part, much the same as is seen in an early hydronephrosis due to some obstruction to the outflow of the urine from the renal pelvis.

The exciting cause of the pyonephrosis and the period at which the infection occurred are factors, however, which are most difficult, if not impossible, to determine.

ACUTE PYELONEPHRITIS COMPLICATING PREGNANCY.

BY

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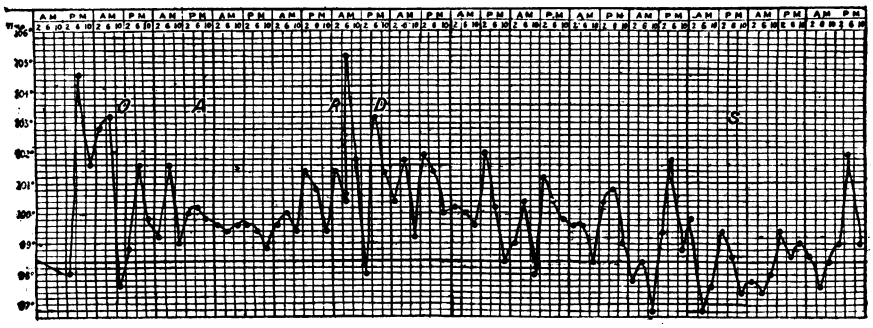
ALTHOUGH pyelonephritis is by no means rare as a complica ion of pregnancy, the following case, which was under my care, seems worth recording on account of the severity of the symptoms and the difficulty in making a correct diagnosis.



O, Operation; A, abortion; D, dressed; S, stitches removed.

A lady, aged 35, was pregnant for the sixth time, the pregnancy being of five months' duration. A fortnight before the onset of the disease she had been in a nursing home on account of a retroverted gravid uterus which had been replaced under an anaesthetic. Since then she had not felt well but had no definite symptoms beyond occasional vomiting, which was thought to be due to the pregnancy.

History of Present Illness.

On February 2nd, in the night, she was suddenly seized with severe abdominal pain and vomited several times. I saw her in the morning, when I found her looking very ill and complaining of great pain in the right loin and right iliac fossa, where there was well marked tenderness. There was no swelling to be felt, no dullness, and the bowels had acted naturally. By vaginal examination the uterus was felt to be enlarged to about the size of a five months pregnancy, but nothing abnormal was discovered. The temperature was 101° and the pulse 120. Whilst I was in the house the patient had a rigor, during which the temperature rose to 106°, and this was followed by profuse sweating, the temperature falling to 97°. The urine was acid in reaction, specific gravity 1020, and contained no albumen. Microscopical examination showed that blood and pus were absent.

The next day her condition was the same, the rigors and vomiting still continuing. The case was considered to be either appendicitis or acute pyelonephritis.

Exploratory Laparotomy.

On February 4th her condition was very grave, the rigors and vomiting occurring more frequently. The abdomen was distinctly distended, and there was dullness in the right flank, but very little rigidity. As she was so much worse I asked Mr. Victor Bonney, under whose care she had been, to see her in consultation. There being no pyuria, the more likely diagnosis seemed to be appendicitis, with the formation of pus, but the case not being quite clear it was decided to wait. In the morning, as she was found to be in the same condition, the abdomen being more distended and the pulse 140, an exploratory laparotomy was undertaken. The ascending colon was found to be distended, but there was no peritonitis and the appendix was healthy. The gall bladder and pelvic organs were normal, but the right kidney was very much enlarged, a fact which pointed to the case being one of pyelonephritis.

After-History.

On the following morning vomiting began to be very troublesome, becoming almost incessant in the afternoon. Labour pains began at 2 p.m., and she was delivered of twins at 6.30 p.m. Delivery was difficult owing to the rigidity of the os and the inconvenience of the abdominal incision.

The urine had been examined microscopically each day, with negative results, but on this day a catheter specimen was found to contain a large quantity of pus. A cultivation was made, with the result that a pure culture of *Bacillus coli communis* was obtained.

On the next day the patient suddenly collapsed, and her pulse was hardly perceptible at the wrist, but she gradually rallied after hypodermic injections of strychnine and digitalin.

After delivery the sickness ceased, but the rigors continued. The incision healed by primary union, but the pyuria did not disappear for three weeks, after which the temperature gradually fell to normal. The patient was sent to the sea for a month, and is now quite well.

After the diagnosis had been made she was given urotropin gr. viii every four hours, her chief food being peptonized milk.

The case illustrates well the sudden onset of the disease, and is instructive because of the difficulty in arriving at the diagnosis. From the beginning pyelonephritis was considered, but the absence of albumen and pus from the urine for the first three days led us to think that the symptoms were more correctly accounted for by a diagnosis of appendicitis with the formation of pus, and it was on this assumption that the abdomen was opened.

Another unusual feature was the occurrence of abortion, which was probably produced by the toxaemia and resulting high temperature. It is worthy of notice that emptying the uterus did not appear to have any beneficial effect on the symptoms, this being contrary to the experience of some reported cases,[1] and showing that the induction of premature labour is not justifiable as a routine treatment for severe cases of this disease.[2]

REFERENCES.

[1] Bellingham Smith, *Guy's Hospital Reports*, vol. lx, p. 238. [2] Bellingham Smith, *Journ. Obstet. and Gyn.*, August, 1905.

FOREIGN BODIES IN THE VERMIFORM APPENDIX.

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THE comparative infrequency of foreign bodies in the vermiform appendix makes the following case worthy of record:

A boy, aged 14, had a mild typical attack of appendicitis in June, 1911. Since then he had frequently had pain in that region, necessitating his being away from school on several occasions for a day or so. At the operation on December 15th I found the appendix considerably thickened and about four inches long. It lay to the inner side of the caecum, below the mesentery. There were a fair number of adhesions around it. The appendix was not of the infantile type. On slitting it up at the conclusion of the operation, the lumen was found to be unusually large, but uniform throughout; there was no ulceration or stricture. Near the distal end was a small piece of wood, about a third of an inch long and an eighth of an inch in the other two diameters. It was irregularly shaped, but being somewhat macerated its points were not sharp. The colour suggested that it had originally belonged to a cedar-wood pencil, but the boy, on being questioned afterwards, denied that he was in the habit of biting his pencils. There were also two hairs about three-quarters of an inch long, the nature of which was confirmed by microscopic examination. There were also several threadworms present, but these, in my experience, are not by any means uncommon. Nothing else was present except some soft faecal matter. No concretions had formed around the foreign bodies.

According to Kelly and Hurdon[1] the commonest foreign body met with in the appendix is a pin. These authors give a list of 46 cases in which this was found. All the cases were complicated by peri-appendicular suppuration, and many of them were fatal. Bullets and shot have also been met with, in most cases derived from eating game.

Other foreign bodies recorded are the following: Pieces of bone, pieces of fish-fin, bristles of a toothbrush, fish-bones, a nail, and parasites—*Ascaris lumbricoides*, *Oxyuris vermicularis*—and a segment of tapeworm. Barnet and Macfie[2] have published a case of gangrenous appendicitis in a hernial sac in which a clove was found protruding from the perforation in the appendix. The patient had not had the opportunity of swallowing cloves since eating an apple pudding a month previously, when he recollected doing so. Apple-pips, grape-seeds, and fig-seeds have also been found. Calcareous enteroliths and true gall-stones are very rarely seen. Battle[3] has suggested that the increase in the frequency of appendicitis in recent years may be due to minute particles of iron derived from the rollers used in grinding wheat. He suggests that these particles find their way into the appendix, where they form the nucleus of a concretion, and he has been able to demonstrate the presence of such a nucleus. Battle[4] also collected four cases in which hairs were present, and in some of these concretions had formed around them.

If sharp points exist, foreign bodies may, and often do, perforate the wall of the appendix and cause acute symptoms of peritonitis. Acute symptoms may be due to the penetration of the inner coats without actual perforation of the peritoneum. Battle quotes such a case recorded by MacDougall.

As regards the frequency of foreign bodies in the appendix, different authors have recorded varying statistics. A. O. J. Kelly had only one case (a pin) in 460 operations for appendicitis. Bell met with 5 cases in 1,000 appendicectomies. Murphy states that they occurred in 3.5 per cent. of his cases, Fitz in 1.2 per cent., while Mutterlich gives 12 per cent. as the result of his experience. At the Johns Hopkins Hospital 4 cases were met with in 1,000 operations for appendicitis. Probably this discrepancy is due to the degree of care with which concretions are examined for a foreign body as their nucleus, and possibly also to the inclusion of concretions by some authors under the heading of foreign body. Personally, I have examined several hundred appendices, and this is the first case in which I have found a foreign body, with the exception of threadworms, which I have noted in several instances. I must admit, however, that I have not always examined concretions carefully for a nucleus.

It is highly probable that, if a foreign body has sharp edges or points, which presumably may easily abrade the mucous membrane, inflammatory changes are produced in the appendix sooner or later in all cases, bacterial invasion of the wall readily occurring. It is possible, however, that the onset of symptoms may be delayed for a considerable period, as several cases have been recorded in which appendicitis, due to the presence of a pin, has not developed until several months after the foreign body was swallowed. Micro-organisms can probably pass through the mucous membrane without any gross abrasion, and their number and chances of flourishing would be greatly increased by the presence of foreign bodies; so that even a smooth foreign body may lead to inflammatory changes in the appendix. The presence of threadworms may also lead to such changes, as it has been proved that bacteria flourish more abundantly in their neighbourhood. It has even been asserted that threadworms may penetrate into the mucous coat. The escape of the foreign body back into the caecum may be prevented by valvular formations of the mucous membrane, by kinks, either congenital or produced by adhesions, or by stricture produced by ulceration. Inflammatory infiltration of the muscular coats, which would prevent peristaltic contraction, may also prevent the passage of the foreign body back into the bowel. Later on, the formation of a concretion around the foreign body may also prevent its escape. On the other hand, Howard Kelly[5] thinks that smooth rounded foreign bodies may produce no inflammatory change, and are possibly expelled into the caecum. Cases have been recorded in which a large quantity of shot has been present in the caecum and appendix without causing any symptoms.

Normally, the small size of the opening into the appendix prevents foreign bodies from entering it. Birmingham[6] thinks that the valve of Gerlach has very little to do with it. In my case, the unduly large lumen probably favoured the entrance of the foreign bodies, and they were then carried, possibly by reverse peristalsis, towards the tip, although the movements of neighbouring coils of intestine may have assisted in their migration. In this connexion the observations of Cannon and Murphy[7] are of interest. By means of observations of bismuth meals with the Roentgen rays, these experimenters found that where there is an insuperable obstruction in the small intestine, violent efforts are made on the part of the muscular coats to overcome it, but after a time, these efforts failing in their object, the intestinal contents are forced backwards in the opposite direction, probably by a process of reverse peristalsis. A similar process possibly takes place in the appendix.

REFERENCES.
[1] Kelly and Hurdon, *The Vermiform Appendix*. [2] Barnet and Macfie, *Lancet*, August 24th, 1907. [3] Battle, *Lancet*, August 24th, 1907. [4] Ibid. [5] Loc. cit. [6] *Textbook of Anatomy*, edited by D. J. Cunningham. [7] Cannon and Murphy, Movements of the Stomach and Intestines in some Surgical Conditions, *Report of Research Work of Harvard University*, December, 1908.

ON THREADWORMS IN THE VERMIFORM APPENDIX.

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THE connexion between threadworms and the vermiform appendix has not long been recognized, but evidence is accumulating which would appear to show: (1) That the appendix is by no means an uncommon nursery for the *Oxyuris vermicularis;* (2) that these small worms may be the direct cause of appendicitis; and (3) that obstinate cases of threadworms which resist repeated courses of treatment may often, and perhaps generally, be thus explained. A recent case illustrates these points.

In September, 1911, I was consulted by a lady, aged 35, who had suffered from grumbling pain in the right iliac region, with occasional exacerbations, for several years, and who had also had recurrent attacks of threadworms, which many courses of treatment by anthelmintics, administered both orally and by enemata, had failed to cure. I was fortunate enough to see the case when slight fever and marked McBurney tenderness pointed clearly to an attack of subacute appendicitis, and when also some threadworms were present in the motions. After the attack had subsided, leaving only some grumbling pain and doubtful tenderness, the appendix was removed. It was found to be kinked and swollen, and the inner coats were greatly congested and thickened, while a careful search revealed the presence of a single threadworm and a single ovum. It is now six months since the operation was performed, and the patient is apparently quite cured not only of her abdominal pains, but also of her tendency to be troubled by threadworms, though no anthelmintic treatment of any kind has been resorted to.

It is strange that more threadworms were not found in the appendix in this case, but no evidence of their presence would have been discovered at all had not a very careful search been made, and it is probable that *Oxyuris* may exist as a cause when none can be found in the removed appendix. Such a finding is, however, probably quite uncommon. In Dr. Macdonald's case[1] "two distinct collections of *Oxyuris vermicularis* were seen towards the base." In "several" of Mr. Burgess's "Five hundred consecutive operations for acute appendicitis"[2] small threadworms were present; while in one of Dr. G. F. Still's cases[3] no less than 111 worms were found in an inflamed appendix.

To Dr. Still, who devotes six pages to a discussion of this subject, we owe the knowledge that this class of case is by no means uncommon among children. "In a series of one hundred necropsies on children between the ages of two and twelve years threadworms were found in thirty-two cases—that is, in 32 per cent."; and in two-thirds of these cases they were found in the appendix. "Moreover, the appendix is in some cases the only part in which the threadworm is found." Dr. Still concludes that the appendix is a common breeding ground for the small parasite, and that the "extreme obstinacy" in some cases, "in spite of all treatment . . . becomes at once intelligible."

Among adults threadworms are fortunately much less common than in children, but when they do occur they are often extremely intractable, and it is probable that one