all, presents physiological as well as anatomical problems, and it is only the latter that are dealt with in the post-mortem room. The following case raises the question whether a man can die of fright.

A Sikh visiting England was treated in the casualty room for a Colles's fracture. He was leaving the hospital when he dropped dead at the exit. The most careful examination revealed no cause of death. He was a well-developed man in the prime of life.

Conclusions.

In my survey I have said nothing about middle-ear disease in children, or of gastric crises; nor have I attempted to deal with syphilis, which I sometimes think can simulate nearly every disease.

It has been said that medicine is made up of common sense and experience. The former is essential if one is to

benefit from the latter. The practitioner is most likely to arrive at a correct diagnosis by means of an orderly method of examination, intelligent use of ancillary means of investigation, avoidance of bias, and the application of general principles derived from his own experience. If for a moment I may be didactic, I would say, Do not be satisfied with a diagnosis unless it explains all the symptoms, and if you have any doubt do not hesitate to say so. Even in the presence of the most difficult case we are not helpless; the whole of our art is not in diagnosis—certainly not from the patient's point of view. The patient seeks relief from his symptoms, and I recall the remarks made by the late Professor Leech in introducing a course of therapeutics: "Relieve the symptoms, make a diagnosis, treat the disease."

RADIOLOGICAL DIAGNOSIS OF THE DISEASED APPENDIX.

BY

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The filling of the appendix with barium was considered by some workers as an exceptional, or even an abnormal, phenomenon only a few years ago. Thus F. M. Groedel, in 1921, wrote: "The appendix does not fill easily with barium meal, and, with the majority of radiologists, I consider at the present moment the radiological visualization of the appendix as an abnormality, or at least as an exception." A few years later the opinion became current that with skill and care the appendix could be visualized in 90 per cent. of cases during the usual routine examination.

The visualization of the appendix probably depends largely on the preparation of the patient; no amount of training and technical skill can enable the examiner to visualize an appendix if the lumen is filled with faecal matter. It is therefore of the utmost importance, in all

types giving rise to definite clinical pictures. (a) There is the appendix fixed all along the caecal wall, forming, so to speak, an integral part of the caecum. It is obvious that this appendix is stretched when the caecum fills, and may give rise to severe pain at the moment when this happens; the pain subsides with the emptying of the caecum. Such an appendix, overlapped by the shadow of the caecum, may occasionally become visible after the caecum has emptied itself. (b) Then there is the appendix only the tip of which is fixed to the pelvic wall. In such cases there is no pain so long as the caecum is full, heavy, and consequently situated low in the pelvis. But as soon as such a caecum empties itself it ascends and drags the appendix with it, thus causing pain.

CASE I.

A boy, aged 8, had about six attacks of abdominal pain during the eighteen months preceding November, 1928. The attacks lasted from half an hour to several days; during them the temperature rose, the breath was foul, and the child became of a pale greenish colour. The pain disappeared after defaecation. The clinical diagnosis made was chronic appendicitis.

The x-ray examination (illustrated in Figs. 1 and 2) gave evidence of hypersecretion of the stomach, with poor filling of the duodenal cap. The appendix became visible at four hours; throughout the whole examination (ninety-six hours) it remained

FIG. 1.—Case I. Seventy-two hours after ingestion.

cases where a diseased appendix is suspected, to have the bowels thoroughly evacuated by a suitable purgative before the x-ray examination. Eau de Châtel Guyon or eau de Gubler are supposed to be particularly effective in this respect, but castor oil or Epsom salts are probably equally good. Alois Czepa advises the administration of the barium meal mixed with two teaspoonfuls of Epsom salts. With this technique the appendix is visualized after six to twenty-four hours, but the best time is between ten and twelve hours, since the ileum is as a rule empty by then and does not overlap the caecal region, while the caecum is well filled.

Mobility of the Appendix.—The normal appendix is freely movable, either spontaneously or on manipulation; of course, the diseased appendix is not necessarily fixed. Among the different kinds of fixed appendices there are two

FIG. 2.—Case I. Ninety-six hours after ingestion and twenty-four hours after a dose of $MgSO_4$.

in exactly the same position and could not be displaced by manipulation, giving the impression of being fixed to the wall of the caecum. It was slightly tender to pressure. Its canal is seen to be dilated, and it remained filled after a dose of Epsom salts. The radiological diagnosis was a chronically inflamed and dilated appendix fixed to the caecum. An operation and histological examination of the removed appendix confirmed the radiological diagnosis.

Appendicular adhesions may alter the shape and position of the caecum, which may appear to be deformed, displaced upwards, etc. Displacement and alteration of the shape of the caecum, descending colon, and lower ileum may be caused by large and encapsulated appendicular abscesses, but, of course, an abscess of any other origin in the region of the caecum would give rise to similar appearances. In one case, in which an acute attack of

appendicitis (in the course of a subchronic appendicitis) began during the x-ray examination (diagnosis confirmed by operation), the caecum showed considerable spasticity and was much deformed; such spasticity may occasionally also be observed in chronic appendicitis.

Dilatation of the appendicular canal is a very important sign, and was present in the case just mentioned. The club-like dilatation of the distal end of the appendicular canal is an almost certain sign of chronic appendicitis.

CASE II.

A married woman, aged 41, had been suffering from attacks of pain in the lower abdomen during the five months ending

FIG. 3.—Case II. Twenty-four hours after ingestion.

April, 1929. The x-ray examination (Fig. 3) showed a long, dilated appendix with club-like end. The appendix seemed to be fixed to the caecum, and was tender to pressure. The radiological diagnosis was chronic appendicitis.

Three weeks later the patient was suddenly taken ill with symptoms of acute appendicitis, and was operated on by Mr. Cairns Forsyth on May 10th. The appendix was found much dilated and adherent to the caecum; it contained a great number of grape and fruit seeds, and its walls were much thinned.

The region of the diseased appendix is as a rule more or less tender to pressure. Quite frequently the patient himself, when asked to show the most tender spot, places his finger over the appendicular region. The tender spot changes its position when the appendix is displaced through manipulation, but, in the absence of other confirmatory signs, not much importance can be attached to tenderness of the appendicular region.

Caecal stasis, in the form of a mass of barium remaining in the caecum for several days after the rest of the colon has emptied itself, is supposed to be one of the signs of chronic appendicitis; but, as a matter of fact, caecal stasis is frequently found in patients with quite normal appendices.

CASE III.

An unmarried woman, aged 21, had suffered for a few years with pain in the right hypochondrium and hypogastrium. At the x-ray examination the appendix was not seen and the appendicular region was not tender; but seventy-two hours after the ingestion there was a noticeable mass of barium in the caecum, and at ninety-six hours barium was still present there and at the hepatic flexure. An operation revealed Jackson's membrane, Lane's first kink, and two strong fibrous bands attached to the outer side of the caecum. The appendix was normal. Adhesions between the ascending and the transverse colon at the hepatic flexure were freed, the bands were severed, appendicectomy was performed, and a good recovery ensued.

In this case the caecal stasis was undoubtedly caused by adhesions and bands, but the appendix was normal. When we find caecal stasis combined with a diseased appendix it is difficult to say which is the primary and which the secondary condition. A diseased appendix may affect the adjoining caecum, but caecal stasis may in turn interfere with the emptying of the appendix, and result in appendicular stasis, leading eventually to chronic appendicitis.

CASE IV.

An unmarried woman, aged 28, had an operation eight years ago for retroversion of the uterus, and since then has suffered from sudden attacks of diarrhoea, which come on irregularly and are caused by certain foods (eggs, fish), by cold, emotional disturbances, etc. In the intervals between attacks the bowels were rather loose. The x-ray examination (Figs. 4 and 5) showed a well-filled appendix, which was tender to pressure and not fixed. The caecum and appendix remained filled 120 hours after ingestion, the remainder of the colon having already emptied itself three days before. The appendix was still filled 144 hours after an effective dose of castor oil. The radiological diagnosis was caeco-appendicular stasis and probably diseased appendix. An operation is still under consideration; in the meantime the patient is keeping fairly well under medical treatment.

FIG. 4.—Case IV. One hundred and twenty hours after ingestion.

FIG. 5.—Case IV. One hundred and forty-four hours after ingestion and twenty-four hours after a dose of castor oil.

In this case the attacks of diarrhoea and the loose stools are undoubtedly caused by the caecal stasis, which keeps up an irritation of the colon; but it is impossible to say which of the two, the appendicular stasis or the caecal stasis, is the primary and which the secondary condition. This is a very important question, since if the appendicular stasis is secondary to the caecal stasis appendicectomy will not bring about a definite cure.

This case brings us to another important sign of chronic appendicitis—namely, appendicular stasis, indicated by the presence of barium in the appendix after the caecum has emptied itself. We must admit, however, that even a severe appendicular stasis, resisting repeated administrations of purgatives, does not necessarily indicate a chronic appendicitis in the absence of other confirmatory clinical signs and data. I have seen an appendix still containing barium six days after administration of the barium meal, and this in spite of two doses of castor oil and repeated enemata. In this case there was not the slightest likelihood of a chronic appendicitis. It is probable that barium is particularly liable to be retained in the narrow appendicular lumen. It thickens and hardens rapidly, so that a sluggish (but not necessarily diseased) appendix would retain it for a considerable time.

The retention of the barium residue in the appendix may be favoured by a partial stenosis of the proximal part of the lumen of the appendix. The liquid barium penetrates through the narrowed part of the appendix into the distal end, but there it thickens and hardens, so that the appendix becomes unable to expel it. This probably happened in the following case.

CASE V.

An unmarried woman, aged 26, had been suffering from abdominal pain for about six months; she had periods of constipation followed by diarrhoeic attacks. An x-ray examination was made after purgation by a dose of Epsom salts, followed twenty-four hours later by the administration of a barium meal mixed with another dose of Epsom salts. The appendix was movable and slightly tender to pressure. It remained filled for ninety-six hours after the administration of the meal, and in spite of a dose of castor oil. The radiological diagnosis was chronic appendicitis.

At the operation there was revealed a long appendix curved on itself with no adhesions. On x-ray examination of the removed appendix the distal three-quarters of the appendix showed broad, dense barium shadows and the regular outline of the appendicular canal; at the junction of the proximal quarter and the distal three-quarters of the appendix there was a narrowing of the

FIG. 6.—Case V. Radiography of the removed appendix.

appendicular lumen. (See Fig. 6.) The abdominal symptoms disappeared after the operation, and there has been no recurrence during fourteen months.

Appendicular stasis is sometimes observed in chronic inflammatory conditions of the right tube or ovary, with or without involvement of the appendix.

CASE VI.

A married woman, aged 38, suffered from sterility and frequent abdominal pain, mostly on the right side. At the x-ray examination the appendicular region, particularly the appendix itself, was found to be tender to pressure, and there was appendicular stasis up to seventy-two hours after ingestion of the meal. A diagnosis was made of chronic appendicitis with involvement of the right tube and ovary.

An operation was performed, and the appendix was found lying in a kind of pocket formed by fibrous adhesions around the right tube; the appendix itself was free. Histological examination of the removed appendix showed increase of the fibrous tissue with signs of chronic inflammatory reaction. The operative findings are rather in favour of a chronic tubo-ovarian inflammatory condition with secondary involvement of the appendix.

In the next case, in spite of the inflammation of the right ovary, the appendix was not involved, but it showed stasis through sluggishness, probably caused by its proximity to the diseased ovary.

CASE VII.

A married woman, aged 30, had been suffering for some time from constipation and headaches. Five weeks before examination she had nausea and an attack of pain on the right side of the abdomen. Constipation was present, but the clinical and vaginal examinations were negative.

The x-ray examination revealed that the appendix remained filled ninety-six hours after ingestion, though the colon and caecum had expelled the barium forty-eight hours after ingestion. The appendix was not tender, but there was a definite tender point below it, and the conclusion was reached that there was a chronic tubo-ovarian inflammatory condition of the right side, but the appendix was probably not diseased.

At the operation both ovaries were found to be adherent to the abdominal wall. The appendix was normal. Adhesions were freed, and appendicectomy was performed. Recovery was uneventful, and there was no recurrence of symptoms during nine months.

The length of the appendix may range from two to twelve inches; occasionally it looks very short, and this may be due to pathological changes within the appendix or to a kink preventing further penetration of the barium. In one case a very short appendix was found in a man who had been operated on for appendicitis twenty-eight years previously. The appendix was removed, but obviously a part of it was left, and this fragment, about three-quarters of an inch long, was very tender to pressure. There were also clinical symptoms of chronic appendicitis. Incidentally the radiological examination revealed the presence of a duodenal ulcer, and of pericholecystitis. It is quite possible that the affection of the duodenum and gall-bladder were secondary to the chronic appendicitis.

The non-filling of the appendix can be interpreted as a sign of disease only when it is impossible to visualize the organ after repeated purgation, followed each time by the administration of barium. In such cases the non-filling of the appendix suggests an obliteration of its lumen, or kinks, or dragging. It may be due also to a retrocaecal position of the appendix, whereby the shadow of the

appendix is overlapped by the filled caecum, the caecum and appendix emptying simultaneously.

These are the most frequent radiological signs of the diseased appendix. Further research and experience will probably reveal other signs and at the same time enable us to interpret more accurately the signs described.

SUMMARY.

1. The appendix can be visualized radiologically in about 90 per cent. of cases. Frequently the appendix is visualized only after thorough purgation of the bowels.

2. Two different types of fixed appendix are described: (a) The appendix fixed to the caecal wall; stretching of the fixed appendix through filling of the caecum causes pain; the pain subsides when the caecum empties. (b) The appendix with the tip only fixed to the pelvic wall; emptying, with consequent rise of the caecum, causes pain through dragging on the fixed appendix.

3. Spasticity of the caecum may be observed during an attack of acute appendicitis, but occasionally also in chronic disease.

4. The dilated appendicular canal, and particularly the club-like dilatation of the distal end of the appendix, are almost certain signs of a diseased appendix.

5. Not much importance can be attached to tenderness of the visualized appendix in the absence of other confirmatory signs and symptoms of appendicular disease.

6. Caecal stasis may be due to a chronic appendicitis, but, on the other hand, may be found in cases of normal appendices. In the presence of caecal stasis and chronic appendicitis, it is difficult to say which of the two is the primary and which the secondary condition. In cases of primary caecal stasis appendicectomy would not cure the caecal stasis.

7. Appendicular stasis is suggestive of chronic appendicitis only in the presence of other confirmatory radiological signs and clinical symptoms of appendicitis. Stasis persisting after the administration of a purgative is sometimes caused by a partial, localized stenosis of the appendicular canal; the fluid barium penetrates through the narrowed lumen, but cannot be expelled after it has thickened and hardened through absorption of fluid.

8. Appendicular stasis is sometimes seen in chronic tubo-ovarian inflammatory conditions, with or without inflammatory involvement of the appendix.

9. The short appendix may be due either to pathological changes within the appendicular canal or to kinks or adhesions of the appendix.

10. The non-filling of the appendix can be interpreted as a pathological sign only in cases where the appendix cannot be visualized after repeated purgation, each purgation being followed by a barium meal.

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