

The Journal of Obstetrics and Gynæcology of the British Empire

VOL. XXII.

JULY, 1912.

No. 1.

Pelvic Inflammation in Woman.

By N. F. LOCK, M.A., M.B. (Camb.),

Formerly Obstetric House Physician, St. Thomas's Hospital.

THIS paper is based on 118 cases admitted to St. Thomas's Hospital during the year 1911.

The total number of patients operated upon for inflammatory conditions of the uterus and its appendages and the neighbouring peritoneum and cellular tissue was 100. Eighteen cases were discharged from the ward without operative treatment. This proportion obtains as cases are generally admitted with a view to operation. In 30 of these cases the pus found at the operation was examined bacteriologically.

While collecting these cases I noticed that a very definite relation obtained between the organism present and the class of case in which it occurred, and that the type of lesion caused by any one organism was remarkably constant. It is these points that, as far as my small number of cases will allow, I wish to emphasize; and I shall confine myself mainly to a discussion of the etiology and pathology of pelvic inflammation.

I have classified these cases under the headings that appear in the hospital register as follows:—

| | No | | Total. |
|-------------------------------------|------------|------------|--------|
| | Operation. | Operation. | |
| Salpingitis | 29 | 7 | 36 |
| Pyosalpinx and Tubo-ovarian abscess | 43 | — | 43 |
| Pelvic Inflammation | 19 | 9 | 28 |
| Hydrosalpinx | 5 | 2 | 7 |
| Hæmatosalpinx | 1 | — | 1 |
| Suppurating Pelvic hæmatocele ... | 1 | — | 1 |
| Blood cyst of ovary | 2 | — | 2 |
| | 100 | 18 | 118 |

This is the classification that will be used as the basis for analysis in this paper. This classification is far from satisfactory, great difficulty being frequently experienced in deciding to which group any particular case may most conveniently be referred. The group "pelvic inflammation" is frequently the destination of a case which, with fuller information, would be classified under the headings pyosalpinx or salpingitis, and misinterpretations actually occurred in more than one case, as in one where an abscess was first drained by vaginal incision, and subsequently when laparotomy was performed, inflamed appendages were discovered and removed.

Wilson,¹ as the result of an analysis of 307 cases of pelvic inflammation, all operated upon, gives the figures that appear below; and I have classified my cases for the purpose of comparison under the same headings:—

| | Wilson. | Lock. |
|---|---------|-------|
| Puerperal Pyæmia | 6 | 1 |
| Pelvic abscess in cellular tissue | 41 | 10 |
| Pelvic abscess of doubtful origin | 12 | 6 |
| Catarrhal Salpingitis and ðophoritis | 60 | 18 |
| Ovarian hæmatoma | 11 | 2 |
| Hydrosalpinx | 26 | 5 |
| Pyosalpinx | 80 | 27 |
| Pyosalpinx and ovarian abscess | 17 | 15 |
| Pyosalpinx and pelvic abscess | 12 | |
| Ovarian abscess | 14 | |
| Pelvic Abscess originating in Appendages | 17 | |
| Tuberculous Salpingitis | 11 | 4 |
| Hæmatosalpinx | — | 1 |
| Suppurating pelvic Hæmatocele | — | 1 |
| | 307 | 100 |

These figures show approximately the same proportions. With regard to "pelvic abscess in cellular tissue," it will be seen that my 10 cases are fewer in proportion, and, further, I have included in this group cases of abscess of the uterine wall. Wilson does not mention any case of this kind.

It is doubtful whether inflammation of the pelvic structures in the female ever occurs without the presence of micro-organisms.

Dudgeon and Sargent² showed the presence of staphylococcus albus in every one of 17 cases of pelvic hæmatocele, resulting from ectopic gestation, examined by them; and this organism is also found in intraperitoneal effusions of blood, such as result from the rupture of other viscera. Whether the adhesions which form round such an effusion are caused by the action of the organism or by the mechanical irritation of the blood it is difficult to say.

During the year 1911, 18 cases of pelvic hæmatocele were operated

upon; these have not been included in the present series of cases with the exception of one which was suppurating, the infection having occurred presumably from the bowel.

In a large proportion of the more chronic cases of pelvic inflammation no organism can be found by bacteriological methods, as there is a tendency for the organism which caused the condition after a certain time to die out.

The commonest course for the infection to pursue is an ascending one; the organisms gaining access to the genital tract during sexual intercourse and parturition, and, less commonly, during examination and operation.

A descending infection is comparatively rare; it is the common route taken by a tuberculous infection, while occasionally the tubes are infected by the passage of organisms from the appendix, or some other portion of the gut. This sometimes occurs as a reinfection of an old pyosalpinx or salpingitis in which the original causal organism had died out. The pelvic peritoneum and Fallopian tubes are involved when general peritonitis occurs from whatever cause; but the local effects are lost in the general invasion of the peritoneum.

Apart from tuberculosis, the common causes of pelvic inflammation are the gonococcus, and the group of pyogenic cocci and bacilli. The gonococcus in some cases ascends soon after infection as far as the Fallopian tubes, and there gives rise to salpingitis, in the majority of cases double, with consequent sterility. In others, however, after an acute attack of vaginitis or cervicitis, it may apparently become latent, and the patient may become pregnant. The pregnancy may proceed to full term or may terminate in abortion. Then after an interval the gonococcus seems to ascend and reach the Fallopian tubes and give rise to salpingitis. This does not seem to occur till some weeks at any rate have elapsed since the confinement, and it is always questionable whether the patient may not have become infected subsequently to the pregnancy.

The group of septic organisms again falls into two divisions: in one the streptococcus is found, either alone or occasionally in association with other organisms; while in the second a large number of organisms seem to occur indifferently, either singly or two or more together. The former condition occurs in puerperal cases with a history of the onset of symptoms within a few weeks of confinement, and the latter are found in cases when the confinement is more remote. We shall find that these two classes differ as much in their clinical characters as in their pathology and morbid anatomy.

SALPINGITIS.

Thirty-six cases were classified as salpingitis; of these 29 submitted to operation. The remaining 7 were treated with rest and general treatment, an important part of which was the relief of

constipation, which is a factor in nearly all cases. One of these cases, it is interesting to note, has since been operated upon in St. Thomas's Home, suppurating tubes having been removed from both sides and an intraperitoneal abscess drained.

TUBERCULOUS SALPINGITIS.

Four out of the 29 cases were tuberculous, and so form a distinct group. In only one of these was there a family history of tubercle. Two were married women and two were single, their ages being 56, 31 and 21 and 17 respectively. There had been no pregnancy.

The clinical histories were characterized by pain in the lower part of the abdomen more or less continuous, with exacerbations, and dating from some time back; the shortest history being 6 weeks. In two cases the abdomen had been getting bigger recently; one complained of profuse vaginal discharge. One case had been treated 20 years previously for stricture of the rectum. Menstruation was normal in all cases with the exception of one in which slight menorrhagia was complained of.

In one case sanious pus was evacuated through an incision in the posterior fornix. This case at a later date, as well as the three others, submitted to the removal of the appendages by the abdominal route. At operation extensive adhesions were found, both ovaries and tubes being diseased in all cases; these parts were removed, and in one case hysterectomy also was performed.

In three cases the peritoneum covering the gut in the neighbourhood was studded with tubercle.

In two cases convalescence was complicated by the appearance of a faecal fistula. In one of these cases an examination of the pus found at the operation showed the presence of *B. coli* as well as tuberculous material. In the other a small piece of the left ovary had been left adherent to the rectum.

Lea³ describes three cases of tuberculous salpingitis, and lays emphasis on the bilateral character of the lesion in all his cases. He finds that the mucous membrane is the part chiefly affected, and that peritoneal tuberculosis is present in all cases.

Lucy⁴ lays stress on amenorrhœa and leucorrhœa as symptoms of bilateral disease, but this is not borne out by the above cases.

Barlow and Watson⁵ describe three cases. They also find the lesion to be bilateral in all cases. Two of their cases complained of swelling of the abdomen, and in one leucorrhœa was present. They find that the tuberculous nodules are confined to the mucous membrane, and that the process is most advanced at the outer end of the tubes. They conclude that infection is commonly by implantation of tubercle bacilli on the surface of the mucous membrane from the peritoneal cavity, and that thence the spread is by lymphatics towards

the uterus. Infection may also occur by the blood-stream, but this is probably very rare.

SALPINGITIS.

The remaining 25 cases of salpingitis include 15 in which salpingitis—in all cases double—was the only lesion. In 5 cases double salpingitis was complicated by an intraperitoneal abscess, and in two cases by abscess of the ovary. In three cases only was the lesion unilateral, and of these, two really belong to the puerperal group, which will be discussed later, the patients in question having been confined seven and eight weeks previously.

There was one acute case in which pus was found dripping from the open end of the tube, no adhesions having formed.

In 7 of these cases there had been no pregnancies; in 16 there had been one or more full-term confinements, and in 2 miscarriages only. The average number of children born to the patients who had had children, was nearly 3 per patient (18 mothers, 46 children). With the exception of the two cases mentioned above the shortest period that elapsed between the confinement and the onset of the illness was three months in one case and five months in two cases. In the former case there was a considerable degree of cellulitic thickening round the inflamed tubes, and an abscess of one ovary. Two cases followed a miscarriage, which in each case occurred some four months previously. In the majority of cases the onset was one or more years after the last confinement.

The causative organisms of salpingitis, apart from the tubercle bacillus, fall into two classes: septic and gonorrhœal. Great difficulty is experienced in attempting to distinguish between these two classes.

A history of sterility associated with recurrent attacks of pain and discharge is practically diagnostic of gonorrhœal infection. This history was present in 7 cases; in the remaining 18, 6 seemed to refer the disease definitely to septic infection at the confinement by some statement in the history as that the placenta was adherent (in 2 cases), that forceps was used or that there was post partum hæmorrhage. In the remaining 12 cases there is nothing in the history to point to septic infection during labour; but to this point I shall return later.

HYDROSALPINX.

There are seven cases classified as hydrosalpinx; five of these were operated upon. In one the hydrosalpinx was present on both sides; in the other four on one side only, the other tube in all cases showing inflammatory changes.

In one case the condition dated back to an operation performed three years previously for the removal of a fibroid. This patient had never been pregnant. All the remaining patients had borne children,

and in all the symptoms dated back fairly definitely to the last puerperium. These patients presented very similar symptoms to those which obtained in the previous group. In none of these cases did the history suggest gonorrhœa as the origin of the disease.

PYOSALPINX.

Forty-three cases of pyosalpinx came to operation; of these 19 are described as double pyosalpinx, three being associated with intraperitoneal abscess; 11 as tubo-ovarian abscess, three again associated with intraperitoneal abscess. In 13 cases the pyosalpinx was unilateral; in all cases the opposite tube showed inflammatory changes; while in two cases there was an abscess of the ovary. In nine of these cases there was a history of complete sterility. In one case there had been a single miscarriage only; in the remaining 31 there had been one or more children, the average again being nearly three per patient. In two the presence or absence of pregnancy is not recorded.

In attempting to classify these cases etiologically the same difficulties arise as were experienced in dealing with salpingitis. Twelve gave a history definitely pointing to the gonococcus as the cause of the infection; of these women, nine had never been pregnant, while in three cases it seemed probable that gonococcal infection had occurred since the last confinement. In one of these cases the gonococcus was isolated, in another the pus proved on bacteriological examination to be sterile.

One of these nine cases is of peculiar interest, and I quote it in some detail:—

CASE 1. D.W., a single woman of 21, had 3 years ago suffered from an acute attack of right-sided abdominal pain which came on a few days after coition and was accompanied by profuse vaginal discharge. She had never been pregnant.

The present attack started 10 days before admission with pain in the left iliac region and later extending to the right iliac region. The last menstrual period was two weeks late and was accompanied by yellow vaginal discharge and a scalding pain on micturition.

On admission her temperature was 102°. Pulse 108. On examination the abdomen was rigid and tender over the lower half. No abdominal masses could be felt.

At operation turbid fluid was found in the peritoneal cavity. Double pyosalpinx was removed and an abscess in the pouch of Douglas opened. Drainage per vaginam. Abdominal incision closed. On bacteriological examination the fluid from the peritoneal cavity was sterile. The pus contained pneumococcus. The abdominal incision suppurated but healed well afterwards.

Here, apparently, is an ordinary case of gonococcal salpingitis, and, but for the results of bacteriological examination, would have been classed as such. I have not been able to find any similar cases

recorded, and it must remain doubtful whether the pneumococcus was the primary cause of the pyosalpinx or whether a gonococcal pyosalpinx was secondarily infected by the pneumococcus.

Thirty-one cases remain. In two of these the gonococcus was isolated, but, apart from the bacteriological evidence, it will be seen that there is no indication in the clinical history to differentiate between gonorrhœa and puerperal sepsis as the original cause of the disease.

CASE II. A.A., aged 24. First child born three years ago, puerperium normal; second child 1½ years ago, in bed with "influenza," lochia offensive, after-pains severe. Discharge continued five weeks, and since then menstruation has been excessive and followed by a yellow discharge.

Fourteen days before admission a severe attack of abdominal pain occurred, at first diffuse, later localised to the right inguinal fossa, diarrhœa, but no sickness.

On admission temperature 101°, pulse 96. Patient looked ill. Abdomen, nothing abnormal detected.

P.V. a large mass was found up the pouch of Douglas and pushing the uterus forwards. An abscess pointing at the posterior fornix was opened and drained. Discharge soon ceased.

Six months later the patient had another similar attack. Re-admitted; a tender mass, rising out of the pelvis, was present on the left side of the abdomen. At the operation the right tube was found inflamed, and the left tube and ovary contained pus. Drainage through posterior fornix.

The pus was found to contain gonococci.

Subsequently intestinal obstruction set in and the abdomen was re-opened and many adhesions were freed, in performing which the gut was damaged and an ileostomy had to be established. Ten days later end to end anastomosis of the ileum was performed, and the patient made a good recovery.

The second case is similar:—

CASE III. M.W., aged 29, had had two children, the second being born six years ago; six months afterwards she was treated for "stone in the kidney." One month after this the pain settled in the left iliac fossa and "removal of appendages" was advised. She has suffered from indefinite pain ever since, and profuse vaginal discharges and dysmenorrhœa. Three weeks before admission there was an acute attack of abdominal pain accompanied by vomiting.

On examination the abdomen was tender all over. Per vaginam masses were felt in both lateral fornices.

At the operation double pyosalpinx was removed, and the pus showed the presence of gonococci.

In these two cases there is apparently nothing to distinguish them from septic puerperal cases apart from the isolation of the gonococcus.

Of the remaining 29 cases, three only gave a history of difficult or complicated labour. In another the condition dated back to an operation for appendicitis performed six months previously, at which it was ascertained that the appendages were then healthy.

Two cases very similar in their clinical features—one ending fatally—point to a reinfection of an old-standing lesion:—

CASE IV. J.S., aged 50, had had two children, the youngest 19 years ago. The menstrual periods had been irregular for the last year, the last two being excessive. Dysmenorrhœa always; no leucorrhœa.

Two days before admission she was seized with a sudden attack of pain in the lower part of the abdomen and back. This passed off, and two days later another violent attack of abdominal pain came on accompanied by vomiting. The onset occurred when a menstrual period was due, but was not accompanied by any loss of blood.

On admission, temperature 100°, pulse 108. The abdomen was rather distended, not rigid, and there was no dullness in the flanks: no tumour was felt. The patient was kept in bed. Ten days later a tender mass could be felt on the right side rising out of the pelvis. Per vaginam the cervix was high up behind the pubes. A hard tender mass connected with the posterior surface of the uterus could be felt bulging down the posterior fornix. ? fibroid; ? salpingitis.

Laparotomy was performed. Dense adhesions were found and separated. The inflamed omentum was found adherent to the back of the uterus. The right tube was distended with pus and was removed with the inflamed right ovary. The left appendages were fairly healthy, and were not removed. Drainage was established and the wound healed well. An examination of the pus showed the presence of staphylococcus albus. Recovery.

CASE V. E.S., aged 52, had two children 27 and 20 years ago. No trouble in either puerperium, no leucorrhœa. Prolapse for ten years, for which she had worn a pessary for eight years. She had a severe attack of pain six months ago and several slighter attacks since. The pain was of a shooting nature and situated in the lower part of the abdomen. Fourteen days ago another severe attack of pain occurred and continued, and was accompanied by menorrhagia, pain and difficulty on micturition.

On admission the temperature was normal, pulse rate 100. Tenderness was present over the lower part of the abdomen, especially on the left. An ill-defined mass was felt rising above Poupart's ligament on the right, and reaching half way up to the umbilicus.

Per vaginam. Hypertrophic elongation of the cervix was present, and the external os uteri was patulous. A large, firm, fixed mass was felt behind the cervix, rather irregular in outline, with a median groove. ? malignant, ? inflammatory.

Laparotomy was performed and dense adhesions separated.

There was pus in the left tube and ovary, also in right. Complete hysterectomy and removal of both appendages was performed. A drainage tube was left in the vagina and also in the abdominal wound. The abdominal tube was taken out on the second day and on the third the vaginal tube also. On the fifth day the pulse and temperature rose steadily and the patient died on the sixth day.

Post mortem. Recent acute peritonitis was found in the lower half of the abdomen. Bloody puriform fluid in the pelvis. The liver was large, pale and fatty, and there was cloudy swelling in the kidneys.

An examination of the pus taken at the operation showed the presence of staphylococcus aureus.

In 14 cases the illness dates back to confinements of comparatively recent date. Many of these have histories resembling Cases ii and iii quoted above. In four only were bacteriological examinations made, the pus being returned as sterile in three, while in the fourth *B. coli* was found; but this may have been an accidental infection, as a pelvic abscess had been previously incised and drained per vaginam in this patient.

One other case is of interest in that a pelvic abscess burst by the rectum while the patient was under observation, and subsequently the inflamed tubes were removed by the abdominal route.

PELVIC INFLAMMATION.

The group labelled pelvic inflammation is a heterogeneous one. While containing many cases which, with fuller information would be classified under one of the headings "salpingitis" or "pyosalpinx," it contains also a very definite group of puerperal cases. Out of 28 women in this group no less than 13 had been confined within the previous 10 weeks, and in one case the confinement had been seven months before. Ten of these submitted to operation.

In six of these cases a bacteriological examination was made of the pus found at operation. In all the streptococcus pyogenes was isolated, in one instance in association with a bacillus not identified.

Of the 10 cases that came to operation, while labour was normal in all cases, and the puerperium normal for the first few days, subsequently (within 10—14 days of delivery) pain and fever set in; in one case there was no pain. A list of the lesions found at operation is shown in the table:—

| | Lesion. | Treatment. | Organism. | Time since confinement. |
|----|---|---|------------------------------|-------------------------|
| 6 | Pus in left tube and abscess in uterine wall. | Tube exsected; drainage. | Streptococcus | 7 weeks |
| 7 | Abscesses in cellular tissue and uterine wall. | Removal of both tubes; drainage. | Streptococcus | 4 weeks |
| 8 | Abscess in uterine wall; seropurulent fluid in peritoneal cavity. Appendages healthy. | Laparotomy drainage. | Streptococcus | 5 weeks |
| 9 | Intraperitoneal abscess, abscess in uterine wall. | Laparotomy drainage. | Streptococcus | 3 weeks |
| 10 | Uterine wall contained multiple abscesses, tubes inflamed, returned c pelvic abscess. | Uterus and appendages removed. Abscess incised. | Streptococcus and a bacillus | 7 weeks |

| | Lesion. | Treatment. | Organism. | Time since confinement. |
|----|--|---|------------------------|-------------------------|
| 11 | Abscess in broad ligament and ovary | Rt. tube and ovary exsected. Drainage. | Streptococcus | 6 weeks |
| 12 | Abscess in broad ligament in left side, adhesions, left appendages inflamed. | Laparotomy. Drainage. | | 7 months |
| 13 | Cystic mass in broad ligament. Appendages healthy. | Laparotomy. Drainage. | | 3 weeks |
| 14 | Cystic mass to right of uterus. Appendages healthy. | Rt. Appendages removed, abdominal wound closed. | | 10 weeks |
| 15 | Pelvic cellulitic abscess. | Incised $2\frac{1}{2}$ inches above Poupart's ligament. | Streptococcus | 7 weeks |
| 16 | Puerperal pyæmia. Abscess in broad ligament. | | Blood culture sterile. | 3 weeks |

In five of these cases one or more abscesses were present in the uterine wall, in one (Case vi) on one side only, in other four on both sides. In a sixth (Case xi) abscesses were present in the broad ligament, which, tracking up along the ovarian veins, extended nearly to the right kidney. In five of these cases—all that were examined—the streptococcus was isolated.

Case xvi is essentially of the same type. No operation was performed during life, but post mortem an abscess was found in the broad ligament, and in addition septic infarcts in the lungs; the case was one of puerperal pyæmia. The pathology of this condition probably is that a septic thrombosis of the uterine vessels occur, which goes on to suppuration, infection taking place through the placental site.

Lea and Sidebotham⁶ show that in 80 per cent. of the cases examined by them organisms were present in the uterine cavity as early as the second and third day after confinement, and that in 20 per cent. of these cases the streptococcus was isolated either alone or in company with other organisms. In the great majority of these cases the puerperium ran an afebrile course without other evidence of infection.

With the large raw surface left after the detachment of the placenta, with the uterine sinuses directly opening into the cavity of the uterus, it is surprising, in the light of Lea and Sidebotham's results, that septic thrombosis of these vessels is not of much more frequent occurrence.

In two of these cases (xiii and xiv) the condition found at the operation was a cystic mass in the broad ligament; the appendages

were healthy. This is presumably one of a cellulitis affecting the broad ligament on one side only, which had not gone on to suppuration.

In one case only was a cellutitic abscess opened above Poupart's ligament:—

CASE XV. E.M., aged 31, had been confined with her eighth child seven weeks before admission: labour normal: on the eighth day of the puerperium there was an attack of pain in the left iliac region which lasted only two days, to reappear eight days before admission; it had been gradually getting worse. The lochia were normal, only lasting three weeks. There had been no rigors and no vaginal discharge since the lochia ceased.

On admission the temperature was 99°, and the pulse 100. The abdomen appeared to be enlarged in the lower part especially on the left side. A large tender mass could be felt rising from the pelvis on the right side reaching to within two inches of the umbilicus. Fluctuation could be obtained over the mass.

The abscess was incised and drained, pus being evacuated, and the mass rapidly disappeared. A bacteriological examination of the pus showed the presence of streptococcus pyogenes in pure culture.

This, then, is a fairly typical case of pelvic cellulitis going on to suppuration as described by Cullingworth.⁷

In these last four cases the infection seems to have been of the broad ligament, and this seems to be the seat of primary pelvic cellulitis, the organisms probably gaining access to the cellular tissue through lacerations of the cervix. In all these cases the infection was unilateral. In three only of the 11 cases was there any salpingitis. In one case it was bilateral. This case (x), on bacteriological examination, showed the presence of bacilli in addition to streptococci. In Case xii the left appendage was inflamed; this case was operated upon seven months after confinement. In Case vi there was pus in the tube and in the uterine wall, while the streptococcus was present in pure culture. Possibly this was a primary salpingitis, or it may have been secondary to the thrombo-phlebitic abscesses of the uterine wall.

Of the nine cases that were not operated upon, five were described as pelvic cellulitis; in one of these the cellulitis was certainly a secondary condition, the last confinement having occurred two years previously. Of the other four cases, in one the onset was 14 days after a miscarriage and proved to be a mild attack of inflammation, the symptoms disappearing after one week in bed. In two others the onset was two to three weeks after confinement. Both were admitted one month after confinement complaining of pain and fever. In both cases a hard mass could be felt in one fornix extending upwards so as to be felt also on abdominal palpation. In both these cases, after two weeks' rest in bed, the masses were much smaller and the pain and fever had subsided.

The remaining case more closely resembles a typical acute pelvic cellulitis:—

CASE XVII. E.M.O., aged 24, had been delivered of her fourth child ten days before admission. Labour was described as normal. On the third day of the puerperium there were three rigors and on the fourth her temperature was 104° . The uterus was hard but not tender on palpation. The lochia were offensive, and a douche was given. On the eighth day there was some pain in the hypogastrium—pain had not been present previously. The temperature still remained high (102° — 103°). The uterus was explored but nothing found; its cavity was douched. On admission the patient looked flushed, but had no pain. A hard mass could be felt reaching up to within two inches of the umbilicus and stretching out to the left.

Per vaginam a hard mass filled up the left fornix, and extended out to the left pelvic wall. Slight thickening was present in the right; the pouch of Douglas was free.

A culture taken from the interior of the uterus showed the presence of staphylococcus albus, diphtheroid bacilli and bacillus proteus. For one week more the temperature rose daily to 103 or 104 , the patient did not feel ill, and had a good appetite, taking full diet. After 14 days the mass was distinctly smaller, the discharge had ceased, and the temperature was normal. She was then sent to rest at home.

It is interesting to note that the streptococcus was not isolated in this case; its absence may perhaps be due to the antiseptic treatment which had been adopted, or it may have been crowded out by the more actively growing organisms which were identified.

Thus out of 118 cases of pelvic inflammation we find only one of acute cellulitis going on to abscess formation; two cases with cystic masses in the broad ligament; one case of typical cellulitis that cleared up without abscess formation, and two very mild cases. Thus we have six cases of true primary pelvic cellulitis, two of very mild degree. We have six cases of thrombo-phlebitis of uterine or ovarian vessels, and one more of a similar nature classified as puerperal pyæmia.

Three cases of pelvic abscess, included in this group for lack of adequate information as to the pathological lesion present, were treated by incision and drainage by the posterior fornix. One of them was almost certainly an old gonococcal salpingitis that had become reinfected; diphtheroid bacilli were isolated from the pus. In the second, perhaps also gonococcal in origin, bacilli and atypical diplococci being isolated, the woman had suffered from a miscarriage 18 months previously. The third followed a miscarriage 14 days previously; the uterus had been evacuated by a doctor, and three days later severe pain had set in with fever; the pain was chiefly referred to the rectum; the symptoms did not improve, so the patient was sent to hospital. On examination a large tense mass was felt bulging forwards the posterior vaginal wall. This was incised and about one

pint of very offensive pus was evacuated. All these cases were probably cases of salpingitis with pelvic abscess, but the condition of the tubes was not determined.

In the four remaining cases that were not operated upon an abscess ruptured into the rectum. One other case in which this happened subsequently submitted to operation, and, pyosalpinx and salpingitis being found, both tubes were removed. This case has already been classed with the pyosalpinx group. Two of the four cases resembled this case in their clinical history, the illness dating back to confinements respectively two years and 15 months previously.

In the third case there was a history very suggestive of gonococcal salpingitis, there having been two previous attacks of pelvic inflammation in a woman who had never been pregnant. The condition found on bimanual examination of this case 14 days after the rupture of the abscess was noted as follows: "Hard masses are felt in each lateral fornix while the large hard mass which previously filled the pouch of Douglas has disappeared."

The fourth of these cases gave a history of miscarriage associated with instrumental interference three weeks previously.

The three former cases therefore probably belong to the groups "pyosalpinx" or "salpingitis." While in the fourth case it remains doubtful whether the abscess was derived from an ascending infection or by a direct infection of the pelvic peritoneum; probably the former obtains.

In three cases, possibly due to appendicitis, a large intra-peritoneal abscess was opened and drained by the abdominal route. Bacteriological examination of the pus in two of these showed the presence of *B. proteus*, staphylococci and streptococci in one, and of *B. proteus*, *B. coli*, and staphylococcus aureus in the other.

Two cases followed operation. In one a cyst of the broad ligament had been removed at an operation performed 18 months previously, at which it was ascertained that the appendages were then normal. In the other a parovarian cyst had been removed 15 years before. At the second operation dense adhesions were found and five pints of clear fluid were evacuated.

To complete the list, in the case classified as double hæmato-salpinx, this condition was found in association with multiple fibromyomata of the uterus. Complete hysterectomy and removal of both appendages was successfully performed.

There were two cases of blood cyst of the ovary which I shall not consider further, and one of suppurating pelvic hæmatocele which has already been discussed.

BACTERIOLOGY.

Taking the 29 cases of salpingitis operated upon, and excluding the four cases of tuberculous salpingitis, in 10 of the remaining 25

pus was present, either in the peritoneum or in an ovarian abscess. This leaves 15 cases of salpingitis without the presence of pus, and if to these we add the five cases of hydrosalpinx we have 20 cases of catarrhal or non-suppurative salpingitis.

There were 43 cases of pyosalpinx and 10 of salpingitis with pelvic abscess. To these we may add the four cases of pelvic abscess which burst into the rectum, and the 3 cases which were incised through the posterior vaginal wall—60 cases in all of suppurative salpingitis.

This is the classification proposed by Orthmann, quoted by Doran in his article on salpingitis.⁸ It is a more rational classification than the one that has been used in this paper, in that it brings together all the cases of pus formation.

Of these 60 cases there are bacteriological reports in 22:—

| | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|----------|
| Pus sterile | ... | ... | ... | ... | ... | ... | 10 |
| Gonococcus | ... | ... | ... | ... | ... | ... | 3 |
| Pneumococcus (Case i) | ... | ... | ... | ... | ... | ... | 1 |
| Staphylococcus aureus (Case v) | ... | ... | ... | ... | ... | ... | 1 (died) |
| Staphylococcus albus (Case iv) | ... | ... | ... | ... | ... | ... | 1 |
| Staphylococcus aureus and albus | ... | ... | ... | ... | ... | ... | 1 |
| B. coli | ... | ... | ... | ... | ... | ... | 1 |
| B. coli and <i>streptococcus pyogenes</i> | ... | ... | ... | ... | ... | ... | 1 |
| Bacilli, diplococci and diphtheroid bacilli | ... | ... | ... | ... | ... | ... | 1 |
| Bacilli and atypical diplococci | ... | ... | ... | ... | ... | ... | 1 |
| B. proteus, streptococci, staphylococci | ... | ... | ... | ... | ... | ... | 1 |
| B. proteus, B. coli, staphylococcus aureus | ... | ... | ... | ... | ... | ... | 1 |

The last two cases were attributed to appendicitis, and the bacteriology supports this view.

Of the 19 cases grouped under salpingitis and pyosalpinx, which from their history were probably gonorrhœal in origin, six were examined bacteriologically; three were sterile, in one the gonococcus was found; in one (Case i), quoted above, the pneumococcus and in one diphtheroid bacilli. This case gave a history of a long period of pelvic discomfort associated with sterility; she had been married 20 years.

Of the cases following confinement, apart from the definitely puerperal group, 14 were examined; seven were returned as sterile; the gonococcus was found twice (Cases ii and iii), while in six various organisms were found.

In one case only the streptococcus was found, and this will be discussed below.

The question arises as to the source of the infection in Cases ii and iii. Lea and Sidebotham⁶ did not find the gonococcus in the interior of the puerperal uterus in any of the 58 cases examined by them. It seems unlikely therefore that the gonococcus ascends from the interior of the puerperal uterus, and thus causes a salpingitis. There are two other possible explanations, either that infection by

the gonococcus took place after the confinement, or that the gonococcus can exist in the tubes without giving rise to such obstruction as to prevent the passage of the ovum :—

CASE XVIII. M.W., aged 39, was delivered of her tenth baby nine weeks before admission. The placenta was said to have been digitally removed immediately after the birth of the child. Three weeks after confinement, the patient had attacks of pain in the left side which had gradually increased in intensity, the vaginal discharge persisted.

On admission the patient looked pale and ill. Temperature 100°. Nothing abnormal was felt in the abdomen. Per vaginam a hard mass was felt behind and to the right of the uterus. At the operation the pelvic viscera were felt fixed high up; the uterus was large and anteverted. The right tube curved upwards and backwards and was adherent to the pelvic brim. On separating the adhesions an abscess was opened in the pouch of Douglas; the right appendage was removed. The left appendage was healthy. The pelvic colon was thickened and inflamed. Drainage by vagina. Abdomen closed. The right tube and ovary was thickened and inflamed.

As regards its clinical history, this case resembles the puerperal cases already discussed. And it seems possible that in this case the salpingitis is really a secondary condition, the primary lesion being a cellulitis or thrombo-phlebitis giving rise to pelvic peritonitis, just as the thickened and inflamed pelvic colon is undoubtedly secondary to the pelvic peritonitis.

Of the group of 11 puerperal cases, to which this bears such close resemblance, we have seen that in no less than six—all that were examined—were streptococci present. In one case bacilli were also present. In this case also there was salpingitis. One other case showed inflammation of the tube, the condition being described as pus in the tube and uterine wall. This was a pure streptococcal infection, and is the only one where the streptococcus apparently caused a salpingitis directly, although even in this case it is possible that it was secondary to the thrombo-phlebitic abscess in the uterine wall.

Thus these puerperal cases contrast strongly with the cases of pyosalpinx and salpingitis. In the puerperal cases the common lesion is either a septic thrombo-phlebitis or a pelvic cellulitis. A consideration of the conditions that obtain will perhaps explain this. We have an open wound—the raw surface of the interior of the uterus, whence the drainage is fairly free. Ordinary septic organisms may infect this surface and cause inflammation of it, but they will not penetrate deeply. The streptococcus alone penetrates, and this is in accordance with its ordinary behaviour elsewhere. If the streptococcus is of a very virulent type we get a septicæmia or pyæmia; if less virulent the infection will remain localized. The streptococcus may take two rather different courses. Infection may

occur through the placental site causing septic thrombo-phlebitis, which may go on to pus formation resulting in miliary abscesses in the uterine wall, and these commonly involve both sides of the uterus, as the placental site is not limited to one lateral half of the uterus. Or the infection may obtain entrance through some laceration of the cervix, and in this case the cellular tissue of the broad ligament is affected, giving rise to true pelvic cellulitis. This is commonly unilateral, because a tear will probably involve only one lateral half of the cervix uteri. It is possible that a very virulent infection of this type will give rise to the cases of acute puerperal peritonitis by extension through the cellular tissue to the pelvic peritoneum.

Lea¹² states that the mucous membrane lining the uterus is not completely restored until some five weeks after delivery. After the second day the cavity of the uterus is lined by a thin layer of granulation tissue except over the placental site. Here the granulation tissue layer takes a much longer time to cover the large venous sinuses and the clots they contain. This granulation tissue layer offers a considerable resistance to invasion of the deeper layers of the uterus by pathogenic organisms. Thus the placental site remains a weak spot in the defence against infection; while if a portion of the placenta or membranes remains adherent to the wall of the uterus the granulation layer will not be able to develop at this place; thus involution will be delayed, and the chances of infection will be increased.

Why does not salpingitis occur shortly after labour, seeing that it is not an uncommon event after miscarriage? The conditions would seem to be favourable, many organisms of various types being frequently present. I would suggest that this does not occur because during the puerperium the cavity of the Fallopian tubes is not continuous with that of the body of the uterus, and the mucous membrane of the Fallopian tube does not join into that lining the cavity of the uterus till involution is nearly complete, being at an earlier period separated from it by the overgrowth of muscle tissue and decidua. The result of this is that an ascending infection cannot occur until the continuity of the mucous membrane has been restored. The only route infection can follow is a direct one through the veins or tissue spaces of the body of the uterus.

CONCLUSION.

Thus it would seem that, apart from certain special cases, the organisms that give rise to pelvic inflammatory conditions adopt three main routes of infection; namely, direct, ascending and descending: and in this we may find a useful basis for classification. These groups correspond with the groups that we have been considering under other titles. In the puerperal group the infection is

direct; in the non-puerperal, or the group containing the majority of cases of pyosalpinx and salpingitis, it is ascending, while tuberculous salpingitis arises by a descending infection.

The ascending infections I have termed also non-puerperal, for the purpose of contrasting them with the puerperal group in which the streptococcus occurs.

The lesions they give rise to are essentially salpingitis. Attempts to classify these etiologically have failed in the main, though we may perhaps subdivide them into gonococcal and septic, the former occurring frequently in the absence of pregnancy or completely apart from it. The lesions produced by the former are usually bilateral, and render the patient sterile; while the latter are in general a late sequel of pregnancy, the exact pathology of the condition being obscure. We have seen that ascent of infection from the uterus to the tubes is very rare in the puerperium, and that this may be due to absence of continuity between the Fallopian tube and the uterus at this time. In some cases it would seem that a streptococcal infection at the puerperium, when associated with the presence of other pyogenic organisms, favours infection of the tube at a later date; while in others presumably an endometritis remains after the puerperium, which, when involution is nearly complete, may ascend to the tubes and there give rise to a salpingitis.

The lesions these two groups give rise to are anatomically and clinically indistinguishable, and are probably best classified according to the method proposed by Orthmann,⁸ into catarrhal or non-suppurative and suppurative salpingitis; obstruction of the abdominal ostium in the former giving rise to hydrosalpinx, while in the latter a pyosalpinx results. If the abdominal ostium is not closed in the latter but the pus covered by adhesions, tubo-ovarian abscess and intraperitoneal abscess result, or in extreme cases a generalized peritonitis.

The tuberculous group originates in a descending infection, and this has been already dealt with.

The distinguishing features of the puerperal or direct group are that the streptococcus is always present, and that the onset is always within a few weeks of confinement. The lesions are in the main extraperitoneal, for the body of the uterus is in reality as much extraperitoneal as is the cellular tissue of the broad ligament.

There are again two main subdivisions of this group according to the course followed by the infection.

When the organisms gain access by the placental site they give rise to thrombo-phlebitis of the uterine vessels. The further results of this depend partly on the virulence of the organisms and the resistance of the patient, and partly on the vessels involved and the extent of the thrombosis.

The infection may subside without abscess formation, or suppur-

tion may take place; while if the virulence of the organism is still greater pyæmia and septicæmia result. The ovarian veins may be involved with consequent cellulitis tracking up along the vessels, and possibly giving rise to retroperitoneal abscess and peritonitis by extension. Ligature and excision of these vessels in cases of puerperal pyæmia was first suggested by Trendelenberg, and has recently received much attention and has been successfully practised by Knyvett Gordon,⁹ Blair Bell¹⁰ and others.

Or the uterine veins may be involved and the clot extend to the common iliac veins resulting in the condition of phlegmasia alba dolens, and pyæmia and septicæmia may also follow.

If the vessels in the substance of the uterus are affected alone the result is the appearance of abscesses in the uterine wall.

When infection occurs through a laceration of the cervix the lesion which results is a true pelvic cellulitis. This may be confined to the broad ligament, or following the planes of connective-tissue and blood-vessels in this region, may extend and go on to suppuration; while if the infection is more virulent puerperal peritonitis is the result.

REFERENCES.

1. T. Wilson. "On Pelvic Inflammations in the Female." *Journal of Obstetrics and Gynæcology of the British Empire*, July and August 1907.
2. L. S. Dudgeon and P. W. G. Sargent. "The Bacteriology of Peritonitis" and "The Bacteriology of Peritonitis in relation to Pelvic Surgery." *Journ. Obstet. and Gyn.*, March 1906.
3. A. W. W. Lea. "Three cases of Chronic Tuberculosis of the Fallopian Tube." *Journ. Obstet. and Gyn.*, January 1907.
4. R. H. Lucy. "Tuberculosis of the Female Pelvic Organs." *Journ. Obstet. and Gyn.*, January 1907.
5. A. H. F. Barlow and B. P. Watson. "Tuberculous Pyosalpinx." *Journ. Obstet. and Gyn.*, September 1911.
6. A. W. W. Lea and E. J. Sidebotham. "The Bacteria of the Puerperal Uterus, etc." *Journ. Obstet. and Gyn.*, January 1909.
7. C. J. Cullingworth. Article: "Pelvic Inflammation" in Allbutt Playfair and Eden's "System of Gynæcology," second edition.
8. A. Doran. Article: "Diseases of the Fallopian Tube." *Ibid.*
9. Knyvett Gordon. "Problems in the treatment of Puerperal Septic Disease." *Journ. Obstet. and Gyn.*, October 1908.
10. W. Blair Bell. "Puerperal Septic Thrombophlebitis of the Pelvic Veins." *Practitioner*, August 1911.
11. W. Blair Bell. "Septic Thrombosis (Puerperal) of the Pelvic Vessels." *Journ. Obstet. and Gyn.*, June 1907.
12. A. W. W. Lea. "Puerperal Infection." Oxford Medical Publications 1909.

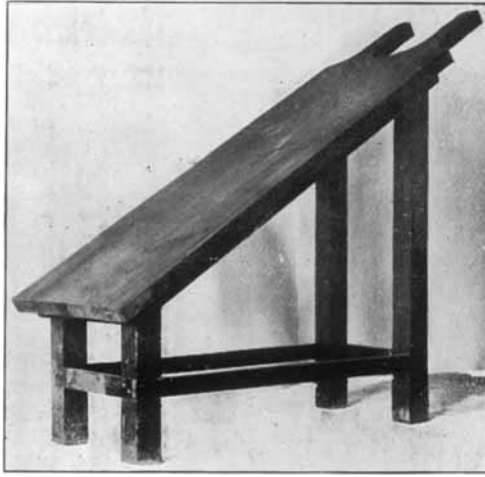


Fig. 1. Operating table made of wood for laboratory work, can be placed on an ordinary bench,—author's design.

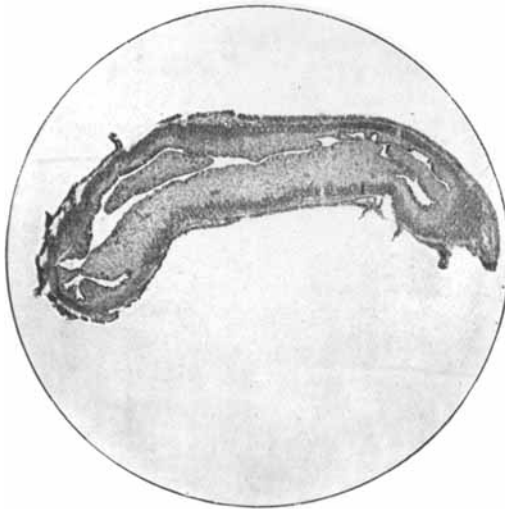


Fig. 2. Infantile uterus of young rabbit, kept alive 62 days after oophorectomy. Muscular wall rudimentary. Glands scanty in number. $\times 17$ D. Exp. I, Series I.