pus, with gas bubbles in it, was drained. No bacteriological report; recovery uneventful. Temperature range was irregular but not above 101 degrees. The leucocyte counts subsequent to operation were as follows: April 10, 46,700. April 13, 15,000. April 17, 7650.

Comment.—Source here may have been through the skin eruption, or from the pelvic organs; urine showed trace of albumin and a few casts but nothing to suggest infected kidney; high leucocytosis; irregular fever up to 101 degrees.

Case III. Pennsylvania Hospital, 239 ('08).—J. D. M., aged 11,

native of Italy. Admitted April 13, 1908; discharged July 18, 1908. Past history negative; ill 55 days with pain over left kidney and later swelling; no chills or sweating; voids urine normally; no œdema of lower limbs. Small, thin, anæmic boy; temperature 100 4/5 degrees, pulse 140, respiration 32; distinct tenderness over left lumbar region; soft fluctuating tumor; local redness and some œdema. Urine: Acid, sp. gr. 1025, trace of albumin, no casts, few epithelial cells and leucocytes, a morphous urates, phosphates, and debris. Hæmoglobin 50 per cent., white blood corpuscles 38,500.

April 15, 1908. Incision in left flank and considerable quantity of greenish-yellow rather thick pus evacuated. Cavity extended toward spine but there was no caries. Bacteriologically the cultures showed pure staphylococci.

July 18, 1908. Discharged but sinus still running.

August 8, 1908. Returned from Atlantic City, examined and found well. Temperature range was irregular, running from normal to 101 degrees.

Comment.—A staphylococcus infection of unknown source in a lad of 11 years; urine practically normal; temperature range irregular up to 101 degrees; high leucocytosis.

Case IV. Pennsylvania Hospital, 1546 ('07).—E. F., aged 23, negro, laborer. Admitted August 28, 1907; discharged October 30, 1907. He gave a history of having fallen off a trolley car three weeks before and having had since then severe pain in the left side with difficulty in the commencement of the act of micturition. After his fall he stopped work for two days, then worked five days, but by that time the pain had become so severe that he could not lace his shoes or walk erect. The muscles in the left lumbar region were very painful and this pain radiated through the left side of the abdomen to the umbilicus. He has had slight cough with yellowish sputum which sometimes has been tinged with blood. Has had fever but no chills.

Somewhat thin, rather anæmic man; bodily movements affecting the trunk apparently painful. Temperature 102 3/5 degrees, pulse 90, respiration 24. Chest expansion equal but over the lower left lung the breath sounds suppressed and note impaired. Heart, liver and spleen normal. Abdomen showed no distention but it is tender over the left side, from the costal margin to the iliac crest. No tumor made out. Urine, clear, faintly acid, 1030, trace of albumin, one or two faintly granular casts. Leucocytes 30,350, hemoglobin 92 per cent. Urine from ureteral catheterization of the left kidney showed normal amount and only 3 or 4 red cells. Sputum gave no tubercle bacilli. Operation on August 30, 1907, by incision parallel to the spine which opened a large perinephric abscess. Temperature was normal two days later and no fever appeared subsequently. The sinus continued to discharge for a long time and he was not discharged until October 30, 1907. Even at that time he continued to complain of a little pain in the left lumbar region.

Comment.—Trauma may have been a factor in this case but on the other hand it may have served only to call his attention to his malady; cough and pulmonary involvement on same side as the abscess; temperature about 102 degrees, but promptly fell to normal when abscess was opened.

Case V. Polyclinic Hospital, 17632.—F. D., aged 18, negro, concrete worker. Admitted August 17, 1909; discharged September 6, 1909. family and previous histories were negative. Two months before admission had a punctured wound of left index finger which became infected and was opened; later necrosis of distal phalanx developed and it was removed. Two weeks prior to admission he commenced to have pain in the right flank which was worse on walking or when he would try to lie on that side.

Lightly muscled but generally well developed young negro. Lips dry, tongue coated, index finger of left hand suppurating. Pain was localized on the right side below the rib edges and outside the erector spinæ. Temperature 101 2/5 degrees. Heart and lungs normal; no cough. Chest movements were equal but the abdominal muscles moved more on the left side. No tenderness over the stomach, liver, appendix, or pelvis; no rigidity of the recti. Outside of the semilunar line and above the umbilical level there was decided muscle stiffness and a quick response to pressure. Tenderness marked from the crest of the ilium to the rib edges and its acme was at the kidney triangle. Indistinctly a mass could be felt. Blood showed leucocytes 18,200, erythrocytes 3,800,000, hemoglobin 60 per cent. Urine was normal in all respects.

On August 21, 1909, under ether anæsthesia an oblique incision was made over the right kidney and about an ounce of creamy pus was evacuated. The abscess was in the fatty capsule and was posterior to the lower pole of the kidney. The pus showed staphylococci. Recovery was uneventful. Temperature range was about 101 degrees but it dropped to normal six days after operation.

Comment.—Source of infection probably hematogenous from felon of left index finger; urine normal; temperature range was about 101 degrees.

Case VI. Polyclinic Hospital.—J. P. F., aged 35, native of Russia. Admitted April 27, 1903; died May 7, 1903. Married 16 years with 7 children; now pregnant in third month; seven years ago after childbirth had "inward trouble but has been well some time." Present trouble began six months ago with pain in right side below costal line and posterior to mid-axillary line which gradually grew worse; went to bed three weeks ago; a swelling in this location developed eight days ago. History was defective as patient could talk English very indifferently.

Heart and lungs normal. Abdomen very tender on right side between costal margin and crest of ilium in axillary line, where a hard mass was palpable which extended apparently backward. Temperature 99 degrees, pulse 80, respiration 20. Urine, weakly acid, 1022, albumin present, red and white blood cells, no casts. Leucocytes, 28,000.

April 29, 1903. Incision over right kidney and a large quantity of pus was evacuated; abscess cavity seemed to point in the direction of

the appendix; kidney apparently uninvolved. Gauze and tube drainage. Bacteriological examination showed the only organism was a typical growth of streptococcus pyogenes.

April 30, 1903. Without chill developed within 24 hours of operation pleural friction sounds over anterior surface of right lung with fine râles in the lung; progressed into typical pleuro-pneumonia of entire lung. Died May 7, 1903; no autopsy. No local developments in the kidney area beyond some foul smelling discharge.

Comment.—A streptococcus infection of unknown origin, possibly pelvic; urine showed nothing significant; within 24 hours of operation patient developed pleuro-pneumonia of corresponding side and died 8 days later.

Case VII. Presbyterian Hospital, 37731.—P. L., aged 39, native of Ireland, fireman. Admitted October 26, 1906; discharge January 31, 1907. Illness began a week before admission with symptoms suggesting typhoid fever but he also had severe pain in the right side posteriorly and laterally below the costal margin. There was no tenderness to pressure, no rigidity, no mass. His condition was diagnosed as typhoid fever. He continued to complain of pain in the region of the right kidney and a month later it was noted that this area was prominent; there was tenderness and rigidity and a mass could be felt at the lower margin of the ribs. In a day or two fluctuation could be felt and it was noted that he lay with his right thigh flexed and efforts to extend it caused increased pain. Temperature range was between 101 degrees and 102 degrees. Blood count showed a leucocytosis as follows: October 28, 8,800; November 12, 13,600; November 26, 15,200. Urine was normal throughout except once a few hyaline casts were seen. On November 28, 1906 an incision was made into the abscess and over twenty ounces of pus liberated. The abscess cavity ran down to the kidney and another part ran upward and backward. The kidney was palpated and found not enlarged. Three days after operation temperature had reached normal and subsequently there was no fever. Convalescence was slow and he was not well until January 31, 1907.

Comment.—A case diagnosed and treated as typhoid fever for a month despite a rising leucocytosis; no urinary changes and kidney found unaffected at operation.

Case VIII. Presbyterian Hospital, 37344.—T. E., aged 49, native of Italy. Admitted September 27, 1906; discharged October 3, 1906. Family history was negative; married and father of 3 children; chancre 23 years ago; also had malaria with jaundice, tender liver and enlarged spleen. Present illness began September 4, 1906 with fever, chill, and sweat. Had severe pain in the lower right side of back which was later felt down the thigh and leg like a sciatica. On admission complained of severe pain in the right renal region and down the leg in the course of the sciatic nerve. He was found to have pronounced rigidity and exquisite tenderness in right lumbar space, from costal margin to pelvic crest. Attempts to flex the thigh were resisted and apparently caused great pain. There was lateral curvature of the spine with concavity toward

the affected side. No kyphosis or spinal tenderness. Urine was normal; leucocytes, 29,600. Refused operation and was discharged unimproved.

Comment.—A case of undoubted perinephric abscess which declined operation; urine normal; high leucocytosis; pain was mainly referred to the sciatic area and efforts to flex the thigh were resisted.

Case IX. Presbyterian Hospital, 39146.—K. M., aged 52, female, native of Pennsylvania. Admitted July 22, 1907; discharged October 5, 1907. Married and mother of 7 children. Two weeks before admission she had an attack of indigestion with severe pain under the heart; indigestion persisted but she worked until the evening before she applied to the hospital, when she was taken ill with pain under the right breast, getting worse and gradually involving the entire right side. The pain was continuous and uniform in character; it commenced high but on admission patient referred it to a point to the right of the umbilicus. Full inspiration caused increase of pain at the lower margin of the thorax, and she described the pain as being "like a boil."

Examination: Abdomen distended, large and flat; patient on right side and in that position a tumor on the right side could be felt, its border extending two inches to the left of the umbilicus. No jaundice, no œdema. Vaginal and rectal examinations negative.

August 4, 1907. The pain was generally located in the right hypochondrium and slightly below the umbilical line. The tumor was cystic and thought to be gall bladder. Temperature range from 100 degrees to 102 degrees. Patient tended to turn in bed toward the right side.

Operation on August 5, 1907 when a vertical incision was made through the right rectus exposing a large perinephric abscess. This was opened through greatly thickened peritoneum and about two quarts of pultaceous material in sero-sanguineous pus was evacuated. The color was dark like decomposed blood. The cavity extended to right kidney which was of normal size. The temperature dropped in 48 hours from 103 degrees to 98 degrees.

August 24, 1907. Patient developed congestion of base of right lung with pleurisy which cleared up by September 2, 1907. Convalescence was delayed by an attack of cystitis which appeared September 8, 1907, and she was not discharged until October 5, 1907, and at that time she was entirely well.

Repeated urine examinations were negative until August 22, 1907, when some epithelial cells and numerous leucocytes were noted and on the development of cystitis the usual urinary findings were noted, but at no time were there any casts. No blood examination and no report on the pus.

Comment.—Transperitoneal opening of a large abscess; diagnosis difficult; kidney not affected and urine normal; convalescence delayed by pulmonary congestion and a late attack of cystitis.

Case X. Presbyterian Hospital, 26433.—A. S., laborer, aged 39, native of Italy. Admitted November 8, 1901; discharged January 11, 1902. His previous history showed that three years before his admission he had been treated in the dispensary for an injury to the left side as

the result of being struck by an engine. Further than this he has been strong and healthy.

Present illness began twelve days ago with pain in the abdomen, especially in the epigastrium; no gastro-intestinal phenomena; no chill or fever. He felt somewhat better after the first attack of pain, but three days before admission he "chinned" himself three or four times on a door. This markedly increased his pain and it became definitely located on the left side about the base of the chest. With this he has had dyspnœa and a slight cough. Bowels have been constipated.

Examination showed on the left side from the midaxillary line to the vertebral column and to the lower margin of the ribs, an area of dullness the size of the palm. This area was tender on pressure but no œdema was present and no fluctuation made out. There was some congestion of the base of the left lung. Leucocytes, 16,800. Urine showed very few leucocytes, no red corpuscles, trace of albumin, and a few hyaline and granular casts were found with the centrifuge only.

November 18, 1901. Leucocytes, 15,800. Apparent deep seated fluctuation in the lumbar region of the left side; complained of some pain.

November 21, 1901. Dr. Willard made an oblique lumbar incision over the involved area. Nothing abnormal was found until the perinephric fat was reached, when a large abscess was opened and considerable quantity of "laudable" pus was drained; no involvement of the kidney. Bacteriological examination of the pus gave abundant staphylococci and an unidentified bacillus. Temperature chart showed slight fever, 99 degrees to 100 degrees, until two days after operation, when it dropped to normal. Discharged, well January 11, 1902.

Comment.—Urine practically normal; pulmonary phenomena; pus showed staphylococci and an unidentified bacillus.

Case XI. German Hospital.—P. W., male, aged 25 railroader. Admitted July 14, 1909; discharged August 17, 1908. Nothing of note in his previous health except five years before he had had an attack of rheumatism. A month prior to admission was taken ill with severe pain in the right lumbar region; the pain was dull and burning, never cutting, and it did not radiate; constantly present but varied in intensity; had no vomiting and no urinary disturbances. The only physical sign was excessive tenderness in the right lumbar region; no mass felt. On July 18, under ether, a quantity of foul smelling pus was evacuated from an abscess about the lower pole of the kidney. Temperature range was about 100 degrees, quickly falling to normal after the operation. Urine was normal in amount and specific gravity; no pus was found, and, aside from a very few hyaline casts, it was normal in all respects. Ureteral catheterization showed no difference in the urine from the right and left kidney. Leucocytes, 14,520. Pus showed bacillus coli commune as the principal organism.

Comment.—B. coli commune infection of unknown origin.

Case XII. German Hospital.—A. E., male, aged 26, knitter. Admitted September 8, 1908; discharged October 1, 1908. For three weeks prior to applying to the hospital he had had constant dull pain in the left

lumbar region, gradually getting worse and preventing sleep. No radiation of the pain. Examination showed in the left kidney region distinct bulging with marked tenderness but no definite mass could be felt. Three days after admission a large pocket of pus was opened by vertical incision over the left kidney. The abscess lay posterior to the kidney which was not involved. There were numerous careful urine examinations in this case but aside from a very faint trace of albumin, a few hyaline casts on one occasion, and a few pus cells seen four days after operation, there was nothing abnormal. The temperature range was between 99 degrees and 100 degrees until the abscess was opened. The leucocytes were 34,600. Pus showed staphylococcus albus.

Comment.—High leucocytosis; infective agent was the staphylococcus albus; urine practically normal.

Case XIII. German Hospital.—T. L., aged 40, groceryman. Admitted December 31, 1907; discharged January 18, 1908. There was nothing of interest in his family, previous or personal history. Three weeks before admission he was seized with sharp, sticking pain in the left lumbar region; this was aggravated on motion or deep inspiration and radiated across the belly and to the spine; it was tender to pressure. There was marked tenderness over an area 10 cm. in diameter, situated posterior to the posterior axillary line from the rib margins to the crest of the ilium, with some rigidity of the muscles; much tenderness was present on deep palpation below the ribs and a sense of resistance was encountered at a point corresponding to the left kidney. Two days later under ether anæsthesia an abscess cavity surrounding the kidney was opened and 300 c.c. of reddish, foul smelling pus was liberated. This contained bacillus coli commune. Temperature ranged from normal to 101 degrees until the operation, when it became normal. Urine on four examinations showed a very faint trace of albumin, two granular casts, a very few leucocytes, no pus, and was acid in reaction. Leucocytes, 11,700; polynuclears, 89.5 per cent. Convalescence uneventful.

Comment.—Urinary findings unimportant; no ascertainable cause; infective organism bacillus coli commune; temperature from normal to 101 degrees.

Case XIV. Presbyterian Hospital, 36 ('09).—A. D., aged 50, housewife. Admitted June 18, 1909; died July 17, 1909. This patient was first treated at the hospital from May 7, 1908 to June 11, 1908 for hemorrhoids and cystitis and underwent the clamp and cautery operation. She returned and was under treatment from January 25, 1909 to February 11, 1909 for carbuncle and cystitis; again she was operated on, the carbuncle was excised and a ureteral stricture was dilated. Her third admission was on June 18, 1909, when she was found to have a large mass in the region of the right kidney with a reddened and œdematous area in the flank. The following day an incision opened a large abscess containing about two quarts of foul pus. It is unfortunate that the notes in this case are not full. On July 9, 1909 a sinus was opened down to the kidney and a secondary incision was made above Poupart's ligament but efforts failed and she died July 17, 1909. The temperature was

practically subnormal throughout. Urine on six examinations was alkaline, with large quantity of sediment, albumin always present, large amount of pus, large number of red and white blood corpuscles; later there were fewer whites and an increase of reds.

The autopsy showed a hypertrophied kidney with a suppurating ureter the size of the little finger; perinephric suppuration; pyonephrosis and calculus; bladder seat of chronic cystitis and contracted.

Comment.—Perinephric abscess of renal source with clear history of urogenous infection; urinary reports characteristic of this form of perinephric suppuration; death followed an afebrile illness.

Case XV. Philadelphia General Hospital.—M. R., male, aged 19, iron worker, native of Norway. Admitted March 8, 1906; discharged June 30, 1906. Complained of pain which was constant though in varying degrees and sometimes stabbing in character in region of the right kidney. It had affected him for about three months but getting slowly worse. Specific urethritis four months ago. Examination showed no chest abnormality; abdomen was slightly rigid in the right flank but no mass could be distinguished. Skiagraph showed no calculus or other distinguishable pathological condition. On March 31, 1906, under ether, about an ounce of yellowish white pus was evacuated from an area about the lower pole of the kidney. No defect of the renal surface of the pelvis could be made out. Leucocytes on March 28, 1906 were 16,200. Urine showed several granular casts, few red blood cells, few leucocytes, and urates. The pus contained streptococcus pyogenes. The wound granulated nicely and healed promptly.

About a month later he developed a prostatic abscess. The late notes are defective but apparently he still later developed laryngeal tuberculosis.

Comment.—An abscess due to streptococci from a mixed infection of the urethra; no evidence of kidney involvement.

Case XVI. Philadelphia General Hospital.—T. S., male, aged 34, laborer. Admitted December 24, 1904; discharged February 13, 1905. Complained of throbbing pain in left lumbar region extending downward along the crest of the ilium to Poupart's ligament. Patient was well up to two weeks ago when the pain started in the groin, and it has since been severe enough to disable him. Nothing of note was found on general examination except a hard mass could be felt in the upper abdomen on the left side. Three examinations of the urine gave normal results.

On January 16, 1905, under ether, an abdominal incision was made through the right rectus, when the tumor was found to be retroperitoneal and behind the left kidney. This wound was closed and by a lumbar incision about a pint of pus was liberated. There was nothing abnormal about the kidney. The pus showed staphylococcus pyogenes aureus in pure culture. The temperature was remittent in type up to about 102 degrees, but it fell to normal the day after operation. The wound healed well and he was discharged February 13, 1905.

Comment.—An average case due to staphylococcus aureus infection of unknown source; urine normal.

Case XVII. Philadelphia General Hospital.—T. M., male, aged 59. Admitted June 20, 1909; died July 14, 1909. Entered the hospital complaining of pain in the right loin and gave a history of gonorrhœa some months before, followed by stricture. He stated that three weeks prior to admission he fell as a result of dizziness, striking his back; the next day he hurt his back again but applied a plaster and thought nothing more of it. However, the pain persisted and got worse, so he came to the hospital.

Examination showed marked arterio-sclerosis, weak and irregular heart action but no murmurs. There was marked rigidity and some redness and swelling of the right loin; the right knee was drawn up and the patient seemed unable to straighten it. The day after admission he had a bad attack of syncope with almost imperceptible pulse. The heart was found acutely dilated and the sounds were almost absent. The lungs showed fine râles in front and behind. Leucocytes were 13,500. Urine: specific gravity, 1010, albumin, few red blood cells, many pus cells, granular casts, amorphous urates and triple phosphates.

On June 22, 1909, under local anæsthesia, an abscess containing about two pints of pus was opened. This pus showed streptococci and pneumococci. His temperature dropped from 101–102 to normal but his pulse and respiratory rates remained up, urine secretion kept below 40 ounces, and he died on July 14, 1909 of myocarditis and cardiac dilatation.

Comment.—The pus in the urine would indicate that the abscess had a renal source; death was due to myocarditis but it was likely accelerated by the infection; the pneumococci and streptococci gave rise to no special phenomena; corresponding thigh was flexed.

Case XVIII. University Hospital.—E. L. W., female, aged 58. Admitted December 1, 1904; discharged January 27, 1905. Twelve years ago she began to have attacks of renal colic and suffered eighteen months; she then recovered and has been well until the present illness. Four weeks prior to admission she began to have pain which was then indefinitely located in the abdomen. Within 24 hours pain and tenderness became located in the left loin and left hypochondrium; it was dull, constant, worse on jarring, and with no radiation. She was worse and better for ten days. Then a fever of about 102 degree abated and for a week she was fairly comfortable with a temperature of about 100 degrees. During the last three days her fever has increased and the pain is worse. The urine has been persistently loaded with pus and a few red cells.

On admission the left loin tissues showed œdema, with tenderness too great to permit of deep palpation. Urine: Acid, 1022, trace of albumin, loaded with pus, and some columnar epithelium. An abscess containing about a quart of greenish pus was opened and found to extend toward the median line to the aorta and above and below the kidney about two inches. The kidney showed at the middle of its convex surface a sinus the size of a dime and at the lower pole there was another sinus. Probes passed through these entered the pelvis and

touched. The upper pole was nearly normal and still showed some fat about it. After operation the urine contained much blood which soon disappeared; hyaline, granular, and pus casts, with many pus cells were observed. Urine drained through the back in free amount for a long time and the sinus was not closed on discharge. There was persistent cystitis during most of her stay at the hospital. Temperature was normal except during the first four days.

Comment.—A case of abscess having renal origin; two sinuses found in the kidney; persistent cystitis.

Case XIX. University Hospital.—S. S., male, aged 60, insurance agent. Admitted July 28, 1905; discharged August 16, 1905. Patient has had rheumatic attacks and thinks for about 25 years he has had "kidney trouble," characterized by pain in the back and frequent micturition. He dates his present trouble to an attack of grippe five months ago, but states the present trouble started two months ago when he noticed a small swelling on the back at the upper border of the ilium, on the right side. A week before admission a small swelling was also noted in the right groin. Has had pain in back and right hip and leg when he walks.

On examination a swelling about the crest of the ilium and upper sacrum was noted. It seems to have deep attachments but not to the spine or ilium. It was the centre of an area of induration about 4 by 6 inches. Urine, clear, 1020, no albumin, no sugar, few hyaline and granular casts. On July 29, 1905, incision along upper border of ilium showed many sinuses dissecting the muscle layers and apparently having perirenal origin. Another opening was made internal to the anterior iliac spine.

Patient was discharged on August 16, 1905, but re-admitted on September 14, 1905, with the observation that the sinuses had continued to discharge and two weeks before swelling was noted about the upper abdomen. Again he was operated on and this time the kidney area was thoroughly explored. Two quarts of flaky pus were evacuated from an area posterior to the kidney, which was found unaffected. Subsequently he developed cough and expectoration and chest examination showed still later that there was obliteration of the pleura from the sixth rib downward on the right side. Convalescence was slow. Pus showed staphylococcus aureus and albus.

Comment.—A case which might suggest renal origin; defective drainage caused a second operation; pulmonary complications; microorganisms were s. aureus and albus.

Case XX. University Hospital.—R. L., female, aged 45. Admitted October 26, 1903; discharged December 2, 1903. Gave an excellent previous and family history. Present illness began 12 days before admission with abdominal cramp, which she ascribed to the onset of the menstrual period; on the following day she went to bed with chills and fever; pain radiated from the right lumbar region to the left side of the body and hip; no jaundice but some vomiting. About a week later her physician noted a prominent mass in the right loin which was

oval in shape and well defined. She could not straighten her right thigh or take a deep breath without excruciating pain. She was not aware of any alteration in the quantity or quality of the urine.

On admission the temperature was 103, pulse 104, respiration 26. Urine: Specific gravity 1032, cloudy, trace of albumin, granular casts, numerous white blood cells, no reds. Leucocytes, 26,940. Abdomen was distended but not tender; on right side extending from the rib borders to the pelvic brim, posteriorly to axillary line and anteriorly to an inch beyond the umbilicus, there could be felt on deep palpation a firm swelling which was not very tender. It was evidently covered by the intestines, and the size and position of the mass was unaffected by inflation of the colon. Pelvic examination showed a perineal and cervical tear, cystocele and prolapse.

Operation on October 31, 1903, and a large perinephric abscess drained; convalescence was uneventful. Pus contained the bacillus coli commune.

Comment.—The origin of the infection may have been pelvic; the infective agent was b. coli commune.

Case XXI. University Hospital.—H. A. G., male, aged 28, bookbinder. Admitted October 20, 1903; discharged November 1, 1903. Nothing of interest in previous, personal or family history. Present illness began about a month before admission, with dull pain in left upper lumbar region, principally under lower two or three ribs; two days later pain was markedly increased by a jolting ride and he went to bed; six days later a swelling in the upper lumbar region was noted; temperature was continuously elevated between 100 degrees and 101 degrees. On admission pain and tenderness were somewhat less than they were. No pleuritic symptoms, no gastro-intestinal disturbances, no alteration in urinary function.

Patient lay with thighs slightly flexed, spine bent a little both antero-posteriorly and laterally. Respirations hurried but no dyspnœa. Urine was normal in all respects. Left loin and lumbar region were the site of a resistant mass, extending from the pelvic brim up to and under the rib edges; whole area very sensitive, hot, and red; dullness from the nipple line to the spine; some bulging in the loin and swelling was very tense. Operated on immediately; quantity of pus not noted but it contained bacillus coli commune. Patient did well and wound was nearly healed when discharged. Temperature range was between 99 degrees and 100 degrees until three days after operation.

Comment.—No cause can be suggested; b. coli commune infection.

Case XXII. German Hospital.—J. W., male, aged 21, bookkeeper. Admitted February 15, 1907; discharged March 30, 1907. Was taken suddenly sick four days before admission with cramp-like pains about the umbilicus, was nauseated and vomited. Admitted to hospital with symptoms of acute appendicitis but also had rigidity of muscles in the right loin. At operation the next day the incision was made in the flank not opening the peritoneum. A large quantity of thin, malodorous, yellowish pus was evacuated from an abscess which extended upward

above the kidney. Pus was found burrowing over toward the left side, the vena cava and ureter were exposed, and many pockets opened. No notes on the kidney condition. Urine examination showed very few changes from the normal. Pus gave the colon bacillus. On February 15, 1907 blood examination showed leucocytes, 16,500, polynuclears, 83.6 per cent., and on February 25, 1907 leucocytes were 13,400 and hæmaglobin 72 per cent. The temperature chart shows an even temperature of about 102 degrees until the sixth day, then a drop to 100 degrees and not reaching normal until March 8, 1907.

Comment.—Symptoms suggesting appendicitis with rapid onset and relatively high fever; urinary changes unimportant.

Case XXIII. German Hospital.—J. C. B., male, aged 32, lineman. Admitted May 17, 1907; discharged June 15, 1907. Gave history of specific urethritis ten years ago and chancroid two years ago. Present illness began one month before admission, with dull pain in right side, which continued and increased in severity. Later he had symptoms suggesting renal colic which were relieved by ice-bags.

No report of physical examination. Operation May 18, 1907, when an abscess was opened. Pus showed staphylococcus aureus. Temperature was practically normal. Urine showed a trace of albumin, a few casts, and a few leucocytes.

Comment.—Probably urethral infection by staphylococcus aureus.

Case XXIV. German Hospital.—S. L., female, aged 60. Admitted May 31, 1907; discharge July 3, 1907. She began to have cutting pain in left hypochondrium one month before admission, which was severe and increased on deep inspiration; it has been associated with irregular vomiting and constipation. Has had chills and fever and has lost about 15 pounds in weight, but has had no cough.

On examination an indurated, tender, slightly movable mass the size of a child's head was felt in the left hypochondrium and extending almost to the navel; it did not move with respiration. Operation June 10, 1907. Lumbar incision opened a small abscess containing thick, dirty yellow pus. Anterior to the kidney was an indurated and immovable mass which was not opened. A definite diagnosis was not made. The urine showed a constant trace of albumin with occasional granular casts and pus. Blood: On June 1, 1907, hæmaglobin 55 per cent., white blood corpuscles 19,200, red blood corpuscles 3,270,000, polynuclears 83 per cent. On June 5, 1907 the leucocytes were 23,300. The pus gave in culture the bacillus coli commune.

Comment.—It is probable that this case was one of pyonephrosis since she continued to have a slightly septic temperature until her discharge.

Case XXV. German Hospital.—J. McG., female, aged 18. Admitted June 12, 1907; discharge July 24, 1907. During three months prior to admission had dysmenorrhœa and for several months a yellowish vaginal discharge. Operated on by Dr. Deaver on day of admission for acute appendicitis, through an incision in the right loin; appendix found pointing upward and backward, deeply congested and covered by plastic exudate. After operation her temperature which was 103 degrees, dropped

to 100 degrees, but almost at once it commenced to oscillate between 99 degrees and 103 degrees, gradually getting higher. It was found that there was great rigidity of the lumbar muscles and the right half of the abdomen. On account of the marked tenderness no mass could be felt. On June 29, 1907 Dr. Deaver again operated and through a lumbar incision opened and drained a perinephric abscess. Eight days later her temperature was normal and convalescence was uneventful. The leucocyte report was as follows: On June 12, 13,600; on June 24, 24,000; on June 29, 22,400. The urine showed a trace of albumin but other changes were unimportant. The laboratory report on the appendix showed only inconspicuous lesions. The pus from the abscess contained staphylococcus aureus.

Comment.—Diagnosed as acute appendicitis and appendix removed with no improvement in symptoms; seventeen days later a perinephric abscess was opened and patient promptly recovered; probable source of infection was pelvic; no material urinary phenomena.

Case XXVI. German Hospital.—A. G., male, aged 18, musician. Admitted November 18, 1906; discharged December 8, 1906. Three weeks before admission noticed pain in region of left kidney, at first intermittent but later constant. Does not micturate frequently. Has had chills and fever. Chest examination was negative; abdomen showed rigidity in left upper quadrant and posteriorly a swelling was noted below the costal margin and back of the posterior axillary line which fluctuated slightly. On November 19, 1906 a large abscess was opened and drained. It lay over the lower pole of the kidney and communicated with another smaller pocket toward the median line.

The urine showed a trace of albumin with some granular and hyaline casts. Leucocytes were 29,500. Temperature which was about 102 degrees, dropped at once to normal. No bacteriological report.

Comment.—No source of infection could be assigned.

Case XXVII. German Hospital.—T. K., male, aged 29, brewer. Admitted February 26, 1906; discharged March 31, 1906. Taken suddenly ill ten weeks before admission with acute pain at the right costal margin posteriorly. With this he had a chill and slight cough. Has had fever and has lost about 40 pounds. Five weeks ago had an attack of aphonia which lasted three days.

He was emaciated; lungs were normal, heart showed an aortic murmur; no distension of abdomen but slight rigidity was present. There was a fullness of the right lumbar region and he was very tender on palpation. By lumbar incision about a pint of pus was evacuated; no report bacteriologically. Temperature was irregularly between normal and 101 degrees for eight days, when it reached normal. Urine showed faint trace of albumin and casts occasionally. Leucocytes were 17,100 on admission, hæmoglobin 42 per cent.; a month later leucocytes were 9,700, hæmoglobin 54 per cent.

Comment.—Symptoms had existed ten weeks before operation with decided emaciation; no recognized source of infection.

Case XXVIII. Mt. Sinai Hospital.—J. T., male, aged 20, laborer.

Admitted November 21, 1908; discharged January 18, 1909. Illness began three weeks before admission with pain in his shoulders and right side of the back; no known cause; family and personal accounts were uninteresting. In the right loin from the last rib to the iliac crest there was a distinct mass which was very tender, painful, and it seemed to fluctuate. On November 23, 1908 a large quantity of pus was evacuated by lumbar incision. The abscess extended downward toward the pelvis, under the kidney, and toward the diaphragm. The urine at this time was practically normal. His temperature, which had ranged from 102 to 103, fell to normal in 24 hours. On December 3, 1908 his temperature suddenly shot up above 103 degrees, and in a day or two it was found that the left lung was entirely consolidated with pneumonia; there was also pleural effusion. He was extremely ill with pulse at times of 140 and respirations of 56. Recovery was slow, consolidation of the left base persisted for some time and it was fully three weeks before his temperature fell to normal. During this time he developed a purulent discharge from the right ear. The wound in his back healed slowly but without difficulty. His urine mainly showed febrile changes but no pus. Blood: Leucocytes 15, 360; polynuclears, 82 per cent. The pus contained staphylococcus aureus.

Comment.—This case is interesting in showing a pleuro-pneumonia of decided severity, involving the opposite lung from the abscess; urine normal and no source of infection recognized.

Case XXIX. University Hospital.—A. R. G., aged 27, native of Russia, salesman. Admitted May 17, 1909; discharged June 6, 1909. Chief complaints on admission were pain in back, cough with expectoration, vomiting and constipation. Six weeks ago had grippe which put him in bed one day; he then worked two weeks but had a cough so severe that he vomited. From the first he had pain in the right lumbar region extending forward and radiating down the inner side of the thigh to the knee; it is dull and aching except when he moves, when it is very sharp. The thigh was flexed and he was unable to straighten it without pain. Previous and family history unimportant; no venereal disease.

Abdomen was tender over the whole right side, becoming less at the middle line; an indefinite elastic mass was felt on deep palpation in the right hypochondrium; posteriorly some bulging was noted between the last rib and the iliac crest, and at this point there was acute tenderness with a feeling of fluctuation. The right abdomen measured 18 and the left 17 inches. There was some curvature of the spine with convexity toward the left; right thigh flexed to 45 degrees. Urine: Amber, normal odor, flocculent sediment, specific gravity 1030, acid, no albumin, no sugar, a few cylindroids and an excess of mucus. Hæmoglobin 82 per cent, leucocytes 16,900. Temperature ranged from 99 degrees to 100 degrees. Skiagraph was negative for stone or spinal caries.

On May 20, 1909 Dr. A. C. Wood evacuated a large perinephric abscess containing thick, greenish, and odorless pus. The cavity extended

upward and inward for about 4 inches but there was no communication with the spine or kidney. On May 22 temperature, pulse and respiration were normal and the patient convalesced quickly and satisfactorily.

Comment.—It is probable that the so-called grippe attack was merely the pulmonary irritation associated with the abscess formation; urine unaffected.

Case XXX. Episcopal Hospital.—E. W., aged 19, female, spinner. Admitted September 8, 1908; discharged November 7, 1908. Five weeks prior to admission patient was caught in a door and sustained a severe contusion over the right kidney. She stated that she voided some blood and had some incontinence of urine. The pain from the contusion became less but she had some tenderness continuously. Two weeks ago the pain and tenderness became greater and she commenced to walk lame, as though the right leg was shorter than the left.

Examination: Great tenderness in the right flank, between the rib edges and the iliac crest; also considerable tenderness over McBurney's point on deep pressure. No limitation of motion or pain about the right hip joint. On September 26, 1908 she was operated on and a large perinephric abscess was opened. No notes on the kidney, but she made an uninterrupted recovery. The pus contained staphylococci. Blood: Reds, 5,290,000; whites, 27,680; hæmoglobin 63 per cent. Urine in five reports showed the average daily amount to be about 40 ounces. There was a trace of albumin but no pus; a few hyaline, pale epithelial and granular casts were observed. Fever was rather high but showed strong remissions (100 degrees to 103 degrees); it touched normal the day following operation but showed slight evening rise until September 30.

Comment.—A case apparently associated with trauma more directly than is usual; no evidence of renal source of infection.

Case XXXI. Jefferson Hospital.—K. J. B., aged 19, school boy. Admitted September 13, 1909. During the summer months he suffered from furunculosis, five boils having appeared on his left thigh. Two weeks before admission he was suddenly taken with intense, knife-like pains in the left loin which were referred to the hip and down the thigh. He soon became lame with stiffness of the left limb and extension was particularly painful. Has had fever of about 102 degrees; no bowel or urinary symptoms; has lost 15 pounds.

Pale, poorly nourished, though fairly developed lad; temperature 100 2/5, pulse 90, respirations 24; no tenderness or rigidity about the abdomen; right kidney not palpable; the lower pole of the left kidney was questionably palpable and there was tenderness anteriorly; on deep pressure under the ribs exquisite tenderness was elicited. There was a marked limp to the left leg and extension of the thigh was impossible. No œdema or redness anywhere. Examinations of the urine on September 13, 14, 16, and 18, gave normal results in all respects. Blood: Erythrocytes 4,200,000, leucocytes 24,000, hæmoglobin 69 per cent., color index .82, polynuclears 83 per cent. The X-ray showed an area of light shading about the left kidney, with poor definition of the organ.

On September 18, 1909, Dr. Schwartz evacuated about 6 ounces of thick yellow pus and found the kidney firm and of normal size. The pus gave pure cultures of staphylococci. The temperature was normal on September 21.

Comment.—A typical case having its source in furuncles of the corresponding thigh; normal urine.

Case XXXII. German Hospital.—L. O., aged 24, domestic. Admitted March 5, 1905; discharged April 12, 1905; re-admitted April 24, 1905; died June 17, 1905.

Healthy girl of good family and personal history. Eighteen months before admission she had an attack of sudden pain in right lumbar region which lasted about two weeks; six months later she had a more severe attack and for a year past she has had at irregular intervals pain which was aggravated by bending or stooping. Has lost about ten pounds in weight.

Examination showed floating right kidney, also a bulging above the crest of the ilium anterior to and just below the kidney area; it was resistant and doughy in feeling. At operation about a pint of pus was evacuated; the kidney was found to be loose and was apparently unaffected by the suppurative process. By the use of iodoform gauze it was replaced nearly in normal position. Urine showed a faint trace of albumin, leucocytes and phosphates. Temperature changes were slight, substantially not over 100 degrees. On discharge she had a granulating wound in the back, but was doing well; ten days later was taken ill with evidences of infection of some sort and was re-admitted on April 24, 1905. While nothing very definite showed about the lumbar area, she was again opened on April 29, 1905, and thoroughly explored. No disease of the kidney, spine or muscle was found. Her temperature remained septic but she was thought to have influenza; temperature was about 99 degrees in the morning, 102–103 in the evening. On May 27 an empyema was made out in the right chest posteriorly and a half pint of pus was evacuated. On June 3 another abscess in the pleura was opened nearer the spine. On June 12, 1905, it was noted that she had a left septic pneumonia and from this she died five days later.

Comment.—In this case the perinephrium of a movable kidney was affected but no disease of the kidney was shown; later the patient developed empyema of the same side and died of septic pneumonia of opposite side.

Case XXXIII. German Hospital.—H. G., 36, tobacconist. Admitted July 15, 1905; discharged August 16, 1905. Nothing in history of importance. Present illness began six weeks ago with pain in left side and back, which was sharp, shooting and continuous; no chills, no vomiting. Abdomen showed a mass in the left ileocostal space, extending anteriorly to nipple line, which seemed movable and caused pain on palpation. An oblique lumbar incision opened a large abscess filled with yellow, flaky pus. Four days later he developed a femoral phlebitis of the left leg. Fourteen examinations of the urine gave normal

results. Leucocytes were 20,600; hæmoglobin 76 per cent. Slight fever (99–100) for the first ten days.

Comment.—A case complicated by femoral phlebitis; urinary changes absent and course practically afebrile.

Case XXXIV. Children's Hospital.—B. C., aged 10. Admitted June 7, 1903; died June 21, 1903. Had measles, rubella, pertussis, and chicken-pox, but not scarlet fever, diphtheria or typhoid. Two weeks before admission was struck on right side of abdomen with blow of fist. The following day he vomited and had severe cutting pain just below right costal margin; the pain remained continuously but varying in severity. Has had no cough and no change in the urine or micturition. The right shoulder was lower than the left. Temperature for a week before admission average 103 degrees. Blood: Hæmoglobin 73 per cent., reds 4,700,000, whites 42,960.

On operation the following day the kidney was exposed and nothing found until a point in front of the upper pole of the kidney was reached, where a small abscess containing thick foul pus was opened and drained. On June 11, 1903, his temperature was normal and on June 14 he was sent to the country branch of the hospital. A few days later a second operation was necessitated apparently by reason of extension of infection. The old wound was re-opened without finding any collection of pus. However, sinuses were found running upward and inward and downward to iliac region. A counter opening in the iliac region opened the peritoneal cavity; the pelvis contained a large quantity of pus and was drained.

The child died on June 21, 1903. Autopsy showed all the cavities along the posterior abdominal wall to be bathed in pus and the pelvis was half full. Both the diaphragmatic and hepatic serosa were covered with fibrinous exudate and pus. The appendix was bound down in a greatly thickened mass of lymph surrounding the cæcum but when dissected out was found to be normal. The mass of lymph was tightly adherent to the posterior abdominal wall and in pushing this aside a pus cavity was found having the kidney for the floor. No notes on the kidney.

Comment.—An interesting case showing the effects of trauma. Death due to extension of inflammatory process to abdominal cavity, a condition liable to result from the anterior position of the original infection.

Case XXXV. University Hospital.—A. McL., aged 16. Admitted May 31, 1909; discharged October 17, 1909. This boy had scarlet fever at the age of seven but otherwise was apparently healthy until present illness. It began seven weeks before admission with swelling under eyes and in the feet and legs, evidently due to nephritis. A month later he had a sharp pain in the left side, intermittent in character, which has continued. On the day before admission he noted a mass in the left iliac region which caused him to flex his left thigh; has had diarrhœa and vomiting since the onset of the pain in his side.

Physical examination showed many general signs of nephritis. Also tenderness in left loin posteriorly running down to left iliac fossa, where

there is a distinct induration and mass. Urine: 1012, acid, cloud of albumin, no casts, many red and white blood corpuscles, triple phosphates. Blood: Reds, 3,130,000; whites, 48,800; hæmoglobin 48 per cent. On operation (June 2, 1909) by incision well above Poupart's ligament in the groin, about a pint of pus was evacuated. Counter openings were made posteriorly and abscess drained with rubber tubes. Pus was examined and found sterile. Temperature averaged 99 degrees to 100 degrees.

Later the evidences of nephritis continuing and ascites developing, he was again operated on (July 17, 1909) and a decapsulation of both kidneys done. The kidneys were large and white, with the left kidney slightly congested. On September 10, 1909, blood count was as follows: White, 14,600; reds, 3,530,000; hæmoglobin, 60 per cent. Abscess cavity healed uneventfully.

Comment.—In this interesting case the infection was of unknown origin; the leucocytosis was very high; there was pre-existing parenchymatous nephritis and a double decapsulation was done after the perinephric suppuration subsided.

Case XXXVI. German Hospital.—U. R., female, 22. Admitted October 28, 1909, complaining of pain in right lumbar region which had existed for three weeks. It commenced as a dull ache and she found she could not fasten her corsets. It was characterized by pain in back and soreness over abdomen in front, no nausea, no jaundice, but she had a cough at first. Has had indigestion for several years.

Rather anæmic and poorly nourished girl. Abdomen distended and somewhat tympanitic. Slight rigidity throughout, but more marked about the upper right quadrant, where there is distinct tenderness extending back to lumbar region; most tender point is on a line from the ninth cartilage to the umbilicus. Liver not enlarged or tender. Mass felt where right kidney would be, which comes down with deep inspiration, but examination was masked by distention.

Under ether on October 30, 1909, abdomen was opened by right rectus incision and a slight amount of cloudy fluid was found in pelvis. Appendix slightly thickened but not acutely inflamed. Gall-bladder, stomach, and pelvic contents were normal. Abdomen closed and a loin incision exposed a kidney with a distended capsule which was opened and considerable pus escaped.

Blood: Leucocytes, 30,300; erythrocytes, 3,980,000; hæmoglobin, 68 per cent.; polynuclears, 88.5 per cent. Pus showed staphylococcus albus; pelvic fluid was sterile. Temperature range was 100 degrees to 101 degrees. Urine was normal prior to operation, but later showed some pus cells and epithelium.

Comment.—The diagnosis was difficult and the first incision was transperitoneal; the abscess was within the fibrous capsule which has not been noted before in this series.

ANALYTIC SUMMARY OF CASES COLLECTED.

Of the 36 cases submitted 25 were males and 11 were females. The age of the oldest patient was 60 and the youngest was 10, with a general average of 31 years, or omitting the cases of pre-existing renal infection, the average age was 28 years, showing clearly that the disease is one of early adult life. The right side was affected in 23 cases, the left in 13. The source of infection was unknown in 20 cases, in 2 there was pyonephrosis, 2 others were probably of renal origin, there was urethral infection in 2, influenza preceded 2, 3 were possibly derived from pelvic disease, peripheral suppurations probably caused 2, and trauma was prominent in 3 instances. Postural changes were noted in 10 cases, in the main being a tendency to flex the corresponding thigh, though in several cases there was some spinal curving and in one with sciatic pain flexion of the thigh was resented. Pulmonary phenomena were seen in 13 cases, varying in intensity from a simple cough to a fatal septic pneumonia; in 3 cases cystitis was present; 1 case developed subsequently a prostatic abscess; 1 had otitis media; 1 had femoral phlebitis; in 1 there was a fatal cardiac dilatation, due to myocarditis; and in 1 the perinephric suppuration occurred in the course of parenchymatous nephritis. The urine was normal in 15 cases, practically normal in 5, having a trace of albumin with casts, etc., in 12, and showing pus in 4. The bacteriological examination of the pus from the abscess was made in 23 cases and gave sterile results in 2 cases, colon bacillus in 6, staphylococci in 5, staphylococcus aureus in 4, staphylococcus albus in 2, staphylococcus aureus and albus in 1, streptococci in 2, and streptococci and pneumococci in 1. 35 abscesses were evacuated and 1 declined operation and was discharged; 30 cases recovered and 5 died. This gives a total mortality of 14.3 per cent., or omitting the cases of recognized renal origin, two of the four dying, there is a mortality of 9.7 per cent. The cause of death in the two renal cases was exhaustion in one and cardiac dilatation in the other, but both were

TABULATED SYNOPSIS OF CASES COLLECTED.

	Sex	Age	Side	Source of infection	Complication	Postural change	Leucocytosis	Pus	Urine	Fever	Days ill	Days in hospital	Result.
1	M	24	L	Unknown	Hard cough		16,600	Sterile	Tr. alb., no pus	Subnormal	25	123	R.
2	F	22	R	Probably pelvic	Cough, expectoration		44,550	No report	Tr. alb., few casts.	Irregular, abt. 101	60	42	R.
3	M	11	L	Source unknown	None		38,500	Staphylococci	Tr. alb., no casts.	Irregular, abt. 101	55	95	R.
4	M	23	L	History of trauma	Congestion, left lung		30,350	No report	Tr. alb., no pus	About 102	21	62	R.
5	M	18	R	Necrosis of phalanx	None		18,200	Staphylococci	Normal	About 101	14	20	R.
6	F	35	R	Possibly pelvic	Pleuropneumonia		28,000	Strept. pyogenes	Tr. alb., no casts.	About 99	180(?)	11	D.
7	M	39	R	Unknown	None	Thigh flexed.	15,200	No report	Normal	Bet. 101 and 102	35	95	R.
8	M	49	R	Unknown	None	Curvature of spine	29,600	No report	Normal		23		
9	F	52	R	Unknown	Cystitis, pleurisy, congestion of right lung			No report	Normal	Bet. 100 and 102	14	74	R.
10	M	39	L	Unknown	Cong. of left lung		16,800	Staph. and a bac.	Tr. alb., few casts.	99–100	12	63	R.
11	M	25	R	Unknown	None		14,520	Colon bacillus	Normal	About 100	30	33	R.
12	M	26	L	Unknown	None		34,600	Staph. albus	Normal	99–100	21	24	R.
13	M	40	L	Unknown	None		11,700	Colon bacillus	Tr. alb., no pus	Normal to 101	21	18	R.
14	F	50	R	Pyonephrosis, etc.	Chronic cystitis			No report	Alb. quan. pus, etc.	Subnormal		29	D.
15	M	19	R	Mixed urethral infection	Prostatic abscess		16,200	Strept. pyogenes	Few gran. casts		90	112	R.
16	M	34	L	Unknown	None			S. aureus	Normal	Irreg. to 102	14	50	R.
17	M	59	R	Probably renal	Pul. congestion	Thigh flexed.	13,500	Strep. and pneumococci	Alb, pus, casts	101–102	21	24	D.
18	F	58	L	Pyonephrosis	Cystitis			No report	Alb, pus, casts		28	58	R.
19	M	60	R	Possibly influenza	Cough	Right-sided lameness		S. aureus and albus	Few casts, no pus		60	90	R.
20	F	45	R	Possibly pelvic	None	Thigh flexed.	26,940	Colon bac	Tr. alb., few casts.	103	12	37	R.
21	M	28	L	Unknown	None	Both thighs flexed		Colon bac	Normal	99–100	30	12	R.
22	M	21	R	Unknown	None		16,500	Colon bac	Normal	About 102	4(?)	43	R.
23	M	32	R	Probably urethral	None			S. aureus	Tr. alb., few casts.	Normal	30	29	R.
24	F	60	L	Probably pyonephrosis	None		23,300	Colon bac	Tr. alb., casts, pus		30	33	R.
25	F	18	R	Unknown	None		24,000	S. aureus	Tr. alb., no casts.	99–103	..	42	R.
26	M	18	L	Unknown	None		29,500	No report	Tr. alb., casts	About 102	21	20	R.
27	M	29	R	Unknown	Slight cough		17,100	No report	Tr. alb., occas. casts	99–101	70	35	R.
28	M	20	R	Unknown	Pneumonia; otitis		15,360	S. aureus	Normal	102–103	21	58	R.
29	M	27	R	Possibly influenza	Severe cough	Thigh flexed; spinal curvature	16,900	No report	Normal	99–100	42	20	R.

	Sex	Age	Side	Source of infection	Complication?	Postural change	Leucocytosis	Pus	Urine	Fever	Days ill?	Days in hospital	Result
30	F	19	R	Hist. of trauma	None	Right-sided lameness	27,680	Staphylococci	Alb. few casts.	100–103	35	61	R.
31	M	19	L	Furunculosis, left hip.	None	Thigh flexed	24,000	Staphylococci	Normal	About 100	14	..	R.
32	F	24	R	Unknown	Empyema, septic pneumonia			No report	Tr. alb., no casts	99–103	..	107	D.
33	M	36	L	Unknown	Femoral phlebitis		20,600	No report	Normal	99–100	42	32	R.
34	M	10	R	History of trauma	Suppurative peritonitis		42,960	No report	Normal	About 103	14	14	D.
35	M	16	R	Unknown	None	Thigh flexed.	48,800	Sterile	Alb. casts, no pus	99–100	30	..	R.
36	F	22	R	Unknown	Early cough		30,300	Staph. albus	Normal	100–101	21	..	R.

NOTES

Case No.

1. Primary incision was transperitoneal.
6. Died 9 days after operation, of pneumonia.
7. Diagnosed as typhoid fever.
8. Had sciatic pain and resisted efforts to flex thigh. Declined operation.
9. Diagnosed as cholecystitis; opened abscess and drained through transperitoneal incision.
14. Autopsy showed pyonephrosis, nephrolithiasis, etc.
15. Probably later developed laryngeal tuberculosis.
16. Primary incision was transperitoneal.
17. Died from cardiac dilation due to myocarditis.
18. Two sinuses into pelvis of kidney were found at operation.
19. Obliterative pleurisy from 6th rib downward, right side.
24. An indurated mass in front of left kidney was not opened.
27. Diagnosed and operated on for appendicitis; seventeen days later a perinephric abscess was opened.
28. Severe pleuropneumonia on opposite side from the abscess.
32. Abscess involved the perinephrium of a floating kidney; later developed an empyema of right side and a septic pneumonia of left side, and died.
34. Secondary infection of abdominal cavity; autopsy showed extensive suppurative peritonitis.
35. Abscess occurred in the course of parenchymatous nephritis.
36. Suppuration was not in adipose capsule but beneath fibrous capsule; transperitoneal incision primarily.

probably uremic. In the other cases one died of pleuro-pneumonia, another of peritoneal extension of the suppurative process, and the third of septic pneumonia. The death rate is lower than in any previously reported series and compares most favorably with the 34 per cent. mortality of Küster's tables; this is doubtless due to the early recognition of the disease and the adequate drainage without unwise interference with the kidney.

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Dr. John B. Deaver said that in the etiology of perinephric abscesses traumatism without question plays a part. There are, of course, a certain percentage of these cases which are hæmatogenous and a certain number which are tubercular. In one of his cases, in which Dr. Miller had witnessed the operation, he could not differentiate the condition between a high appendiceal and a kidney condition. There were no symptoms referable to the kidney either in the shape of subjective symptoms, or from X-ray, or cystoscopic examination, ureteral catheterization, or chemical examination of the urine. She had circumscribed tenderness anteriorly but not posteriorly. He opened her abdomen believing it to be a tubercular case with abscess, and that if he did not succeed in reaching the abscess cavity that he could at least locate it. When the incision was made serous exudate immediately escaped; there were enlarged mesenteric glands and

exudate around the duodenum and hepatic flexure of the colon; the post-peritoneum was densely infiltrated and adherent at the latter point,—all these conditions pointing to the kidney. The incision was closed and a posterior one made; the perinephric fat and capsule were normal, but an abscess upon the anterior surface of the kidney beneath the true capsule was found. He firmly believed the case to have been tubercular, although no tubercular reaction was obtained on administration of tuberculin, and the patient made an uninterrupted recovery. In a more recent case of localized abscess of the upper pole of the left kidney in which the colon bacillus was found, he questioned if it was not also tubercular and the presence of the colon bacillus due to a mixed infection. More frequent than perinephric collections are collections within the kidney. His experience with this condition tallies with Dr. Miller's conclusions, that in perinephric conditions where the kidney is healthy practically all get well.

Dr. John B. Roberts said that Dr. Miller's paper gave some light as to diagnosis by speaking of the kidney triangle where pressure located at this point, earlier than other symptoms, may lead to a diagnosis of perinephric lesion. If he is correct in thinking that pus around the kidney gives a higher leucocyte count than similar abdominal lesions, this should be a very valuable aid in diagnosis. He is right in saying that a good many cases of perinephric abscess are primary and not secondary to the kidney lesion. He recalled two cases seen some years ago, one a case of perinephric abscess the result of an internal urethrotomy for an old stricture, and in the other case a perinephric abscess the result of a gonorrhœa causing general sepsis, there being abscesses in other parts of the body also.

Dr. John H. Gibbon said, in reference to perinephric abscess not having its origin in the kidney, he thought many conditions were called perinephric abscesses which were not. Many are tuberculous, having their origin in the muscle sheaths. Surgeons are apt to call an abscess opened posteriorly a perinephric abscess. Those which are truly tuberculous, he thought, keep up discharging for months and months, many afterwards developing some change in the lumbar spine, showing an origin in Pott's disease. Tuberculous muscular abscesses are often called perinephric; they are not perinephric, they are in the abdominal wall and the surgeon has not gone through the muscular wall before

he has opened the abscess. This explains the absence of any symptoms relative to the kidney in many so-called perinephric abscesses.

Dr. Morris Booth Miller (in closing), in answer to the suggestion that some of the cases reported were tuberculous, said that he had attempted to exclude all doubtful cases. The bacteriological examinations show no tubercle bacilli but the ordinary pyogenic micro-organisms were present in all the cases noted save two, where it was stated that the pus was sterile.

Dr. Roberts did not mention that 26 years ago he read before this Academy a masterly paper on the subject of perinephric abscess with particular relation to the referred pain, based upon careful anatomical studies. This work, which was published in the *American Journal of the Medical Sciences,* April, 1883, stands to-day as an authority upon this phase of the subject and as such has been frequently quoted.

The case mentioned by Dr. Deaver was an unusual one. In it the pus was entirely confined beneath the fibrous capsule and none was found in the adipose capsule. It was a staphylococcus albus infection. It was a difficult case to diagnose as the symptoms were vague though pointing to some upper abdominal trouble on the right side. Fever was moderate and the urine was normal. However, the leucocytosis was as high as 30,000 and there was a history of cough early in the attack.

He called attention to the apparent greater frequency of this disease in this country in contrast to European statistics. Socin found 4 cases out of 16,661 and Sutter noted 1 in 4437 cases. At the Presbyterian Hospital he had found 5 cases out of a total of 10,429, and at the German Hospital—where about 3500 cases are treated a year—the average number of perinephric abscesses is 2.

PUS IN THE ABDOMINAL CAVITY.

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OF PHILADELPHIA,

Surgeon-in-Chief to the German Hospital.

The last three decades have cleared up the rôle of bacteria in pus production, and pathologic physiology has taught us much concerning its meaning. Surgery has turned a flood of light upon the avenues of intraperitoneal infection, and, armed with a knowledge of its principles, has been making an increasingly successful fight against it. Still, infection and its sequel, pus formation within the abdominal cavity, constitutes one of the chief dangers to life and consequently one of the chief problems of surgery.

Pus in the abdominal cavity may be either free or circumscribed. That it may become confined is due to the adhesive powers of inflamed peritoneal surfaces. In general, circumscribed collections of pus are less dangerous to life than an unconfined suppurative process. Collections in the lower part of the abdomen are less serious than those in the upper portion. Abscesses situated at the margins of the cavity afford a better prognosis than those located centrally, and those which abut upon the wall through which discharge may be effected, than those which lie between loops of bowel, folds of mesentery, or in recesses behind the viscera.

Wherever it be, however, a definite collection of pus within the abdomen requires surgical aid, except in the rarest instances. "Ubi pus ibi evacuo" is as true to-day as it was when it was coined in the days before the pathogenesis of pus was understood. The practical problems, therefore, resolve themselves into two, namely, the time of attack, and the method of approach.

The chief sites of circumscribed pus are: in the lower abdomen, the right iliac fossa and the pelvis; in the upper abdomen, between the diaphragm and the subjacent viscera, below the right lobe of the liver, in the so-called subhepatic space, and in the peripyloric region, both anteriorly, in the general peritoneal cavity and posteriorly, in the lesser sac. These sites correspond in general to the great sources of intraperitoneal infection, the appendix, the internal genitalia of the female, the gall-bladder, and the pyloric region of the alimentary tract. Usually, therefore, the location of an abscess points to its origin.

There is, however, considerable variability from the type of abscess derived from each of these sources; secondary collections may form elsewhere, and less frequent conditions, such as diverticulitis, perforation of benign or malignant ulcers of the intestine, suppurating mesenteric glands, acute pancreatitis, and a host of other conditions may on occasion give rise to abscess formation, so that no region of the abdomen is entirely immune.

An appendiceal abscess should be attacked as soon as its presence is determined, providing the patient's condition warrants any operative risk. The form which is most amenable to treatment is that which lies external to the cæcum in the flank. A simple incision into the abscess will evacuate the pus and provide free drainage. The cavity should not be irrigated, nor should the wall be roughly wiped free of pus. Nature has already thrown about the cavity a protective wall of embryonic connective tissue which will do its own work of cleansing, and will secrete antibacterial serum for the extermination of the micro-organisms, while granulation will start at once when pressure is relieved. Let the delicate granulations alone. A cautious search for the appendix may be made, and if it be found in the wall of the abscess cavity it is proper to remove it. In my opinion it is inadvisable to insist upon finding the appendix, if, thereby, it is necessary to do extensive damage to the confining adhesions or to open the looser post-peritoneal tissues. Recurrence will occasionally happen when the appendix is not removed, but in my opinion the immediate indication is the urgent one,—and that indication assuredly is to get the patient well from his present attack, accepting no unnecessary chances. Nature has already excluded the appendix and it is no time to do preventive surgery in the presence of infection and toxæmia. Loose gauze packing is advantageous, not as drainage but to keep the cavity and incision open so that drainage may occur. Care should be taken not to obstruct the free drainage with tightly packed and sodden gauze, misnamed drainage. This is the course which has given me the best results, where the incision may be made through the parietes directly into the abscess.

Where the abscess does not abut in this manner upon the accessible abdominal wall, as in collections beneath the mesentery, between coils of intestine, below the liver, or retrocæcal, it is necessary to open freely into the abdominal cavity. Then, cautiously exploring the limits of the abscess, gauze pads should be packed about it to push the unaffected bowel away and to protect it from soiling. The abscess may then be opened and the pus aspirated or gently mopped away.

In such a case I make a special effort to locate and remove the source of infection. Nature had excluded it from the general cavity, but we have annulled her work and placed it once more in communication. We must therefore, if possible, provide against a recrudescence under conditions once more favorable to generalization. Having accomplished this much we must provide a tract for the discharge of necrotic and infectious material from the site of the abscess and the isolation of that tract from the general cavity. This we do by tubular drainage of rubber or glass, or other material, if the abscess cavity be distant from the surface where discharge is to take place, as in pelvic abscess or abscess located below the liver, or in the enteronic area. It may be advisable to bring such drains out through a stab in the loin or suprapubic portion. Isolation of the tract we effect by making use of the power of gauze to excite adhesions. Some soiling of clean peritoneal surface must occur in such manœuvers. But the

peritoneum is no longer regarded as it once was, as the most vulnerable structure of the body. It is the good friend of both surgeon and patient, and with the aid of the immune forces of the body already rallied against the infection, it can take care of itself, providing the original focus is not able to direct an attack against it. We do not presume, however, on this defensive power of the peritoneum, but aim to soil as little clean surface as possible.

Like loin abscesses, collections of pus in the pelvis, may at times be advantageously opened extraperitoneally by way of the vagina. These abscesses arise usually from tubal disease. When acute or subacute if we have reason to believe that the pus contained is still infective, this is a safer procedure than to attack the collection from above. This is distinctly a palliative operation and will usually require abdominal section at a later date. Therefore, when the process is of considerable duration and we have reason to believe that the pus is sterile or of low virulence, it is best to make a laparotomy in order to attend at the same time to such organs as are diseased beyond hope of repair.

Subdiaphragmatic abscess affords special difficulties both of recognition and treatment. In view of Dr. Jopson's more extended paper upon this subject to-night it is unnecessary for me to do more than mention it.

Abscesses in the pyloric region, if in the greater sac, must be attacked anteriorly and our drainage arranged so as to give the most efficient and direct outlet, at the same time disturbing normal relations as little as possible. In the disposal of all drainage we must give consideration to the position of the intestines, avoiding such tortuous paths as will conduce to kinks and secondary obstruction. We should also, whenever possible, make use of the force of gravity to carry off the secretions,—in other words, secure dependent drainage. This is often impossible, and we must be content with relieving tension and providing a free outlet, by far the most important indications.

Owing to the difficulty of localization before incision, it

will sometimes happen that after opening the abdomen we will find our collection within the lesser sac. In such cases it is usually wise to close the anterior wound and make our avenue of discharge through the flank. This holds true also for peripancreatic suppuration due to suppurative or gangrenous pancreatitis.

In these cases the pus is really post-peritoneal, though it may simulate, by its forward bulging, an intraperitoneal tumor or abscess. I have several times encountered the condition, and have had no cause to regret my choice of posterior drainage, though it involved another incision. In one remarkable case, about a year ago, the entire body and tail of the pancreas, completely gangrenous, was spontaneously discharged twelve days after operation, and the patient made a good recovery.

By slight appropriate variations of these principles any abscess in the abdominal cavity may be attacked with good hope of success. In certain cases one will find more or less reparative surgery indicated. A perforating ulcer must be closed, or perchance resected. Malignant masses may require removal. These possibilities are too numerous to be foretold or here discussed. The largest measure of interest attaches to those cases in which the pus is not confined, but exists free within the abdominal cavity. At the outset of infection there is practically always some free pus formation in the immediate vicinity. This is a defensive process of Nature. To fulfil its purpose in an ideal manner, it must speedily accomplish the destruction of invading micro-organisms and again undergo absorption. This frequently occurs. How often we are met with a thin turbid fluid, seropus, when we open the peritoneum in search of an inflammatory condition! A culture may, or may not, be positive for micro-organisms. If not, it was formerly explained on the grounds of a chemical peritonitis, but we now know that failure to find organisms indicates that they have been destroyed, absorbed, or entangled in the fibrinous mesh upon the surface of the intestines.

If the infecting organisms be of high virulence, or in too

great dosage, whether by sudden escape of large quantities of infective material or by reason of a slower but continuous outpouring of renewed infection, or if the bodily resistance be inadequate, the defense is overpowered, exudation continues, the slain and useless phagocytes accumulate, the fluid-deprived of its antitoxic and antibacterial properties, becomes at once a culture medium for their multiplication and a means for their transference to fresh fields. The powerful toxic emanations of the bacteria held in solution in the liquor puris make it a poisonous foreign material, locally injurious and, by absorption, dangerous to the delicate parenchyma of the essential organs. Thus we are "hoist with our own petard."

Of all single factors which influence the outcome of such a case that of time is the most important. It is true that there are cases of infection of the peritoneum which at the present time seem to be uninfluenced by surgical treatment at any stage. These are usually due to the streptococcus and cause little pus formation but an intense inflammation and paralysis of the intestines with rapid fatal toxæmia. No known surgical measures seem to change materially the course of such an infection. Thus Barker in the last Address in Surgery before the British Medical Association was led to remark: "When we speak now of peritonitis we are conscious that we are using a term which includes conditions as widely apart as an ordinary attack of eczema and a desperate cutaneous, streptococcal erysipelas." In these cases I doubt whether the mechanical aids of surgery will ever be sufficient to avert a fatality, and I look for help rather to some method of inducing active or passive immunity to the micro-organism.

Fortunately these extreme cases are comparatively rare. The vast majority will yield promptly to operative treatment provided it be done sufficiently early. In my experience the prognosis of peritonitis depends not so much upon the type of infection as upon the duration of the disease before treatment is instituted. Late peritonitis is quite a different disease from early peritonitis. I may illustrate this from my own experience by a series of cases which I have had compiled recently.

In 70 consecutive cases of diffuse peritonitis secondary to perforative or gangrenous appendicitis, or ruptured gastric or duodenal ulcer, which were operated upon within forty hours after onset, there was but one death, a mortality of 1.4 per cent. Of 99 cases operated within the first fifty hours, three died, a mortality of 3 per cent. This gives an idea of the rapidity with which the mortality mounts as a result of delay in this class of cases. As a further illustration I may say that in the last consecutive 55 cases which I have found suffering with generalizing or generalized peritonitis, there have been 11 deaths, a mortality of 20 per cent. A number of these cases were in extremis when admitted, and I confess that I know of no way to save the neglected cases. I resent the fact that these deaths are charged to surgery when the blame really rests upon the cause of delay, whether that be due to circumstances, to the patient himself or, as in too many instances, to bad advice.

While we are busied with improvements in technic, therefore, let us not forget to sound the note against delay, the most important single cause of mortality.

As a corollary to the importance of early operation is the fact that the most important single object of operative intervention is the treatment of the focus of infection itself. Appropriate treatment of this source will often be sufficient in itself to allow nature to complete the cure. There are, however, many subordinate aids in treatment which are of great value, among which I would mention the importance of quiet, the Fowler position, light careful anæsthesia, quick, skilful operation, saline infusion hypodermically, intravenously and particularly by way of the rectum as introduced by Murphy, and careful after treatment, usually consisting in a "masterly inactivity." The scope of this paper, however, precludes more than passing mention of all these and necessitates close adherence to the subject.

What is to be our attitude towards the pus already present within the abdominal cavity? It is but a few years since the peritoneum was considered one of the most vulnerable tissues

of the body. Surgeons were horrified at the discovery of pus within the abdomen, and with little faith in nature they devised methods of treatment consonant with their belief that the recovery of the patient was possible only through their ingenuity in getting rid of the pus. So we find that patients had their bellies washed out with antiseptic solutions, the intestines vigorously scrubbed with gauze, and some surgeons, more ingenious than clear sighted, devised means for constant irrigation of the abdominal cavity. These measures were supplemented by cumbrous methods of drainage both with gauze and tubes. These attempts at plumbing not only failed signally to perform the function for which they were devised, but gave rise to complications due to their presence. On the other hand it was observed that the peritoneum of itself possessed wonderful resisting and recuperative powers. More and more was entrusted to nature and even to-day we have not found the limit. I am certain that I drain less and less every year. Where I once said, "When in doubt, drain," I am now likely to say, "When in doubt, don't drain." I do not hesitate to close up any case which shows only a small amount of seropurulent fluid within the abdomen. Often the culture from such an exudate will be sterile, indicating that the infection is already overpowered. But even when micro-organisms are demonstrated it makes no apparent difference in the ease of recovery.

Thick, vicious-looking pus in considerable amount, especially if it be foul smelling, is in my mind still an indication for drainage. I waver somewhat even in certain of these cases, and I have closed a few of them without ill effect. I believe that we will find it unnecessary to drain many of these cases if the source of infection can be rendered innocuous. I believe this to be true both because of the clinical evidence of having seen such cases get well without drainage and because I am skeptical of the degree of general drainage of the abdominal cavity that may be obtained by practical methods. I have pointed out that the earlier attempts at extensive sewage systems resulted in failure. Now when we limit the amount

of drainage we get hardly more than a local effect. It is a fatuous hope to drain the abdominal cavity by introducing a tube into the pelvis, or indeed into any other region of the abdomen. In my opinion we are still much misled by the idea of drainage as applied to the abdominal cavity. Any foreign body within the peritoneum speedily excites adhesions which cut it off from the general cavity. Especially is this true when the peritoneal surfaces are already inflamed. The function of any sort of drainage placed among the intestines rapidly becomes purely local. For a few hours it may serve to a limited extent as a general avenue of discharge, but this soon ceases and the discharge becomes usually thin and watery, being nothing more than an exudation from the walls of the drainage tract. I have not infrequently seen such drainage from a tube when there was a large amount of unconfined pus in other areas of the abdomen. This fact also has a bearing upon the ideas in regard to the relief of tension, almost a cant phrase nowadays. In desperate cases it is not so uncommon to find a high degree of tension with accumulation of pus in spite of tubes introduced within the abdomen. Thus, when the surgeon is cajoling himself with such ideas of scientific assistance he may be doing very little to affect the result. These facts confirm me in my belief in little drainage, skilfully placed and quickly removed, as its effect becomes local rather than general.

Another misleading term is drainage as applied to gauze, the true use of which is to isolate necrotic areas or dangerous foci of infection from the general cavity and establish a tract opening upon the outer world. When used as drainage it more often defeats its purpose than it accomplishes it. Sodden, pus-soaked gauze is an obstacle to the flow of secretion instead of a conductor. As I remarked long ago, a cigarette drain is an excellent thing when there is nothing to drain.

In the treatment of free pus within the abdominal cavity, then, we are obliged to rely very largely upon the powers of the peritoneum to care for itself. We may aid by the evacuation of an excess of pus at the time of operation, and by means

of drainage we may secure a sustained effect for some hours. This is undoubtedly very important for many cases and should be done, but in many others it is not essential, and in those which are benefited we often aid nature but little in the disposal of pus and infection already present.

The advisability of washing away the exudate at the time of operation is, of course, another point to be considered here.

I am aware that free general irrigation, local irrigation, wet sponging, dry sponging, and no irrigation, all have their strong adherents well fortified with opinions and statistics. I feel, however, that any strenuous measures directed towards removal of exudate already present are but an expression of the old tendency to do too much and rely too little on nature. While Blake and some others have reported excellent statistics obtained under the irrigation treatment I am convinced in looking over the statistics reported by many workers that those who do not irrigate get the best results. I have been better satisfied since I abandoned it some years ago. My objections to irrigation in brief are that:

1. It consumes time that we cannot afford to lose.

2. It diffuses infectious material, a serious matter in generalizing peritonitis where there may be extensive areas of peritoneum as yet unaffected.

3. By causing us to manipulate the bowels it has a tendency to promote paresis.

4. My own experience, and I believe the combined experience of operators all over the world, show a higher percentage of cures without irrigation.

I do believe it to be good practice to aspirate any collection of fluid in the pelvis, or elsewhere, that is accessible, or to absorb gently with gauze any highly foul or purulent exudates about the source of infection, but to wash extensively or to go on any extended tour of the abdomen seeking for exudate to clear away, I believe is wrong.

One other suggestion. I have observed in certain desperate cases with large amounts of vicious pus in the cavity that a long incision partially approximated and overlain with gauze

to retain the intestines permits a marked escape of exudate and seems to relieve abdominal tension in a far more satisfactory way than a single tube or multiple tubes brought out through an angle of the incision.

Dr. Walter G. Elmer inquired as to the value of abdominal irrigation especially in connection with stab wounds or gun-shot wounds of the abdomen in which the intestines have been completely severed. In such cases the surgeon has to deal with a very low grade of infection—the colon bacillus—which in its normal state is not virulent.

In regard to operating for appendiceal abscess and not removing the appendix he related the case of a trained nurse who undoubtedly had an appendiceal abscess but persistently objected to operation on the plea that her appendix had been removed. When, after much persuasion, the abscess cavity was opened the appendix was found inflamed and gangrenous, although the patient had been under the impression that it had previously been removed. He thought it would therefore always be better to tell patients when after such operations the appendix is left undisturbed, in order to prepare them if necessary for future developments.

Dr. John B. Deaver remarked, relative to the question of subdiaphragmatic abscess, that he had seen a large number of such cases. He had never seen a case of subdiaphragmatic abscess without some effusion in the pleura of corresponding side. The best way is to early resect the ninth rib; do not wait until the case is far advanced.

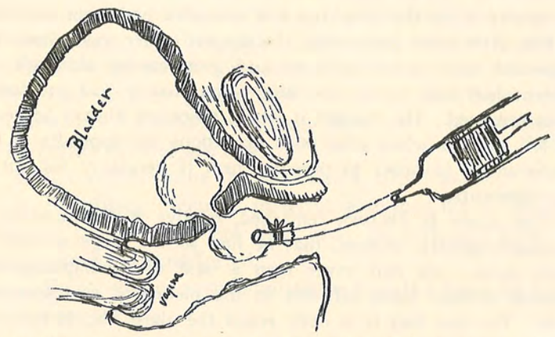
In the 70 cases of peritonitis he reported a bacteriological examination was made and a pyogenic organism found. Many were sick more than 40 hours. He maintained that if every case of peritonitis in the lower abdomen, particularly of the appendix, the gall-bladder and the pelvis, was operated upon within 40 hours of its onset, the mortality would be very small, probably 1 per cent. When the peritonitis has lasted for 50 hours the mortality begins to crawl up.

He had learned that a circumscribed appendiceal abscess where the appendix is not accessible is better treated without the removal of the appendix. There was a time when he did what Murphy had recommended, open the peritoneum, pack with gauze

above the abscess and take out the appendix. He did this before Murphy recommended it and stopped doing it long before. In the majority of cases, say 45 out of 50, one will be able to remove the appendix, but there will be one case every now and then where the appendix had better not be removed.

As to drainage in stab wounds of the peritoneum, he had operated upon very few such cases. He had one case not long since of rupture of the intestines where suture was required. He no longer washed such cases out, but wiped them. He was not as much afraid of fæces in the peritoneal cavity as he was of pus. He was not afraid of the colon bacillus in the peritoneal cavity unless associated with pus.

FIG. 1.



Temporary closure of vesicovaginal fistula by distended rubber finger-cot, for cystoscopy

PLUGGING A VESICOVAGINAL FISTULA.

DR. GEORGE ERETY SHOEMAKER reported the history of a woman in whom a large tumor of the kidney was bleeding so freely as to choke the bladder. It was decided not to attempt removal of the offensive decomposing clots with an evacuator, with the probable necessity of repeating the operation as hemorrhage continued. The hæmoglobin was already 25 per cent. and infection of the kidney imminent. A vaginal opening was therefore made into the bladder and the clots removed, after which frequent irrigation easily made the field clean. It was now

necessary to prove the sufficiency of the opposite kidney. Any one who has tried to cystoscope the collapsed bladder with a fistula in it will appreciate the problem. The following procedure was adopted with entire success.

With the assistance of Dr. Laws the end of a piece of rubber tubing was lashed tightly into the open end of a thin rubber finger-cot. The collapsed rubber bag thus made was pushed part way through the fistula so that one-half was in the bladder, the other half in the vagina. On distending the rubber bag with water the two ends dilated while an isthmus formed at the site of the fistula, holding the appliance in place. The valve-like action made a tight closure. Water was now injected into the woman's bladder and the cystoscope used as usual. By watching the spouting of blued urine from the two ureters it was determined that one kidney was doing nearly all the work. Nephrectomy was successfuly done. The fistula was afterward closed under local anæsthesia, using eucaine and adrenalin.

It was found experimentally that it was not difficult to keep this patient dry with this apparatus for some hours by clamping the tube. However, when her bladder contracted after normal urination there was a tendency to drive the fluid out of the inner sac and thus displace the appliance. Of course a longer and larger bag can be used for a larger fistula.

SUBPHRENIC ABSCESS FOLLOWING APPENDICITIS.

DR. JOHN H. JOPSON reported three cases of subphrenic abscess secondary to appendicitis, as follows:

CASE I.—M. M., male, aged 40, was operated upon at the Presbyterian Hospital in August, 1906, for an acute gangrenous appendicitis and diffuse peritonitis. Removal of the appendix, drainage, Fowler position, enteroclysis. The abdominal symptoms were promptly relieved. The temperature, however, continued elevated between 100–102°, without marked increase in pulse or respiration, while the general condition was excellent.

Failing to find evidences of accumulation in the lower abdomen, and flatness being present over the lower lobe of the right lung, posteriorly, puncture of the pleura was practised on the seventeenth day, with negative results. Dulness persisted, but characteristic physical signs were absent. Patient's condition

continued good and diagnosis by exclusion pointed to subphrenic collection, which diagnosis was confirmed by Dr. W. E. Hughes four weeks after operation. On the following day, before operation could be performed, the abscess discharged through a bronchus, much pus was expectorated, and the patient experienced characteristic shock with high fever, accelerated pulse and anxious expression. Aspiration in the ninth inner space gave pus from beneath the diaphragm, and operation under local anæsthesia, twelve hours later, showed the pleural cavity the sight of much recent effusion, and a subphrenic abscess, which was drained by transpleural route. Recovery followed.

No pleural or pulmonary infection or irritation were present until rupture occurred, and the prolonged elevation of temperature and the modest physical signs at the base of the right lung were the only danger signals present before rupture and pulmonary shock developed.

Case II.—Catherine T., aged 8, white, was operated upon at the Presbyterian Hospital, September 9, 1909, for acute appendicitis of two days' duration. The appendix lay well above the crest of the ilium, in the posterior position. It was perforated, gangrenous, lay in a moderate sized abscess, and was removed. Counter opening made in the loin, drainage by tube and gauze instituted. Pleural friction rub developed on the right side the following day, and twelve hours later there were fine râles over the same area posteriorly.

For three days the temperature continued elevated, pulse rapid and irregular (140–160), respirations from 40–48, and she was delirious. There were râles and harsh breathing over the right base posteriorly. Her condition then improved somewhat, but the temperature remained at about 100, pulse and respiration still rapid. There was dulness as high as the scapula on the right side, fine râles, and a loose cough. A small fecal fistula was observed in the posterior wound; otherwise the abdominal condition was satisfactory. The diagnosis was bronchopneumonia. On the fourteenth day her condition was noted as not so good. She had lost much flesh, took her nourishment poorly, temperature ranged from 99–101, physical signs in the chest remained the same, diarrhœa was present. Tuberculosis was suggested by a medical colleague. On the eighteenth day the subphrenic space

was aspirated, in the ninth inner space posteriorly, and foul, thick pus was evacuated. Operation refused, but consented to on the following day.

Operation was performed on the nineteenth day after primary operation. Posterior transpleural drainage by resection of ninth rib behind postaxillary line. Pleural cavity contained no effusion, but wall was gray and œdematous. Suture of parietal and visceral layers of pleura, and further protection of pleural cavity by packing. Large abscess found beneath the diaphragm extending as far toward the median line as the vertebral column. Operation well borne. Death from exhaustion the following day.

In this case there were symptoms of pleural inflammation, and later of consolidation in the right lung. Moderate, persistent elevation of temperature, rapid pulse and respiration, and later rapid emaciation.

Counter opening at the first operation was made by reason of the high location of the appendix, with the deliberate intention of avoiding a subphrenic infection. This it failed to do, or, more probably, such infection was already present. The symptoms closely simulated those of septic pneumonia. The prolongation of the process and the rapid emaciation indicated the subphrenic location of the infection. Had aspiration been practised earlier, it is possible that recovery might have resulted. No postmortem was obtained and we cannot say, therefore, whether a pneumonia had been present or whether the symptoms were only those of subphrenic abscess and secondary pleurisy.

Case III.—Mrs. Ada V., aged 25, was operated upon at the Presbyterian Hospital, June 29, 1909, for acute appendicitis of three days' duration. The appendix was perforated and gangrenous, pointed upward beneath the liver, almost touching it, and extending deeply into the right subcostal region. There was an abscess at this point, a large collection of pus in the pelvis and free pus all through the right side of the abdomen. Tube and gauze drainage from right subhepatic space to pelvis. Murphy-Fowler after treatment. Right-sided pleurisy developed promptly after operation with slight increased dulness over lower chest posteriorly. Temperature remained elevated with brief remissions, ranging from 100–102. There was profuse purulent discharge from the wound; pus was washed out in large quantities,

especially from the upper tube. Secondary posterior drainage was considered, but gradual diminution of discharge, occasional remissions of the temperature, and the fact that the general condition remained fairly good decided against it. The temperature fell to normal after three weeks, but rose again, and on July 31 patient expectorated small amounts of pus of decided odor. There was flatness to the ninth rib posteriorly and forward to the postaxillary line. No alteration of area of dulness on change of position, diminished fremitus over the area. Discharge of pus was much diminished. There was evidently a subphrenic collection, and operation was deferred for a day or two on account of moderate shock. There was rapid improvement, however, and the abscess finally drained itself; small amounts of pus being expectorated, the greater portion being washed out through the tubes. Aspiration of the pleura on one occasion gave only serum. The patient made a tedious recovery, with final complete return to robust health.

A study of this case shows that following appendiceal perforation and abscess in the subhepatic region there were prompt development of pleural inflammation, as shown by the usual symptoms: friction rub, pain, etc., a prolonged period of moderate fever, the development of a subphrenic collection which was evacuated partly through the lung, but mainly through the drainage tract. Aside from some loss of flesh, constitutional depression was mainly conspicuous by its absence, except on two or three occasions when shock and pulmonary irritation were marked, notably when pus was evacuated through the bronchi.

Some criticism might justly be made, because secondary drainage of the subphrenic space was not instituted. Temporary improvement, however, occurring on each occasion when operation had been decided upon, resulted in postponement, and the patient was finally fortunate enough to escape without a transpleural thoracotomy, which while a comparatively simple and easy operation in itself, is attended by certain manifest risks. Nor could this case fairly be classified as recovery of an unoperated case. Drainage vicarious but finally successful through the long tract between the abdominal wound, the posthepatic and subphrenic regions was present from the first, and comparatively a small amount of pus perforated the diaphragm and bronchus and was expectorated.

Dr. Jopson remarked further that subphrenic abscess is a rather infrequent complication of appendicitis. Elsberg collected 73 cases and Eisendrath added 33, a total of 106 cases reported up to 1908. Weber noted it in 9 cases out of 350 cases of appendicitis, and Moschowitz found it 8 times in 2000 cases in the Mt. Sinai Hospital. Appendicitis ranks according to most authors after gastric and duodenal ulcer, as the most frequent cause of subphrenic abscess, one-third of the cases being due to perforated ulcers around the pylorus, and one-sixth to appendicitis. Of the seven cases of subphrenic abscess which he had seen, in three it followed peritonitis from perforation of the appendix. The splendid paper by Barnard in the *British Med. Journal* in 1908, was a noteworthy contribution to the anatomy of these and other types of subphrenic abscess. The majority of subphrenic abscesses from appendicitis are intraperitoneal, the pus finding its way upward behind the cæcum and colon, and the position of the appendix has much to do with favoring such a course. The posterior position of the appendix, and especially a high location, places the abscess in the most favorable site for invasion around the liver to the subphrenic space. An extraperitoneal collection on the right side may form between the layers of the coronary ligament, which it separates, being continuous with the retroperitoneal tissue below, as Barnard emphasizes; an appendiceal collection which takes an upward course may reach it and become subphrenic without perforating into the peritoneal cavity. In the early stages, in cases of intraperitoneal infection, the process is diffuse, later the collection is walled off, forming a localized abscess. Hence, the advantage of postponing operation by the transpleural method in the early stages. The abscess at this time is small in size, deeply situated under the dome of the diaphragm and consequently difficult of access by this route. In the early stages the lumbar route is to be preferred. Occasionally the abscess will point in the epigastrium, and is conveniently opened there. In the majority of cases of any standing the abscess grows in size, pushes the lung up, the costophrenic sinus of the pleura is obliterated and posterior thoracotomy with drainage through or below the pleura is to be preferred.

Posture is an important factor in the development of subphrenic infections. Lymphatic drainage in the abdomen is upward

through the diaphragm. In addition to this the subphrenic space is a natural anatomical pocket when the patient is in a recumbent position; hence, the influence of gravity in spreading infection to this neighborhood, and hence, also the advantage of the Fowler position in overcoming it. Unfortunately, infection has oftentimes reached this point before the case comes to the operating table, especially when the appendix is in the position already described.

As is well known the *symptoms* of such collections may be acute or chronic. In the very acute cases the temperature is often markedly elevated, the pulse may be very rapid, and severe pain, nausea, vomiting, with chills and sweats and the acute constitutional symptoms of sepsis may be conspicuous features. The points he would emphasize, however, are, that a moderate continuous elevation of the temperature, a pulse little if any above the normal, an entire absence of abdominal symptoms, and a physical expression of comparative comfort and well-being are to be recognized as not inconsistent with the presence of a subphrenic abscess. Owing to adhesions of the liver to the diaphragm the liver is not often displaced downward, at least anteriorly. Most of the physical signs are to be looked for in the chest, except in those cases where the abscess bulges forward in the right hypochondrium, forming a swelling in that region which occurs when the subhepatic space is involved. Otherwise, compression and inflammation of the lung, due to an upward projection of the abscess, are produced.

In regard to the *diagnosis* of subphrenic abscess from pleural effusions and pulmonary consolidations, it has been his experience that reliance on text-book descriptions, and the attempt to elicit the finer shades of distinction as to the exact shape and definition of areas of dulness, may be fallacious and lead to error, even on the part of the most skilful clinicians. It is not to be wondered at, therefore, that one's faith in physical signs is sometimes shaken.

Dulness over the base of the right lung posteriorly is a valuable sign. If it occurs in connection with diminished tactile fremitus, and a continuous elevation of the temperature, without adequate explanations in the abdomen, following an appendiceal operation, one may suspect that a subphrenic collection is present. The most frequent association of physical

signs in these cases is said to be dulness with limitation or absence of breath sounds, vocal resonance and tactile vocal fremitus. The area of dulness is convex upward, unless gas be present. In the latter case tympany overlies dulness, and amphoric and coin sounds are presumably present. Immobilization of the thorax on the same side is sometimes noted, with cough and expectoration. Of course, the expectoration of pus is confirmative, but it is much to be desired that the diagnosis be made before this stage is reached; not only because sepsis may be much advanced, but because, as it has been his experience to see several times, the rupture of pus into a bronchus either from empyema or subphrenic abscess is attended by a degree of shock which makes operation at that time highly unfavorable.

Barnard did not find either friction sounds or râles present with any great frequency in his series, but the occurrence in two cases under Jopson's observation, of pleurisy and evidences of pulmonary involvement almost immediately after operation, and both in cases where infection was present in the subhepatic region from the time of rupture of the appendix, makes him inclined to believe that these symptoms are of some diagnostic value.

In cases of doubtful diagnosis the use of the exploring needle is of paramount importance; and its use at an earlier time than usually practised would undoubtedly result in saving a larger percentage of cases. If pus is found on aspiration of the subphrenic region below the ninth rib, operation must be at once proceeded with, as leakage and infection of the pleura through the needle puncture will almost certainly ensue if the costophrenic sinus has not been obliterated by inflammation. This occurred in Case I. Fortunately such obliteration often takes place early, and the drainage of the abscess can then be accomplished without risk of infection of the general pleural cavity. In a case of subphrenic abscess in a child reported some years ago by Dr. Jopson, the abscess had pointed through the diaphragm, both layers of the pleura and the chest wall, forming a collection outside the lateral wall of the thorax without infection of the general pleural cavity.

With few exceptions posterior thoracotomy is the route to be chosen in draining these abscesses. Many cases can only be reached by a transpleural operation, and if care be used in suturing the visceral pleura and the diaphragm to the intercostal

muscles and further protecting the pleura by gauze before going through the diaphragm, serious infection of the pleura will usually be avoided. In this connection the subpleural methods of Elsberg and Eisendrath may be mentioned. The operation itself is a simple and easy one. It is the condition for which operation is done that makes the prognosis so serious and which furnishes the 25 per cent. mortality. High as this mortality is, it is lower than that of subphrenic abscess in general, which is estimated at from 35 to 42 per cent. in operated cases.

It is interesting to note that in children the mortality from subphrenic abscess is less than it is in adults. In 1903 Jopson collected 23 cases in patients under fifteen years of age. The mortality in 15 cases in whom operation was performed was 13.3 per cent. The explanation of this is probably to be found in the fact that appendicitis is the most frequent cause of subphrenic abscess in children, in whom perforation of gastric and duodenal ulcers with their excessive mortality is rare. In seven cases of this series, appendicitis was the cause of the infection. Most of the other causes active in adult life were present occasionally.

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