differentiating fever caused by the pyogenic bacteria from typhoid fever, tuberculosis and malaria. Also the leucocyte count is of great assistance in the diagnosis of the leukemias. Of course, along with the leucocyte count, an examination of the stained specimen of blood should be made.

The red blood count can also be readily done by physicians away from the laboratory, and though a longer process, the technic is as simple as that of the white count.

Another laboratory test which is much neglected and which is simple is the microscopic examination of the stools. By this method embryos and adult parasites are readily recognized, and eggs of parasites are quite readily distinguished, even by those who do not see them frequently. Another test of value for the practitioner who cannot keep a live culture of typhoid bacilli always at hand is the macroscopic Widal test. This test seems to be nearly as accurate as the microscopic Widal test.

The amount of equipment necessary to do all these tests mentioned by Dr. Cummings and myself is by no means large. A dozen re-agents will cover all the needs in that line, and in addition there must be a little preliminary outlay in blood counters, Bunsen burners, centrifugal machine, platinum loop, etc. Space sufficient for a small shelf in a closet, a sink and a table for a microscope are all that is necessary.

SUPPURATIVE PERICYSTITIS.

BY ARTHUR L. CHUTE, M.D., BOSTON.

IN April, 1908, I removed two calculi, presumably phosphatic, from the left kidney of a man thirty-seven years old. He had been refused life insurance five years before because of the condition of his urine. More recently he had had attacks of vomiting that had been unattended with edema. He had never had any venereal trouble.

When I saw this man he was very pale and pasty, and looked "renal." He was passing about 50 oz. of pale, turbid urine, having a specific gravity of 1008. This urine contained a large trace of albumin and was deficient in urea (.76%). The sediment, which was abundant, was mostly pus, but contained a few casts; it also contained two different varieties of organisms, a large bacillus and a small coccus, the latter in small numbers. Tubercle bacilli could not be demonstrated either in stained specimens of the sediment or by means of guinea pig inoculations.

Examination of his bladder showed a chronic cystitis. The right ureter gave on catheterization a non-infected urine that contained a few leucocytes; the left, a urine that contained much pus and many organisms. A radiograph showed the presence of calculi in the left kidney.

After his nephrolithotomy this patient made a slow recovery. He had occasional attacks of vomiting and his urine continued turbid; it was at times very foul. During his convalescence he developed a bronchitis and also a mild pleurisy, but, in spite of these complications, his lumbar wound closed about the thirtieth day. Four or five days later (May 16) he was allowed to go

home. Between the time his sinus closed and the time he went home his evening temperature, which had been normal, went to 100° on two occasions. During these days he also complained of bladder irritability, but I could see no definite cause for this, and considered it some unimportant recrudescence of his cystitis.

On May 20, four days after he reached home, his loin sinus opened and discharged a little urine. He complained of painful and frequent, as well as of difficult, urination, though his urine was less foul than it had been. He complained of some pain over his bladder and of considerable pain in his rectum. There was suprapubic tenderness and his prostate seemed larger and more tender than normal. He had a moderate temperature. I believed this man had a lighting up of his cystitis accompanied by an acute prostatitis, and advised palliative treatment. The patient's condition kept on much as above, the temperature varying from 100.5° to 103° until May 23. I had the feeling that I had to deal with what would prove to be a prostatic abscess and would probably open spontaneously into the urethra or rectum. On May 23, in addition to his frequent and painful urination, rectal pain, temperature and suprapubic tenderness, he developed hiccup which was difficult to control. Beside suprapubic tenderness he now showed a definite mass above the pubes that corresponded in contour and location with a distended bladder. A catheter showed that his bladder was not full, though micturition was incessant, difficult and painful. There was by rectum a tender mass that I still believed to be prostate.

The next two days were attended with less pain, and his general condition seemed to improve somewhat. Up to this time the patient did not have the appearance of being a particularly sick man, and I had entertained no question as to the outcome of his trouble.

On the 26th of May this man had the appearance of being decidedly ill. An examination under ether, at which time Dr. F. B. Lund saw the patient with me, showed two fluctuant points that proved to be not in the prostate, but above and below it, the prostate itself being uninvolved. The bladder was indurated and had the feeling of being much thickened and distended. It was not until this time that the true significance of the condition became evident. Before this I had supposed that I had to do with two coexisting conditions, a developing prostatic abscess and a very acute lighting up of a chronic cystitis.

The fluctuating points were opened and a considerable amount of foul pus evacuated. Tubes were inserted into the abscess cavities, and though there was considerable drainage through these tubes, the mass above the pubes was unaffected. The patient failed steadily and died thirty-six hours after operation. There was no autopsy.

This case illustrates one of the rather unusual types of bladder disease, unusual enough to be commonly overlooked at first, and to be considered either as an inflammation of the prostate or a very acute cystitis.

Englisch, in 1889, took up the question of suppurative pericystitis in a classic monograph that he wrote on inflammation of the space of Retzius. He treated the subject with such thoroughness that I think no really new facts have been contributed since that time. In this type of disease an infection followed by suppuration takes place in the zone of loose tissue surrounding the bladder. This condition has been called by various names. Suppurative pericys-

titis, suppuration of the prevesical space and phlegmon of the space of Retzius are the names most commonly used. This type of disease is much more common in males than in females. It has been noticed from infancy to old age, but is relatively rare in the young.

As has been said, these suppurations follow an infection of the loose pericystic tissue. Most instances of infection and infiltration of the pericystic tissue do not terminate in suppuration, but in resolution. Examples of these infiltrations of the space of Retzius that do not go on to suppuration are reported by Englisch, Hitchcock, Necker, Bierhoff, Thiem and others. The proportion of cases in fact in which suppuration takes place in infections of the prevesical space is probably small. I have only recently had under my care a man who, following prostatectomy, developed what I believed to be an infection and infiltration of the space of Retzius. The process did not go on to suppuration, but slowly resolved, and that, I believe, is the rule with these infections.

There are a certain number of infections of the pericystic tissue that are tuberculous. They are less common than the non-tuberculous infections, and have been well described by Misiewicz. They do not come into consideration in connection with the reported case, and I shall make no further mention of them.

The non-tuberculous infections of the prevesical space may come about in a variety of ways. There are infections that take their origin from lesions of the urinary tract, either by direct extension (Hallé), or by way of the lymphatics (Imbert). There are other cases in which some traumatism seems to play a part in bringing about the infection (Englich). In some cases the infection extends by continuity or by the lymphatics from foci of disease situated in the vicinity of the bladder; sometimes in the abdominal cavity, sometimes in the pelvis (Michels, Brun, Blondel). In a considerable proportion of these cases of suppurative pericystitis the infection is presumably brought by the blood stream (Englich and Pauzat). In some of these blood-stream infections the focus from which the infection comes is perfectly evident; in others it is not.

The numerous causes of suppurative pericystitis have led some writers, notably Englisch, to divide the cases into a considerable number of classes. Thus in the article just mentioned, the inflammations of the prevesical space are divided into the idiopathic, traumatic, metastatic and symptomatic. I do not see that such an elaborate classification is of any particular advantage and would suggest that a division into the processes of urinary origin and those of non-urinary origin would be much simpler and probably quite as valuable. Hallé has suggested that the cases of pericystitis as a whole, not the suppurative type particularly, be divided into the "true" and the "false"; that one base this division on whether the bladder was or was not the source of the infection.

The pericystic infections that are of urinary

origin naturally have the greatest interest for us. It is said of these urinary infections that the prognosis is worse than in the cases in which the infection is brought by the blood stream. The reasons given for this are these: there is usually a large supply of infecting organisms; the patient's resistance is often reduced owing to a long and debilitating illness; not infrequently there may be a co-existing pyelonephritis, due also to extension from an infected bladder.

Infection of practically any part of the lower genito-urinary tract may lead to this infection of the prevesical space. It has even followed an ulcerated wart on the glans (Imbert). It has followed various sorts of lesions of the urethra, but more particularly urethritis and stricture (Englich, Meignant). According to Imbert, the glands in the prevesical space are in intimate connection with the lymphatics that drain the lower urinary tract. It is said, but I believe that it is based largely on theoretical grounds, that a focus in the prostate is less likely to lead to an infection of the space of Retzius than a suppuration in the other parts of the lower urinary tract. The reason given for this is the dense fibrous coverings of the prostate.

The bladder has been rather the favorite starting point for these infections. It has been suggested that infections of the surface of the bladder have two ways of getting into the prevesical space: By the lymphatics at times (Imbert), but most often simply by the infection extending directly through the bladder wall into the loose pericystic layer (Hallé).

These suppurations seem to begin by preference in the prevesical space just behind the pubes. The prevesical space, or space of Retzius, is a layer of loose tissue that almost surrounds the bladder. Its function is to allow the increase and diminution in size of the bladder. It is a potential or possible space, and becomes a real space only under pathological conditions, when the loose tissue is destroyed by suppuration and the cavity filled with pus.

This beginning just behind the pubes seems to be the rule in the cases in which the infection is by means of the lymphatics; also in those in which the infection is by the blood stream. When, on the other hand, the infection extends through the bladder wall directly, it may reach the pericystic layer of tissue at any point. Even in this last condition, the extension to the region behind the pubes is usually rapid. Occasionally, as in the case I have reported, the suppurative process may appear to be most marked and most advanced at the bladder base.

When a suppuration beginning behind the pubes goes on to involve the loose tissue at the base of the bladder, it is probable that the extension takes place along the anterior wall of the bladder rather than along the posterior wall. Englisch believes that in those instances where the suppuration reaches the bladder base it extends between the bladder and the pubes, passing on either side of the prostate. It is his opinion that what he calls the ligamenta vesico-

umbilicalia offers a considerable opposition to the spread of the suppuration posteriorly. I have nothing to offer either to substantiate or refute this view.

In cases where the suppuration is extensive the bladder may be nearly surrounded by a sac of pus that has replaced the prevesical areolar tissue. In more extreme instances the suppuration may involve the whole iliac fossa (Pauzat) and even dissect up behind the peritoneum as far as the kidneys (Englisch).

The symptoms of this condition depend to a considerable degree upon the cause of the suppuration. All cases practically present a temperature and the other signs of an infection. Usually the signs are those of an infection of moderate severity, but sometimes the signs are those of a pretty marked sepsis, as shown by chills, sweats, diarrhea and delirium. There is suprapubic pain that varies much in degree, and also tenderness over the pubes. There is usually marked disturbance of urination, and in cases of urinary origin the urine itself shows changes. In the cases that are of non-urinary origin, urination is usually disturbed though the urine itself may show no changes. Rarely, both the urine and the function of urination are normal.

In cases such as Michels and Brun have reported, cases in which the suppuration spreads to the prevesical space from a neighboring intra-abdominal focus, the early symptoms have naturally been those of the original trouble and have differed materially from the symptoms shown by cases that have been of urinary origin.

The hematogenous infections are often puzzling. For a time they may present simply suprapubic pain and tenderness, with frequent and painful urination, and sometimes with a normal urine. When the urine is perfectly normal, as has been the case in some of these blood-stream infections, it is almost impossible to make a diagnosis before the appearance of the mass above the pubes. Suprapubic pain and tenderness are usually the first local signs of a pericystic inflammation. The suprapubic mass makes its appearance shortly after, though at times this may come only after an interval of some days. The more acute the process, the earlier this mass appears. This mass can usually be felt very plainly above the pubes, but bimanual palpation may show it even more distinctly.

The appearance of a mass above the pubes is practically the point upon which one depends in nearly all cases for establishing his diagnosis. It should, perhaps, be possible in some of the cases that begin in the pericystic tissue at the side or near the base of the bladder to recognize the condition from the areas of induration or fluctuation that are to be felt by rectum. There will usually, however, be an uncertainty about the significance of these masses that does not exist with the suprapubic mass. The mass felt above the pubes has the feeling, if palpated casually, of a distended bladder. When examined more carefully, it may show a slightly uneven surface, due to the slightly lobulated condition of the tissue

of the prevesical space. It will be seen also that the mass broadens, or tends to broaden, just above the pubes, in a way that a distended bladder does not do. The passage of a catheter and the finding that emptying the bladder makes no change in the mass is the crucial test in distinguishing between a full bladder and a pericystic infiltration. Some writers have likened the mass felt in these prevesical indurations to that of a pregnant uterus.

When a suppurative pericystitis is of urinary origin it should be possible to recognize it more readily than when it is not of this origin. It may be possible, perhaps, to recognize it even before there is a marked suprapubic induration. It has been said that when a temperature appears without evident cause in a chronic bladder infection we may feel sure that one of two things has taken place: either the infection has extended to a kidney pelvis, or to the prevesical space.

While a suprapubic mass, such as I have described, is pathognomonic of a pericystic infiltration, it is not necessarily so of a pericystic suppuration. Where there is an extension from the main suprapubic mass up toward the umbilicus, along the course of the obliterated hypogastric vessels and urachus, it is pretty definite proof that suppuration has taken place. The presence of suppuration is evident when there is fluctuation, but fluctuation, though sometimes seen, is not common in this condition. When the skin is red and adherent, one is of course sure that suppuration exists. The presence of a considerable leucocytosis should be a help in differentiating between an infiltration and suppuration of the prevesical tissues, as should chills or an irregular temperature. In some cases, as in mine, there may be fluctuant points to be felt by rectum; in others one may have to use an exploring needle to determine the presence or absence of pus. It is probably better to make an incision into the prevesical space in cases where doubt exists rather than to wait an unduly long time to demonstrate definitely the presence of pus.

Beside the definite points of infiltration that one may feel by rectum, there may be masses of infiltrated tissue or a thickening of the bladder base. It has been a common mistake to consider the infiltrations and fluctuant points that are felt by rectum as having to do with the prostate rather than with the pericystic tissue. I believe this error is avoidable if one bears in mind the possibility of these pericystic inflammations giving rise to masses that may be felt by rectum.

In arriving at a diagnosis, one may have to consider a considerable number of conditions, some of which I will mention briefly. Suppurations in the sheath of the rectus muscle are usually confined to one side, which is not the case in suppurative pericystitis. Suppuration of the pyramidalis muscle is ordinarily of bony origin and usually confined to the sheath of the muscle. Suppuration of the subperitoneal tissue is more superficial and more diffuse than what we see in the pericystic suppurations.

Cases of pelvic peritonitis may usually be dis-

tinguished by the history and the fact that the pain and tenderness are not localized just above the pubes. In some instances, however, a suppurative pericystitis has followed upon a pelvic inflammation. Retention of urine is ruled out by the fact that the mass above the pubes does not disappear when the bladder has been emptied by a catheter. It may be difficult to rule out acute prostatitis at the onset, but it should be easy to do so as soon as the suprapubic mass makes its appearance.

New growths do not, as a rule, have a temperature. A diverticulum on the anterior bladder wall can be easily ruled out by a cystoscopic examination.

The prognosis in the cases of urinary origin is, as I have said, supposed to be somewhat less good than the prognosis in the cases that are not of urinary origin. This better prognosis of the non-urinary cases applies only, I believe, to the cases in which the infection is by the blood-stream. The prognosis of the cases that are secondary to some neighboring abdominal lesion naturally depends largely on the nature of the primary process, and will be very grave in a considerable proportion of cases. Thus, in one case cited by Michels, a cancerous coil of intestine adhering to the bladder had caused the pericystic suppuration; in one, Brun cited an appendix abscess had infected the prevesical tissue. Both of these cases were fatal.

There have been a considerable number of cases in which recovery has come about without any surgical intervention. In such cases the pus collection has opened spontaneously. Above the pubes, and in the region of the umbilicus, have been the favorite places, while in other instances the pus has been discharged into the bladder, rectum or vagina.

Because induration of the prevesical space very closely resembles suppuration, as shown by the number of instances in which an incision has shown no pus, it is impossible to be sure that pus was present except in cases in which it was either demonstrated by operation or by spontaneous rupture.

In the cases that terminate fatally the fatal outcome in a considerable proportion of the cases is the result of pus breaking into the peritoneal cavity and setting up a generalized peritonitis. In a lesser number it is due to septic absorption from the abscess cavity.

In the matter of treatment I believe but one thing can be advised, that the collection of pus be drained, and as early as possible. The incision should by preference be just above the pubes and be carried well down into the pericystic tissue. Should there be fluctuant areas to be felt by rectum, they should be drained. In a case such as the one I have reported, where there were foci to be felt by rectum, it is a question whether in addition to opening these, one should not also make a suprapubic opening. Though in the reported case drainage was profuse, it is doubtful if it was adequate. Though Meignant, Pauzat, Lang, Pasteau and many others report cases that

have recovered after operation, yet the number of reported cases is too small to allow one to compile useful statistics.

CONCLUSIONS.

Suppurative pericystitis is a somewhat uncommon condition in which suppuration takes place in the zone of loose tissue above the bladder, and in which either a part or the whole of the space of Retzius becomes a veritable abscess cavity.

In a large proportion of cases the infection is secondary to some disease of the lower urinary tract. The infection of the prevesical space takes place by direct extension, or through the lymphatics. In a considerable number of cases of suppurative pericystitis the infection is through the blood stream and may come from a focus existing in practically any part of the body. In some instances the disease is an extension from a neighboring intra-abdominal or intra-pelvic lesion.

The characteristic thing diagnostically is the presence of a mass above the pubes that more or less closely resembles a full bladder but that is unaffected by passing a catheter.

The disease is one that will probably always have a considerable mortality. The disease is of a secondary character and its mortality will depend largely upon the nature of the disease that it is secondary to. The treatment should be free drainage of the pus collection.

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Reports of Societies.

AMERICAN CLIMATOLOGICAL ASSOCIATION.

THE TWENTY-SIXTH ANNUAL MEETING, HELD AT
FORTRESS MONROE, VA., JUNE 4 AND 5, 1909.

(Concluded from No. 12, p. 411.)

DR. JOHN H. LOWMAN, of Cleveland, Ohio: I think one of the growing hopes in the treatment of pneumonia is the gradual recognition of the fact of where the strain lies. Now it can be deduced from much that has been said here to-day that the strain lies upon the right heart, and that venesection and the use of veratum viride are based upon that fact; whereas, from