trained nurse is necessary, and it is therefore important that the practice of attending midwifery cases without such help should be discontinued.

Now for the results. During the last ten years 20,705 cases were attended—12,505 in the hospital and 8,200 in their own homes. The number of deaths from sepsis was five, giving a rate of 0.24 per 1,000, and they all followed abnormal labour. As the number of cases and the time over which they were spread are more than sufficient to eliminate chance errors, we may fairly draw the following conclusions: (1) that death from endogenous infection after normal labour is an uncommon occurrence; (2) that the antiseptic precautions used were effective in preventing deaths from exogenous infection following normal labour; and (3) it is doubtful whether these measures are carried out to their full extent throughout England and Wales. The results also exemplify what I have already said, that measures which are effective in preventing death from sepsis after normal labour will not prevent it after abnormal labour.

In this series of cases there was no evidence of spray infection. This might have been a matter of chance, for none of our midwives might have been carriers of *Streptococcus haemolyticus*. To meet this possibility Dr. Leonard Colebrook examined swabs taken from the throat and nose of every pupil midwife when she began her month on the district. From October, 1932, to April, 1933, forty-five district pupils and sisters were examined, and haemolytic streptococci were found in five, which I am told is about the proportion in the general population. The first of these five wore a mask during her month, but the rest carried on their duties without special precautions. To discover if there was any streptococcal infection of our mothers a swab was taken from the cervix of every woman delivered between June, 1932, and May, 1933, who developed a temperature of 100° F. or more, unless a definite extragenital cause for the rise was found. One gave a positive result, but the throats were probably not the cause, for one of the children sleeping with the patient had impetigo, which, on culture, yielded a haemolytic streptococcus. Although typing failed to identify it, the presumption is that it was the source of the mother's infection. In view of this evidence it appears likely that the person who is usually stigmatized as a carrier is a perfectly harmless individual. At the same time, I am not prepared to say that anyone with active disease of the nose or throat is not a danger to the mothers, and as a matter of precaution we preclude any such person from practising midwifery until the disease has cleared up.

A few words are necessary upon our attitude towards gloves. We have tried them and found that they have certain disadvantages: (1) they are expensive; (2) the pupil midwives who wear them are unable to find out whether the os is fully dilated or the membranes ruptured, two very important practical points; and (3) the pupil midwives are inclined to be less careful in washing their hands, and find it difficult to manage the wrists of the gloves without getting them contaminated. I am also satisfied that doctors wearing gloves find it more difficult to perform intrauterine manipulations. For these reasons we have discarded their use, and our results show that we have not needed the added margin of safety that they are said to give. In my opinion it is probable that a simple routine such as has been described here will be more faithfully carried out than a more complicated one, and so in actual practice will ensure a greater degree of safety to a greater number of mothers.

We will now collect in the form of axioms the conclusions at which we have arrived, being confident that if general practitioners would base their methods of midwifery upon them they would effect a very definite

diminution in the number and the severity of their cases of puerperal sepsis.

Summary

1. A low sepsis rate in any practice depends upon success in securing spontaneous labour and in avoiding intervention.
2. Efficient care of the patient during pregnancy and labour will reduce the predisposing causes of sepsis to a minimum.
3. The practice of attending midwifery cases without the help of a trained midwife or nurse is dangerous, and should be discontinued.
4. A simple routine for antiseptic precautions is more likely to be faithfully carried out than a more complicated one, and so in actual practice will ensure a greater degree of safety to a greater number of mothers.

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SOME OBSERVATIONS ON THE ACUTE ABDOMEN*

BY

T. G. ILLTYD JAMES, M.Ch., F.R.C.S.

CENTRAL MIDDLESEX COUNTY HOSPITAL

Acute abdominal conditions still loom largely on the horizon of medical practice. Their frequency does not appear to be abating, and the mortality rates of such examples as intestinal obstruction and perforated peptic ulcer still indicate the need for earlier treatment. In many instances a careful history and a complete clinical examination will indicate the correct diagnosis. Those conditions which may simulate an acute abdomen can usually be excluded, if the possibility of their occurrence is borne in mind and confirmatory evidence sought; such, for instance, as pneumonia with its referred pain, uraemia with its vomiting and abdominal distension, lead poisoning with its colic, or pregnancy and the various complications associated with it. Again, the history, the clinical signs, and an analysis of the character of the pain will usually serve to indicate those cases which do not necessitate an immediate operation—for example, renal or biliary colic.

The picture presented by many acute abdominal conditions necessitating urgent surgical treatment may be so typical that a diagnosis is readily made. Certain circumstances, however, may alter the local and general appearances and cause considerable difficulty. This paper is concerned with some of these conditions, and certain points in their diagnosis will be discussed.

The Influence of Old Age

The aged are subject to the same abdominal catastrophes that beset those of lesser years, and in many of them the manifestations may differ but little from those usually encountered. It is characteristic of old age, however, that the mental and physical response to stimuli tends to become sluggish, and this slow response is not

* Delivered to the Willesden Branch of the British Medical Association.

uncommonly illustrated by acute abdominal conditions of an inflammatory nature—notably acute appendicitis. Pain may not obtrude itself upon the patient until the local condition has advanced to the stage of peritonitis; the atrophied abdominal muscles may allow considerable distension to occur, but they are incapable of much rigidity, which is therefore slight or entirely absent. As one would expect, the temperature is often normal or but little raised, and constipation is usually present.

The senile patient thus frequently comes under observation late in the course of the malady, and the clinical picture is such that a diagnosis of intestinal obstruction may be made. One patient, a man of 80, suffering from appendicitis with peritonitis, presented such a marked degree of abdominal distension that a pre-operative diagnosis of volvulus of the sigmoid colon was made. It is not very uncommon for some of these patients to be submitted to operation—a blind caecostomy being intended for a supposed large bowel obstruction—but when the abdomen is opened appendicitis with peritonitis is found. At operation it is frequently discovered that a considerable degree of ptosis is present, the caecum and appendix being found in the pelvis. This may account, in part, for some of the anomalous features presented by these patients.

If the possibility of this departure from the normal is borne in mind confusion is less likely to occur. Tenderness over the lower abdomen and tenderness on rectal examination are seldom absent, and, as Lewin¹ has pointed out, the vomiting is much less than one would expect in an intestinal obstruction with a corresponding degree of distension. In any doubtful case auscultation of the abdomen and the radiological appearances would be valuable diagnostic aids. It is proposed to deal with these methods in detail later.

The sluggish response of the aged is again shown in the tendency to severe constipation, which not infrequently advances to the stage of faecal impaction with intestinal obstruction. Indeed, this is one of the commonest causes of obstructive symptoms in senile patients, and its importance lies in the ease with which the cause can be detected and removed.

Peritonitis Complicating Labour or Abortion

The peritonitis that may follow abortion or labour complicated by sepsis frequently presents anomalous features. It was not uncommon at operation for a large quantity of purulent fluid to be found in the peritoneal cavity when the clinical signs were but few. Abdominal pain may be only slight, and rigidity of the abdominal wall is often absent. No doubt the stress and strain on the abdominal muscles due to pregnancy and labour bring about an alteration of the usual reflexes, while the accompanying toxæmia or septicaemia will help to mask many of the local features.

In this type of peritonitis abdominal distension is frequently marked, and there is usually tenderness of the hypogastrium. Diarrhoea may be a prominent feature.² The preceding history, the temperature, and the character of the pulse will be useful guides. Pyrah and Oldfield,³ in an admirable survey of thirty-six cases, have shown that in sepsis following labour, so frequently streptococcal in nature, any abdominal pain and tenderness, especially if associated with abdominal distension, should be regarded with grave suspicion, for they usually indicate the presence of peritonitis. Similar features were presented by several cases of peritonitis following abortion that have come under observation. Abdominal pain and tenderness, however, were more prominent than in the preceding group, but rigidity of the abdominal wall was seldom a marked feature. The pallor presented by some of these patients was in keeping with the virulent nature of the infecting organism.

Perforation of Peptic Ulcers

Acute perforation of peptic ulcers is another condition that may cause difficulty in diagnosis. The typical features—the sudden onset of severe abdominal pain with prostration, and general rigidity and tenderness of the abdomen—are too well known to need amplification. But when the perforation is minute the picture may not be so clear, unless the case is seen early. This type is not uncommon, for, in the last eighty perforations observed, it has been present in six. It usually occurs when the stomach is empty and the small hole is rapidly covered by lymph.

The onset resembles the ordinary perforations, but the intensity of the pain may not be quite so severe; the initial signs and symptoms, however, rapidly abate, and become localized to the upper part or to the right side of the abdomen, simulating acute cholecystitis, acute appendicitis, or acute diseases of the chest. Shoulder pain, if present, or the absence of liver dullness, in conjunction with the local findings and the history of previous dyspeptic disturbance, would be strong presumptive evidence of the nature of the condition. In the absence of these helpful signs and symptoms, however, the diagnosis may be in doubt. The temperature in the early stages of perforated peptic ulcer is usually normal or subnormal, and this is a useful differential feature from acute affections of the chest. If the means are at hand, the demonstration of free gas in the peritoneal cavity by *x*-ray examination is conclusive evidence of perforation. It is possible, by means of a portable apparatus, to undertake this procedure with little or no discomfort to the patient.

The value of this method in a difficult case is illustrated in the following example. A male patient, aged 55, was brought to hospital five hours after the onset of acute abdominal pain, which had occurred in the City, and morphine had been given to relieve it. There was some tenderness and rigidity of the upper abdomen, but the clinical picture strongly suggested an early pneumonia; the respirations were rapid, shallow, and thoracic, and there were crepitations at the base of the right lung. An *x*-ray picture, however, revealed the typical sickle-shaped areas of free gas under the diaphragm, making the diagnosis of perforated peptic ulcer definite. Auscultation of the abdomen in this case presented absolute silence except for the transmission of heart sounds. When there is doubt this finding is strongly in favour of a perforation.

The Value of Auscultation

The stethoscope has long established itself as an indispensable aid in the diagnosis of diseases of the chest. Its use in acute abdominal conditions, however, is but little known and infrequently practised. In an obscure case its value may be very great. If we exclude those sounds associated with the pregnant uterus, and those sometimes transmitted when an organ like the stomach is distended, normally, on listening to any part of the abdomen, a medley of sounds is heard due to peristaltic activity. These sounds range from soft rustling noises to loud rumbling gurgles, and their number and variety may at first be confusing. Over the lower abdomen this confusion is less, and for practical purposes auscultation in this region suffices, concentrating on the sounds produced by the small intestine. It is the actual presence of these sounds rather than their nature that is important from the clinical point of view. After a little experience a certain amount of rhythm may be noted, the sounds rising and falling in intensity every ten or twenty seconds or so. It is advisable to listen for a few moments and to repeat the process, for the sounds may vary from time to time, often subsiding into silence to reappear in abundance.

It is clear that any mechanical obstruction causing retention of intestinal contents and increased peristalsis will lead to an augmentation in the number, the frequency, and the volume of these sounds; and, conversely, any condition diminishing peristaltic activity, such as paralytic ileus or peritonitis, will lead to a corresponding diminution. In intestinal obstruction the increase in the number and intensity of the sounds is easily elicited, and they give one the impression of metallic resonance in hollow caverns, often interspersed with loud and long gurgles as if gas were passing through narrow channels. They are very characteristic and, once heard, are readily recognized. In addition, the accumulation of fluid and gas often allows a splashing sound to be elicited when there is small-gut obstruction—by dipping the fingers quickly on the abdomen—a very useful sign when positive. These auscultatory signs are of most value in those cases of obstruction of the small intestine where little or no distension is present, not an uncommon finding in cases due to bands or adhesions.

In contrast with these findings we have the absolute silence presented by the abdomen in general peritonitis or paralytic ileus. Distension may be considerable in these conditions, and the clinical picture may resemble mechanical obstruction. Auscultation thus affords a ready means of differential diagnosis. A silent abdomen is also presented by most cases of perforation of the intestinal tract, even before peritonitis is established, but while peristaltic sounds are absent, transmitted heart sounds may sometimes be heard almost as loudly over the abdomen as over the praecordium. This sign was described long ago by Claybrook⁴ as an indication of a rupture of the intestine following an abdominal injury. It may be positive, however, in any condition where there is a combination of free fluid and gas in the peritoneal cavity, and when elicited is suggestive of a perforation somewhere in the intestinal tract. These auscultatory signs have been found of considerable value in a doubtful case, and especially in atypical perforations of peptic ulcer. Abdominal auscultation may occasionally be of help in the differentiation from acute lesions of the chest, for in the latter conditions the sounds are rarely absent.

It is important to bear in mind that in acute inflammation of individual organs, such as the appendix or Fallopian tubes, so long as the inflammatory process remains confined to that particular viscus the sounds will be normal, perhaps a little diminished in their frequency and intensity. It is only when the inflammation becomes more general that the abdomen is reduced to silence. Confusion is not likely to arise from the coarse rubs that may sometimes be heard over inflamed organs like the gall-bladder; these are more readily detected by palpation.

To recapitulate, on auscultation of the abdomen it has been found that in mechanical obstruction of the intestine the number, the frequency, and the intensity of the normal peristaltic sounds are increased. General peritonitis and paralytic ileus reduce the abdomen to silence, while in perforations of the intestinal tract this peristaltic silence is frequently associated with the transmission of heart sounds, a combination of great diagnostic significance.

Radiology in Intestinal Obstruction

A method which often allows a definite diagnosis to be made in a suspected case of intestinal obstruction is that obtained by means of radiology. The mortality from obstruction is still high, and rises with each hour of delay. Earlier diagnosis and treatment are essential if mortality is to be reduced. The diagnosis may not be in doubt in many cases presenting typical features, for instance, the intussusception of children, strangulated external hernia,

or the acute obstruction that supervenes upon chronic occlusion of the large gut; but obstruction of the small intestine by bands or adhesions, especially those occurring soon after an abdominal operation, may present considerable difficulty. Distension of the abdomen is frequently absent in the early stages, and may be only slight even later if the obstruction is high.

It is particularly in this group that radiological evidence may be definite while clinical signs are equivocal. Radiological signs may be positive as early as two hours after the initial onset, and are earlier in strangulated than in simple obstructions.⁵ This method, therefore, is useful as a complementary diagnostic aid to auscultation, when the means are at hand. No preparation is necessary, and there is no discomfort to the patient; if a portable apparatus is available the picture may be taken while he sits in bed. A lateral picture will often show a degree of distension much greater than that visible on clinical examination.

Under normal conditions in adults gas in demonstrable form is absent from the small intestine. In the large gut its presence is a matter of everyday observation. When obstruction occurs gas and fluid accumulate in the small gut, the junction of the two being shown by straight fluid levels in vertical or lateral radiographs, which are very characteristic. When the small intestine is affected the distended coils, with their feathered appearance, are readily seen, while gas is absent from the colon. Gas in the colon, in fact, would be strong evidence against obstruction of the small intestine.

By this method, therefore, it is possible to differentiate between obstruction of the large and of the small intestine, and in the former the exact site of the block may often be demonstrated by the abrupt termination of the gas shadow. This is of very great value in planning the type of operation. It will be seen that when the large intestine is involved the high gas columns are in marked contrast to the numerous shallow columns of small-gut obstructions. Paralytic ileus may present the same radiological features as mechanical obstruction, but the silence of the abdomen serves to differentiate this condition.

It is not to be inferred that radiology is necessary in the diagnosis of all acute obstructions; it is of value in the cases that are clinically doubtful; but even in those cases where the diagnosis is clear, a plain radiograph will often serve to demonstrate the site of the block.

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W. A. Riley and C. H. Scheifley (*Journ. Amer. Med. Assoc.*, April 14th, 1934, p. 1217) maintain that trichinosis in man is far from rare in the United States, as a large number of serious cases come to the attention of the medical practitioner or pathologist, and a diagnosis of typhoid fever, rheumatism, or malaria is frequently made when the condition is really one of trichinosis. On examination of 117 cadavers at Minneapolis these writers found twenty cases of trichinosis in subjects who had never shown any symptoms of the disease. E. R. Pund and R. Mosteller (*ibid.*, p. 1220) report a fatal case of trichinosis in a negro boy, aged 11, who developed encephalitis three weeks after vaccination. There was no diarrhoea and no eosinophilia, but examination of the blood showed sickle-cell anaemia. Sections from the cortex, basal ganglia, medulla, and cerebellum showed minute inflammatory foci, in many of which embryos of *Trichina spiralis* were found.