SOME PECULIARITIES OF APPENDICITIS IN THE FEMALE SEX,

WITH SPECIAL REFERENCE TO APPENDICITIS OCCURRING
DURING PREGNANCY.*

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INFLAMMATION of the vermiform appendix is without doubt much commoner in men than in women. Out of 170 cases of appendicitis upon which I have operated, only 55 have occurred in women. This gives a percentage of 32.4 of my cases as having occurred in women, as against 67.6 in men. These figures agree closely with the experience of other observers; and we may take it that the disease is about three times as common in the male sex as in the female.

Various causes have been assigned to explain this fact. Differences in women's habits of life, in their food, or in their surroundings have all been given; but it is more probable that a developmental or anatomical difference is the real cause.

It has been suggested that the vascular anastomoses which exist in women between the blood vessels of the appendix and the ovarian vessels on the right side may have an important bearing on this comparative immunity. These anastomosing channels would serve to relieve congestions and inflammations of the appendix by carrying off some of its blood into the systemic circulation.

But when such inflammation does occur, in addition to the other complications which may ensue, whatever be the sex of the patient, we may have in women a peculiar train of symptoms or set of complications due to the near presence in their pelvis of their special organs of generation. I do not think that sufficient importance, at any rate in this country, has been paid to these special complications. The close association of the appendix vermiformis with the uterus and the uterine appendages is apt to be overlooked, and we are perhaps too prone to look upon inflammatory troubles in the uterine appendages as essentially primary in character; whereas they may, often at any rate on the right side, be in reality secondary to disease in appendix caeci.

During the past few years, as my experience in cases of appendicitis has grown larger, I have seen a number of cases in which both the appendix caeci and the uterine appendages have been simultaneously involved, and have had to deal with a few cases of appendicitis occurring in pregnancy. It is on this subject that I now wish to make a few observations.

APPENDICITIS DURING PREGNANCY.

Pregnancy does not seem to predispose to a primary attack of appendicitis; but if a patient have previously suffered from the complaint, and afterwards becomes pregnant, the pregnancy may light up another attack. This it does probably by stretching or breaking down old inflammatory adhesions as the uterus enlarges and rises out of the pelvis.

During the past year I have had under my care 3 cases of appendicitis during pregnancy, and have had the opportunity afforded me of closely observing a fourth case.

Pregnancy is a complication which greatly increases the risks and dangers of the disease. The danger to life depends partly upon the stage of the pregnancy, and partly upon the severity of the attack of inflammation. The further advanced the pregnancy is, the worse is the prognosis, particularly if pus has formed.

In mild attacks, during the early months of pregnancy, the inflammation may completely subside, and pregnancy go on uninterruptedly to term. But if suppuration takes place, the risk to life increases enormously. Abrahams states that the mortality of cases of perforative appendicitis (during pregnancy), even when operated upon without delay, is as high as 58 per cent., and that the fetus is born dead in 90 per cent. of the cases.

When pus forms in the later months of pregnancy, miscarriage almost invariably takes place, whether operation be performed or not, and in cases where the pregnant uterus forms part of this abscess wall, must occur. When the uterus is thus suddenly emptied, the risk of general septic peritonitis is extremely grave, for limiting adhesions are almost necessarily broken down, and the peritoneum thus flooded with septic material. Even after drainage of the abscess cavity, in the later stages of pregnancy or in cases where miscarriage has taken place already, the risks to life

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are by no means small, as a septic salpingitis and endometritis may be set up by direct extension.

Occasionally in less severe cases, after labour at full term or miscarriage in the later months of pregnancy, a right-sided pelvic inflammation follows delivery, and frequently goes on to suppuration. This is due to direct extension of the inflammation from the diseased appendix along the appendiculo-ovarian ligament to the connective tissue of the broad ligaments. Such cases resemble very closely the ordinary cases of pelvic parametritis occasionally seen after delivery, and pursue a very similar course but almost always end in suppuration. The abscess tends to point in the groin above Poupart's ligament, and may be opened there without its appendicular origin being suspected. This was done in Case iv. It was not until some years afterwards that a faecal concretion in a residual abscess which formed, gave the clue to its real nature. The prognosis in these cases seems to be much more favourable.

Turning now to the clinical aspect of these cases, there are several points of interest in the symptoms and course of the disease which demand attention, and which will considerably modify the course of treatment we pursue, as compared with the treatment of non-pregnant cases.

The attack may occur at any stage of pregnancy. I have myself seen one in the sixth week of pregnancy and as late as the eighth month. It may be a primary attack, the patient never to her knowledge having had any trouble previously. But on careful questioning it will often be found that there have been one, or several, previous attacks, though in some cases they have been of so mild a character as to have been almost disregarded.

The illness may be of all degrees of severity, from the transient appendicular colic to the acute fulminating appendicitis which proves fatal in a few hours. In the mild cases the sickness which ushers in the illness is liable to be mistaken by both patient and practitioner for the ordinary vomiting of pregnancy. The use of the clinical thermometer in a doubtful case should prevent mistake, for the vomiting of pregnancy is "apyrexial," and the presence of fever, however slight, should always put us on our guard and lead us to make a careful examination of the right iliac region.

Owing possibly to the increased blood supply, and to the congestion of the parts due to the pressure of the enlarging uterus, cases of appendicitis in pregnancy seem to run an unusually rapid course. Though some subside, the majority, if left, seem to go on to suppuration. The prognosis will depend upon the intensity of the inflammation, the presence or absence of actual suppuration, and upon the stage to which the pregnancy has advanced.

Bearing in mind the extreme gravity of the case when suppuration has once taken place, and the small risk, to the mother at any rate, of removal of the organ in the non-suppurating stage, it should, in my opinion, be an almost invariable rule in cases of pregnancy, to remove the appendix almost as soon as the diagnosis has been made, without waiting for a subsidence of the symptoms, or for distinct evidence, on the other hand, that pus has actually formed. If only the *fons et origo mali* can be removed before suppuration has occurred, the prognosis should be but little if any worse than in cases where pregnancy does not exist.

Some surgeons would go further, and would in every case remove the appendix in women immediately after an attack of appendicitis, if they be of a child-bearing age.

In the more acute cases not a moment should be lost in opening and draining the collection of pus. The appendix should be removed in such cases if it can be done without much disturbance of the parts. But the uterus and pelvic viscera are to be disturbed as little as possible, and should be protected as much as possible from coming in contact with the inflamed area by interposing intestine, or preferably omentum, between them.

Where general septic peritonitis already exists at the time of operation—whether miscarriage has already taken place or not—the prognosis is almost hopeless. My only case proved fatal a very few hours after my operation.

It has been suggested that in these cases the uterus should be at once emptied, and the pregnancy brought to a termination. Such a proceeding is to my mind utterly unscientific. The pregnant uterus may form part of the actual abscess wall, and its sudden emptying will almost certainly cause the peritonitis to become a general one.

Nor is it necessary or advisable to empty the uterus after opening the appendicular abscess. Unfortunately abortion, premature delivery, or death of the fetus takes place in 86 per

cent. of all cases where suppuration has actually occurred when the abdomen is opened.

Before leaving the subject it remains to mention two points which follow from a study of it.

First, in all cases of appendicitis in married women we should invariably ascertain at once whether pregnancy co-exists or not, as the prognosis and the treatment will be materially altered by its coexistence.

And, conversely, in cases of pregnancy where miscarriage occurs, if the symptoms have previously pointed to any abdominal or pelvic complication a careful examination should always be made, lest an appendicitis coexist, and have actually caused the miscarriage. For in this case the suppurative will frequently have become general, and require immediate operative interference if the mother's life is to be saved.

I give a brief clinical history of four cases of appendicitis during pregnancy which have occurred in my own practice.

CASE I.—*Acute Non-Suppurative Appendicitis: no Operation: Recovery: Delivery at Term.*

E. R., a young married woman, aged 26, was seen in consultation. She was three months pregnant, when she was seized with an attack of acute appendicitis. When a girl she had had several slight attacks of pain in the right iliac fossa, which had been thought to be ovarian, as the attacks always coincided with her menstrual periods.

The attack of appendicitis was a typical one, with a hard, tender, inflammatory mass in the right iliac fossa. Under medical measures it rapidly subsided, and with prolonged rest in bed she went to term, and had a normal and easy confinement. I advised removal of the appendix after confinement, but at present she has not had it done.

CASE II.—*Acute Suppurative Appendicitis in the Second Month of Pregnancy: Abdominal Section and Drainage: Recovery with Continuance of Pregnancy.*

S. S., aged 26, was seen in consultation with Dr. Gibb. She had been married two years, and had once before been pregnant. During almost the whole of that pregnancy she suffered intensely from morning sickness. She had never had a previous attack of appendicitis.

When seen on November 2nd she was nearly two months pregnant, and since the beginning of her pregnancy had suffered from morning sickness. Five days previously she had been suddenly seized with violent abdominal pain and sickness. The pain was at first all over the abdomen, but has gradually become fixed in the right lower quadrant of the abdomen. The sickness has been incessant. She was admitted into the General Hospital on November 3rd.

On admission her pulse was 124; temperature 103.2°. There was an extremely tender mass to be felt in the right iliac fossa. No general peritonitis. A vaginal examination revealed the uterus enlarged about the size of a two-months' pregnancy. A hard, tender, convex mass could be felt on the right side of the abscess behind.

Abdominal section was performed. A localized abscess was opened to the outer side and below the caecum, containing several ounces of faeculent pus. It was carefully evacuated and drained, the main abdominal cavity being protected by gauze packing.

She made an uneventful recovery. The temperature never rose above 99°F. The abscess cavity gradually closed. Morning sickness was occasionally very troublesome, and during the whole of her stay in hospital her pulse was somewhat rapid, ranging between 80 and 90.

She is now more than five months pregnant, and Dr. Gibb reports that she has put on flesh and strength to a striking extent, and that there seems not the slightest indication that she will not go to full term. The vomiting has also entirely ceased.

CASE III.—*Appendicitis During Pregnancy: Miscarriage at Five Months: General Septic Peritonitis: Death.*

A. W., a young married woman, was sent up to the General Hospital on November 1st with general peritonitis and appendicitis.

The history of her illness was as follows: She had been married two years, and twelve months previously had miscarried when two and a-half months pregnant. Five months ago she again became pregnant.

On October 25th last, after previously being in good health, she was suddenly taken ill with pain in the right iliac fossa. She had a severe rigor and was sick; the temperature was 101°. There was no uterine haemorrhage, and the external os was then closed. She was kept in bed, given a milk diet and opium, and the symptoms all subsided in four days, the temperature then being normal.

On October 30th she was seized with sudden pain in the lower half of the abdomen with collapse; temperature subnormal; pulse 140 to 150, very weak and thready; the os uteri was found dilated, and a 5-months fetus with placenta was delivered; she did not improve, however, and symptoms of general peritonitis supervened.

On admission, her temperature was 101°, pulse 128. Her face was flushed, mouth dry, eyes sunken with dark areolae; she was vomiting up dark coffee-ground material. The abdomen was very distended, tympanitic in front, dull on the flanks; it was almost motionless on respiration; it was uniformly tender, but the tenderness was most marked on the right side. The liver dullness was present. There was a blood-stained vaginal discharge, not offensive. Per vaginam, the uterus was soft and flaccid, about the size of a cocoon. Douglas's pouch was distended, and a hard tender mass could be felt high up on the right side of the pelvis. General peritonitis, probably due to appendicitis, was diagnosed, and abdominal section was performed as giving her the only chance of recovery, though a very slender one.

On opening the abdomen, the peritoneal cavity was found full of bloody fluid, the intestinal coils distended and glued to each other by recent lymph. The peritonitis was most intense in the pelvis and right lower quadrant. The right ovary and tube were very greatly swollen and intensely injected, and were removed. Behind and to the outer side of the caecum and colon there was a large thin-walled abscess cavity containing faeculent, foul-smelling pus, and in it a loose faecal concretion.

The abdominal cavity was thoroughly flushed with large quantities of saline fluid. A large drainage tube was left in Douglas's pouch, and a second one in the right loin, and brought out through an opening made in a dependent position in the loin. The patient's condition steadily became worse, and she died some thirteen hours after the operation.

At the autopsy general suppurative peritonitis, with pockets of pus between the coils of intestine, was present everywhere. The appendix vermiformis was gangrenous and perforated at its extremity. The lumen of the non-gangrenous portion was very small. The uterus was subinvolved and measured 8 in. in length. The lining membrane along its posterior wall was in a gangrenous condition. The left Fallopian tube was very oedematous; the left ovary was small and contained three abscesses. The right tube and ovary had been removed.

CASE IV.—*Pregnancy with Appendicitis: Miscarriage: Abscess in Right Side of Pelvis: Abdominal Section: Eventual Recovery.*

H. P., a multipara, was first seen in March, 1897. She gave the following history:

As a girl she used to have occasional attacks of abdominal pain, chiefly on the right side. Since her marriage she has had eleven children, the labours usually being easy and natural.

Her present illness began when she was seven months pregnant. She was seized with violent abdominal pain in the right iliac region, with shivering and vomiting. At the end of a week labour was induced and a dead fetus was delivered. After delivery she remained extremely ill for nearly three months, with high fever, shivers, and vomiting. An

Appendicitis during Pregnancy.

No.	Type of Disease.	Period of Pregnancy.	Operation.	Effect on Pregnancy.	Result.	Observer.
1	Non-suppurative appendicitis	9 months	None	Labour at term	R.	Crutcher, <i>Med. Record</i> .
2	"	9 months	"	"	R.	Abrahams, <i>Amer. Jour. Obstet.</i> , 1897.
3	"	9 months	"	"	R.	"
4	"	"	"	Miscarriage at 7½ months	R.	"
5	"	"	"	"	R.	"
6	"	4 months	"	Labour at term	R.	My own case.
7	Gangrenous appendicitis	9 weeks	Abdominal section	Abortion	D.	Abrahams, <i>Med. Record</i> , 1895.
8	"	2 months	"	"	D.	Crutcher, <i>Med. Record</i> , 1896.
9	Perforative appendicitis	3 months	No operation	"	D.	Wiggin, <i>Med. Record</i> , 1892.
10	Suppurative (?)	4 months	Abdominal section	Labour at term	R.	Gerster.
11	"	4 months	"	"	R.	Mitchie, <i>Brit. Gynaecol. Jour.</i> , 1895.
12	"	4½ months	"	"	R.	Hirst, <i>Med. News Phil.</i> , 1894.
13	"	4½ months	"	"	D.	Merx, <i>Med. Record</i> , 1898.
14	"	4½ months	"	Abortion	D.	McArthur, <i>Amer. Jour. Obstet.</i> , vol. xxxi.
15	"	5 months	"	"	D.	Monde, <i>Med. Record</i> , 1895.
16	"	5 months	"	Miscarriage	R.	Harrison, <i>Med. Record</i> , 1895.
17	"	6 months	"	"	R.	Lidiard and Sedgwick, <i>Lancet</i> , 1904.
18	"	7 months	"	Premature labour	R.	Merx, <i>Med. Record</i> , 1898.
19	"	8 months	"	Miscarriage	R.	Monde, <i>Med. Record</i> , 1895.
20	"	9 months	"	Confinement at term	D.	"
21	"	"	No operation	"	D.	Godson, <i>Brit. Gynaecol. Jour.</i> , 1898.
22	"	4 months	Abdominal section	Pregnancy continues	R.	My own.
23	"	5 months	"	Miscarriage	D.	"
24	"	7 months	"	"	R.	"

abscess burst into the bowel and a large quantity of pus was discharged per rectum.

On admission into hospital under me, the case was diagnosed as probably a right-sided parametric abscess. Abdominal section was performed and a large abscess opened in the pelvis. The abscess lay behind the uterus and to its right side. The pus was foul-smelling.

She made a good recovery and was sent home in two and a half months. Two years later, a second abscess formed and was opening through the old scar. The sinus very slowly healed and she was again discharged apparently well.

In November last she was admitted under my care a third time with a large abscess in the right iliac fossa. This was opened and a large quantity of faeculent pus evacuated. The diagnosis this time was made by the escape of a faecal concretion from the abscess cavity. The abscess gradually filled up and she was discharged well in December, 1904.

The table has been drawn up from the published cases of various surgeons, and gives a fair idea of the risks attending the mother if appendicitis occur during pregnancy.

Including my own 4 cases it comprises 24 in all. Of these 6 were non-suppurative cases. All these recovered without operation, though in several the appendicitis brought about a miscarriage. In the remaining 18 suppuration occurred. In some it was a localized abscess, in others a general peritonitis, following a gangrenous appendicitis, or a burst appendicular abscess. Of these cases 9 recovered and 9 died, giving a mortality of 50 per cent., which is indeed a very high mortality; but is probably even then below the actual mortality-rate, as so many unsuccessful cases remain unreported. In only 4 cases was the pregnancy not interrupted, giving a percentage of 73 per cent. of cases in which abortion or miscarriage took place after the formation of pus.

These figures speak for themselves, and show the urgent necessity for operation in all cases before pus has actually formed if the patient's life is to be saved.

APPENDICITIS SIMULATING OVARIAN DISEASE.

But it is not during pregnancy only that the symptoms due to an acute appendicitis in women may be misread, and be thought to be due to other causes.

The appendix vermiformis is probably responsible for a very large proportion of so-called attacks of right-sided pelvic peritonitis in women. Salpingitis and ovaritis are undoubtedly more common on the right side than on the left, and the explanation at once becomes obvious when it is realized that in many cases the inflammation of the tube or ovary is an extensive form of a diseased or disordered appendix vermiformis.

When inflammation starts in the appendix it may spread in one of two ways to the uterine appendages on the same side. In cases where the appendix lies over the brim of the true pelvis, an extension of the peritoneal inflammation may spread by direct continuity from the appendix to the ovary and tube. Appendix, ovary, tube and omentum are frequently found at operation adherent to one another. These adhesions may indeed be so extensive and firm as to necessitate the removal of both tube and ovary in the removal of the appendix. This I have twice had to do. In other cases the extension is probably by means of the lymphatics of the appendix and those of the broad ligament.

It has been shown (Clado) that there is a direct communication between the lymphatics of the appendix and those of the uterus, ovary, and Fallopian tube by means of the appendiculo-ovarian ligament. Septic troubles in the former organ may thus give rise to a lymphatic infection which may spread to the broad ligament and ovary without the peritoneal covering being involved. Bland-Sutton¹ calls attention to this fact of appendicitis simulating right-sided pelvic cellulitis, and records a case operated upon three weeks after delivery as a case of pelvic cellulitis. A knowledge of these pathological facts throws considerable light on some of the clinical phenomena of appendicitis in young girls and women.

In cases of relapsing appendicitis in young women the attacks of pain frequently occur just before or at the menstrual period. The relapses in these cases are determined by the congestion of the tube and ovary at each menstrual period, and which may quickly spread to the adjacent appendix, particularly if it have previously been inflamed, and is adherent to any of the pelvic viscera.

I have in my own practice seen several such cases, and the diagnosis previously made in some cases has been a right-sided salpingitis or ovaritis. In fact, in all cases of so-called right-sided ovarian pain the possibility of appendicitis should be raised. I give the short notes of two or three typical cases of this kind.

CASE V.—Appendicitis simulating Ovaritis: Appendix adherent to Ovary.

The first was a nurse, aged 23, who the day before her expected period had an acute attack of pain in the right inguinal region. The temperature rose to 103.5°, and she had a slight shivering fit. There was tenderness on deep palpation, in both iliac regions, but it was more marked on the right side. No tumour could be felt. The attack subsided with the onset of the menstrual flow, and in a week she was well. Similar attacks occurred at varying intervals, but each attack coincided with the onset of a menstrual period. The case was diagnosed as one of right-sided ovaritis with salpingitis. She was advised to have a prolonged rest in bed.

On opening the abdomen I found the appendix vermiformis lying in the true pelvis. It was permanently twisted upon itself by old adhesions, was distended into a sac at its distal end, and was firmly adherent to the right ovary. The appendix was dissected off the ovary and removed. The patient made a good recovery, and has been quite well since.

CASE VI.—Appendicitis and Cystic Ovarian Disease.

The second case was a young lady, aged 22, seen in consultation with Dr. Quirke, of Handsworth. She had had two previous attacks of appendicitis. The attacks occurred at the onset of her menstrual periods, and were accompanied by frequent and painful micturition. The last attack was the most severe. The temperature rose to 103°, and there was much sickness. A diagnosis was made of appendicitis in an appendix in the true pelvis with a probable extension to the right uterine appendages. At the operation the appendix was found surrounded by much matted and adherent omentum fixed to the wall of the pelvis. It was removed with some difficulty. The right ovary and tube were also adherent to the omentum and side of the pelvis, and bounded a cavity containing muco-pus. As the ovary was cystic and it was impossible to separate the adhesions, it was removed with the Fallopian tube on the same side. She has since her operation, now nearly two years ago, had excellent health.

CASE VII.—Appendicitis: Appendix Adherent to Ovary.

A nurse, aged 25, had repeated attacks of pain and tenderness in the right iliac fossa. The attacks were all of a mild character, and almost without exception began two days before the menstrual periods. The temperature never rose above 100° in any of the attacks, and she was generally able to return to her duties—that of private nursing—in three or four days. The diagnosis lay between appendicitis and some right-sided pelvic perimetritis. In favour of the latter view was the fact that the attacks were always coincident with the menstrual period. No tumour was ever felt in the iliac fossa. Per rectum a distinct tender swelling could be felt high up on the right side of the pelvis. Abdominal section was performed in the right linea semilunaris, the patient was put in the Trendelenburg position, and the appendix and right uterine annexa examined. The appendix was entirely intrapelvic; it was elongated, somewhat bulbous at its distal extremity, and adherent to the right ovary and omentum. It was easily separated from the latter. The omentum was ligatured off, and the appendix removed. She made a good recovery, and has had no more trouble of any kind since.

In operating upon such cases it is useful to have the patient in the Trendelenburg position, and to make the incision a vertical one at the right linea semilunaris. If it is found that the uterine appendages are involved in the disease, and adherent to the appendix, by slightly prolonging the incision downwards one can get a good view of the pelvic viscera, and deal with such adhesions as one finds. The appendages should of course be separated and left whenever it is possible, but it may occasionally be necessary to remove the right tube and ovary with the appendix, as was done in the case I have just related. If before opening the posterior sheath of the rectus that muscle be drawn to the inner side, the incision be made rather towards the middle line, there is practically no risk of a ventral hernia occurring at the site of the operation scar.

Lastly, it should always be a rule in removing the appendix in women, in cases where no suppuration is present, to examine the right uterine appendages before closing the abdomen.

REFERENCE.

¹ St. Bart's Hospital Reports, 1903.

MISS EMILY PERRIN has examined statistics gathered from the *Dictionary of National Biography*, and from *Who's Who*, in the hope of determining how far ancestral bent and how far environmental conditions influence a man in his choice of an occupation in life. Her results were published in a recent number of *Biometrika*. The general conclusion is that in the choice of a profession inherited taste accounts for about two-thirds, and environmental conditions for about one-third. The figures refer to Great Britain. The authoress suggests that it would be interesting to compare these results with those for a new country like America, where it would be reasonable to expect a greater freedom from environmental influences, and more chance of choice for the son, and thus a nearer approach to pure inheritance of taste.