An Address

ON

THE DIFFERENTIAL DIAGNOSIS OF SURGICAL DYSPEPSIAS.

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BY

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THE surgical lesions giving rise to dyspepsia are not only of relative frequency and of a serious nature, but are very prone to be mistaken for less important conditions; and since they are capable of being relieved only by adequate surgical treatment, I have considered that a discussion of the methods whereby an accurate diagnosis can be arrived at will be of practical interest.

The clinical history will in these cases be of the greatest value, and, as Moynihan^{41 43} has so clearly pointed out, it alone may be sufficient to indicate the nature and site of the lesion. I shall therefore first draw attention to the variations in the symptoms as they occur in gastric ulcer, early gastric carcinoma, duodenal ulcer, gall stones, and some cases of appendicitis, and shall then consider the physical signs which may be present at the same time.

DISCOMFORT AND PAIN.

Of all symptoms this is the most important, for in the majority of cases it is pain that causes the patient to seek advice, even if it is not the first symptom to appear. At the same time it is often so insidious in its onset that the discomfort or even actual pain which the patient describes as dyspepsia may be present for some months, or even years, before relief is sought. Although in the diseases which I am here considering he will nearly always complain simply of dyspepsia, careful investigation of the nature of the actual symptoms will often show that they vary considerably with the different lesions.

With a chronic gastric ulcer the onset is insidious, there is complaint at first of slight discomfort following soon after the ingestion of food, the discomfort is situated in the epigastrium, and is at first distinctly local. Later it becomes severe, and is, in fact, definite pain. This, again, may be localized to the epigastrium or may start here and then radiate to the right or left, being usually described as of a burning or boring character. As a general rule, the longer it has existed the more does it radiate; in the majority of long-standing cases it passes through to the back, and may be felt at the level of the sixth to eighth dorsal vertebrae or under the angle of the scapula. The most characteristic fact concerning this pain is that it is relieved as the stomach empties, so that it is definitely regarded as being due to the food, and with certain articles of food which are generally regarded as being indigestible the pain is more marked. Another characteristic is that it is present in attacks which may last for some days or weeks and then be followed by relief for two or three months, these attacks of pain in all probability being dependent upon exacerbations of the chronic ulcer, but in all cases the presence of pain is a prominent feature. Sir Bertrand Dawson⁷ found that in 60 cases the pain was the most marked symptom in all but one. The time of onset of the pain after food is very variable. In some cases it may occur immediately, and be present before the meal is finished, whilst in others it may not be felt until two or three hours after the meal, and thus resembles the pain of duodenal ulcer. The time of the onset of the pain has been regarded as indicating the site of the ulcer, occurring earlier with ulcers nearer the cardiac end. The fact that the time of onset of the pain is generally constant in the individual patient would lend colour to this belief. The evidence of Sir Bertrand Dawson's cases, did not, however, support this view. Thus of the 60 cases 23 showed pain immediately after food, but in 19 of these the lesion was near the pylorus and associated with obstruction. It is probable, however, that with obstruction this

indication would be valueless, and the pain immediate, for the stomach would tend to lose its normal shape and become converted into a single-chambered viscus.

With typical cases of gastric carcinoma a marked difference is seen in the character of the pain. It must be remembered, however, that carcinoma may occur either as a complication of gastric ulcer or arise in a stomach apparently free from previous disease, the symptoms in the two cases being different. The first group, those in whom there has been a previous chronic gastric ulcer, are the more common. Thus, Mayo Robson³⁵ found 57 per cent. of this variety, and Moynihan³⁹ 60 per cent. Mansell Moullin³⁰ found that in over 60 per cent. of his cases the patients had been told previously that they were subjects of chronic gastric ulcer. And in quite half the rest there were symptoms of such previous trouble. Wilson and MacCarty³⁸ place the figures as high as 71 per cent. Mayo,³¹ in his earlier series found previous ulcer in 54 per cent., but in his later series of 216 gastrectomies, reported by MacCarty,²⁷ of 158 carcinomas, 125, that is 79 per cent., showed evidence of previous ulcer.

In this group there is the history of many previous attacks in which the pain was typically that of gastric ulcer. In the last attack, however, its character has altered; the intervals of freedom between the meals gradually shorten, and then disappear altogether, so that the pain becomes constant, although it may still be increased by food. At the same time, if the pain has been severe in the previous attacks, it tends to decrease in severity, so that there is complaint of slight but constant pain.

When the disease occurs in a patient previously free from any evidence of gastric trouble, the age at which the pain appears becomes an important factor. Most commonly the condition occurs after the age of 40. As Hale White¹⁵ points out, there is an enormous number of people over that age with dyspepsia and no organic lesion, but such usually have symptoms of dyspepsia when they are young adults. "If symptoms of serious chronic gastric indigestion first appear after the age of 40, organic disease of the stomach should be strongly suspected." But at the same time it must be remembered that carcinoma may start at a much earlier age than this. Canny⁵ has recorded a case in a boy aged 19. In many of these cases pain is an insignificant symptom—there may be a sudden or a gradual onset of other symptoms, and but little or no pain complained of throughout the course of the disease. When present it is usually of the nature of a constant discomfort, as in the last group, and not a severe pain, this discomfort becoming perhaps definite pain after food, and being more marked after solid than after fluid nourishment. It may be severe enough to keep the patient awake at night.

Although in typical cases the pain of carcinoma is distinct from that of gastric ulcer it must be remembered that unfortunately but few cases are typical in this respect. In many, especially in those following gastric ulcer, the symptoms may very closely simulate, or indeed be indistinguishable from, this latter condition.

The pain occurring in duodenal ulcer may again be quite distinct from that seen in other lesions. It is generally the first symptom noticed. The age at which it commences is, however, no criterion. Moynihan's youngest case³⁸ was 19 months old, his oldest 73 years. Kuttner²⁴ has recorded two cases, one in a child 10 days old, and one at 4 years, both being females, and Finny¹¹ a case of perforation in a male child 2 months old.

The nature of the pain, which has been so clearly defined by Mayo Robson³⁵ and Moynihan³⁸ under the term "hunger pain," is now well recognized. The man, for the patient is usually a male—in Mayo Robson's series 86 per cent. were males—complains of pain coming on some two to three hours after food. It commences as a sense of discomfort in the upper abdomen which passes into a gnawing sensation, later giving way to definite pain. With the onset of pain Moynihan⁴¹ has described a free gush of saliva, the swallowing of which is often associated with relief. At first it may be relieved by eructation of wind, later it becomes more severe, and then passes through to the back, to the right of the middle line. At times it may be so severe as to be indistinguishable from that of hepatic or biliary colic. The most characteristic fact, however, is that it is definitely relieved

by food, so that the time immediately after meals is the most comfortable time of the patient's day. It may wake the patient up at night, so that many develop the habit of taking food to bed with them or carrying something in their pockets. It is relieved by alkalis as well as by taking food. As already mentioned, in cases of gastric ulcer where the ulcer is close to the pylorus, the pain may also not appear until some time after food, and thus the diagnosis be difficult. Kemp²³ goes so far as to state that one cannot distinguish between ulcers proximal and those distal to the pylorus. Recent statistics have shown also that duodenal ulcer is as common as, or even more common than, gastric ulcer. C. W. Mayo³² found in his last 1,000 cases 401 (64.5 per cent.) duodenal, and 201 (32.5 per cent.) gastric, while in 19 (3 per cent.) both viscera were affected. Moynihan³⁸ in his first 114 cases found 40 per cent. associated with gastric ulcers.

Even more marked than in the case of gastric ulcer is the periodicity of the pain. At the onset of the disease it may last two, three, or four days, and be followed by complete relief for three, six, or even twelve months. In the later stages the attacks of pain become longer, and the intervals of freedom shorter, but it is only in the very late stages that it becomes constant. The attacks may be brought on by an indiscretion in diet, or even by exposure to wet or cold.

Gall stones, while they are still confined to the gall bladder and unassociated with complications, will, as Moynihan³⁷ and Mayo Robson³⁴ were the first to point out, give symptoms which are mainly referred to the stomach. Two distinct types of pain may be present which, as I have previously pointed out,⁵⁶ seem to depend upon the presence or absence of chronic cholecystitis. In the first group the pain is localized to the epigastrium and right hypochondrium. Soon or immediately after taking food there is a sense of fullness in the epigastrium and a feeling as of having eaten too much. It is often associated with flatulence, the feeling of distension being relieved when the clothes are loosened. The sense of distension may later be replaced by a dull aching or gnawing pain which in many cases varies with the nature of the food taken. This symptom was present as the first indication in 45 per cent. of the 400 cases of gall stones I have previously reviewed.⁵⁶

In the second group of cases, where some chronic inflammatory condition is generally present, the pain is more severe. It is constant, but subject to severe exacerbations after meals. There are attacks of pain in the right hypochondrium and epigastrium, radiating from here to the back and shoulder. Although the pain is severe it is usually bearable, and thus differs from the agonizing pain of true colic. Like the pain of gastric and duodenal ulcer there is a well-marked periodicity, the attacks of pain lasting, perhaps, for a week or fortnight, during which there is but little relief. During such attacks the pain may be worse at night, and thus, from the point of view of this symptom alone, duodenal ulcer may be closely simulated. In severe cases, indeed, the two conditions may occur together. Moynihan³⁸ states that of the 114 cases of duodenal ulcer he had reported up to 1907, 7 cases had gall stones as well. In other cases the pain may be most marked in the right iliac fossa, so that appendicitis may be simulated; in fact, at times both conditions may be present (Ochsner,⁴⁵ MacCarty and McGrath.²⁸

Of late years much evidence has been brought forward to show that there is a very close relationship between appendicitis and gastric lesions. Moynihan⁴² first showed that in many cases of dyspepsia in which a lesion of the stomach, duodenum, or gall bladder might have been supposed to have been present none could be found, but on further investigation a lesion of the appendix was noted. He gave a full account of the symptoms, and showed how they closely resembled those of gastric ulcer, but how in many cases the condition could be distinguished. Fenwick¹⁰ shortly afterwards described the presence of gastric hypersecretion in cases of appendicitis. Of 112 cases of such hypersecretion, the fault was in the appendix in 31. He goes on to state that an ulcer of the stomach may actually follow, the steps being as follows: A hypersecretion due to the appendix is the mildest form of the complaint (in acute conditions of the appendix the gastric juice is usually increased in

quantity and acidity); the continuous flow of this hyper-acid gastric juice is likely to incite an inflammatory change in the stomach, and be followed by an actual ulcer of the stomach or duodenum. At the same meeting Paterson⁴⁸ published the results of his investigations, which had been commenced before Moynihan's work was published. He operated in all upon 24 cases of appendicitis, 20 of which were females. In 15 of them a diagnosis of gastric or duodenal ulcer was made before operation. He gave the name of "appendix dyspepsia" to the symptoms which occurred. In a later publication⁴⁷ he showed that there was obvious appendicular disease in 66 per cent. of cases in which duodenal ulcer was present at operation, suggesting that appendicitis was one of the causes of duodenal ulcer as well as of gastric ulcer. Moynihan,⁴⁴ in his latest paper, shows the marked frequency with which the appendix is diseased in cases of duodenal ulcer, it being affected 12 times out of 14 consecutive cases. He states that in no case of duodenal or gastric ulcer should the appendix be left unexamined. I have myself shown⁵⁶ that there is very strong evidence that, in the majority of cases, gall stones are dependent upon a chronic *B. coli* infection which obtains admission by the intestinal canal. There is, therefore, every reason to believe that appendicitis may not only closely simulate one of the other lesions, but may actually be the cause of them. I shall describe later how the mimicry may even be carried further by the presence of haematemesis in appendicitis.

The pain may commence in the epigastrium shortly after food. In some cases it is rather a severe continuous discomfort than actual pain. In many it may radiate to the right iliac fossa and pressure here may increase the epigastric discomfort. Rarely does the pain radiate elsewhere in the abdomen. It is associated often with eructations, and although made worse by food, rarely shows complete relief between meals. In many cases the symptoms may date from childhood, and although in some they follow an acute illness suggestive of acute appendicitis, in others the onset is insidious. The symptoms often appear in definite attacks, lasting one to two weeks, but there is rarely complete recovery between, as with duodenal or gastric ulcers.

APPETITE.

Variations in the appetite in these lesions are common, and seem to depend largely upon the changes in the secretion of hydrochloric acid. It must always be remembered, however, that they may be of two distinct varieties. In the first case the patient may take but little food owing to the fact that pain is thereby produced. In the second there is actual loss of appetite often amounting to repugnance for food.

In cases of gastric ulcer the appetite is very rarely reduced. The patient will, however, note that the ingestion of larger quantities of more indigestible food is followed by an increase of his pain. The general statement is, however, that he could eat anything, but is frightened to do so owing to this fear of the production of pain. With the presence of carcinoma, however, and possibly owing to the resulting decrease in the amount of hydrochloric acid present in the stomach, the appetite fails and the patient notices a gradually increasing distaste for food. This loss of appetite is, as would be expected, most marked towards meat foods, but is present for other solids in nearly as marked a degree. It is generally an early symptom, and thus, if it develop in a case which has shown a history of previous attacks, probably due to chronic gastric ulcer, suspicion should at once be aroused that the condition has now become carcinomatous. It is in such cases, however, that the appetite is most likely to remain good with the onset of carcinoma.

In cases of duodenal ulcer the appetite is good and is, in fact, better than normal. In addition to the actual condition of the appetite, there is the fact that the patient soon realizes that the ingestion of food relieves his pain, so that food may be taken in larger quantities on that account.

With gall stones and appendicular dyspepsia there may be little or no alteration in the appetite beyond the limitation of food brought about by the fact that pain is caused. At other times there may be distinct loss of appetite, whilst in others, again, it seems to be better than normal,

and associated with true hunger pain. These changes are probably dependent upon the fact that the amount of free HCl seems to be very variable. Thus Paterson⁴⁸ found in 17 cases, hyperchlorhydria in 2, and marked hypochlorhydria in 9.

HAEMATEMESIS AND MELAENA.

The nature of the loss of blood in any of these lesions is never sufficiently characteristic to make the diagnosis absolute. In cases of gastric ulcer the amount of blood lost may be very variable. On the one hand it may be so small in quantity as only to be found on minute examination of the stomach contents, whilst in others a severe or even fatal haemorrhage may be the first evidence of anything amiss with the stomach. More commonly there are attacks of free haemorrhage which last but a short time and are relatively quickly recovered from. Previously the presence of haematemesis associated with pain and vomiting was regarded as almost pathognomonic of gastric ulcer, but of late considerable evidence has been brought forward to show that all these symptoms may be present with no definite ulcer. Hale White¹⁴ gave an account of 29 cases of haematemesis, of which 27 were females and 2 males, on whom a careful *post-mortem* examination had been made, but in no case was there any evidence of an ulcer. Similar cases were reported by Herringham¹⁷ and Lejars.²⁵ Hale White has given the name "gastrostaxis" to this condition. In the majority of cases the difficulty arises in the diagnosis of acute gastric ulcers, which are rather of medical than of surgical importance; but in many the symptoms have lasted for so long a time that a diagnosis of a chronic ulcer is most likely to be arrived at. Sir Frederic Eve⁸ reports 12 cases of such haemorrhage, where at operation with careful search of the interior of the stomach no trace of any ulcer could be found. In one of these cases the symptoms had lasted for twenty years, and in another for twelve years. In only three cases was the history of less than two years' duration. Bolton,³ however, disputes the above findings, and states that in all cases an ulcer can be found if special precautions are taken on examining the stomach after death. Hale White,¹⁶ in answer to this, quoted cases in which the evidence of the absence of an ulcer seemed to be very strong, and I think that it must undoubtedly be accepted that well-marked haemorrhage can occur from the stomach wall without any definite ulcer being present.

With cases of carcinoma the haematemesis is more likely to be slight in quantity, but constant, so that each vomit will contain a small amount of altered blood, giving the well-known coffee-ground appearance. In many other cases there may be no trace of blood in the stomach contents even if vomiting be frequent, as occurs when the growth is situated near the pylorus. In a smaller number the amount of blood lost may be large in quantity, and not only may a severe haematemesis occur, but altered blood be present in the stools. In a few of such cases with no previous history of chronic ulcer the first symptom may be a severe haematemesis, perhaps one or one and a half pints of blood being brought up.

The haemorrhage with duodenal ulcer may again be very variable. Moynihan³⁸ states that in a few cases it is the only, or at least the chief, symptom. There are attacks of faintness followed by anaemia, an examination of the stools then showing the presence of blood. It must be understood, however, that such cases are very unusual. He found in his 114 cases, which he at that date reported, 42 of haemorrhage, in 15 of which it was the urgent cause of operation. If it does occur it is a more serious matter and is much more likely to be fatal than a similar symptom with gastric ulcer. Both he and Mayo Robson³⁶ have pointed out the serious results of such a condition, and have laid stress upon the fact that under no circumstances must it be waited for in order to arrive at a diagnosis. If cases of occult haemorrhage—that is, haemorrhage that is only discovered by chemical or microscopic examination—are included the percentage is much higher. Moynihan,⁴⁴ in his latest paper on the subject, states that it was present in 50 per cent. of his cases, and Kemp²⁹ found it in 7 of his 10 cases.

Owing to the position of the ulcer, blood is more likely to pass down the intestine than back into the stomach, and therefore to be found in the stools in an altered state. If it be relatively large in amount the stools would have

the characteristic tarry appearance. It is a matter of very considerable interest that in many cases of gall stones and appendicitis, although the lesion is so remote from the stomach and duodenum haematemesis may be present. I have already shown how in many cases this may be due to the fact that these conditions may be associated with chronic gastric ulcer. In many others there is, however, but little evidence of any ulcer clinically, although at operation or *post-mortem* examination erosions and acute ulcers may be found. In some cases the condition has been noted before operation. Paterson,⁴⁸ in his 24 cases, found haematemesis in 5. In one the stomach at operation was found in the condition which has been described as weeping blood. McWilliams²⁹ has reported a case of severe and fatal haemorrhage after an operation for acute appendicitis, and quotes Schwalbach⁵²—who collected 30 such cases, 17 of which were fatal—as stating that the condition was dependent upon haemorrhages, erosions, and ulcerations in the stomach and duodenum. J. Hutchinson³⁰ reported a fatal case following an operation for gall stones, and quoted the figures of the cases which I had previously collected from the London Hospital in the three years 1907 to 1909 inclusive. There were 24 cases of haematemesis dying after operation, 13 of which were of appendicitis. Of the others 6 showed some septic condition. In addition to these there were 16 medical cases in which acute ulcers were found *post-mortem*, 13 of them having been admitted and treated for some septic lesion. That is to say, that of the 40 cases some septic lesion was present in 80 per cent., and appendicitis in about 32.5 per cent. MacCarty and McGrath²⁸ showed in a similar way that of the cases of gall stones in which the appendix was removed, 59 in all, 69 per cent. showed inflammatory lesions of the appendix. Spencer⁵⁴ also pointed out how haematemesis was dependent upon sepsis, especially intra-abdominal. With these figures and the evidence I have previously mentioned there can be no doubt that duodenal and gastric ulcers as well as gall stones are largely dependent upon some septic infection which in a large proportion of cases is situated in the appendix, and is probably due to the *Bacillus coli*.

VOMITING.

Vomiting with any of the above lesions is extremely variable, and apart from the presence of blood is of no aid in arriving at a differential diagnosis. In many cases its presence is dependent not so much upon the actual disease as upon the mechanical change brought about by the presence of that disease. Thus, in a large number of cases of chronic gastric ulcer there may be no actual vomiting, although eructation and regurgitation of acid material may be present. In other cases vomiting will occur with the attacks at the height of the pain, this latter being thereby immediately relieved. If there be any constriction of the stomach, either in the body in the form of an hour-glass deformity or at the pylorus, vomiting of large quantities of decomposing and fermenting material may take place, the amount which is returned and the frequency depending upon the amount of dilatation proximal to the obstruction. With carcinoma, again, the character of the vomiting will depend upon the presence or absence of obstruction of the gastric outlet. If there be no such obstruction there is early flatulence and regurgitation of bitter and foul material, while later actual vomiting occurs. In either case it may be associated with slight haematemesis. The amount of vomited material is generally small, and it is important to note that the act is not, as a rule, followed by relief, as in the case of a chronic gastric ulcer. If obstruction of the pylorus be present the characteristic type of vomiting found with a dilated stomach will occur early and not differ from that taking place when the obstruction is due to gastric ulcer.

With duodenal ulcer vomiting is rare; and although this is to be expected, it is a point which is insufficiently recognized. My own experience has been that vomiting occurring with a case showing otherwise typical symptoms of a duodenal ulcer, points to the presence of a gastric ulcer, gall stones, or chronic appendicitis as an addition to the duodenal ulcer. Moynihan³⁸ laid special stress upon the variety of vomiting in this lesion, and showed that it was only a constant symptom if stenosis of the duodenum had supervened from constriction of the ulcer.

When gall stones are present and are giving rise to the

more severe type of pain, vomiting is common. It then occurs at the height of the pain, and is followed by relief. This relief, although definite, is not generally so marked as in the case of chronic ulcer.

With chronic appendix gastralgia vomiting is frequent, and is often the most marked symptom. As is to be expected, it is most evident during the exacerbations of the symptoms, but may even be present between the attacks.

It will be seen that in many cases it is possible to arrive at a diagnosis from a careful consideration of the previous history, but there are so many exceptions to the common types that it is impossible to diagnose any one of the lesions with absolute certainty from this aspect alone. Certain further evidence can be gained from a careful examination of the patient.

In most cases anaemia is present. With chronic ulcer this may be due to the loss of blood or to the underlying toxæmia, for it is a noticeable fact that it is often marked in those cases where there has never been any visible loss of blood. Rutimeyer⁵⁰ found that the haemoglobin was reduced in 82 per cent. of his 200 cases. This is of interest, for the diagnosis between anaemia and gastric ulcer is thereby made less easy. In a similar manner, anaemia may be present with chronic duodenal ulcer, gall stones, appendicitis, or carcinoma of the stomach. And although it may be possible to recognize a distinction in the appearance of a patient suffering from haemorrhagic anaemia and that of one with an anaemia due to toxic absorption, too much stress cannot be laid upon it.

Emaciation and cachexia are likewise useless as a means of diagnosis. In carcinoma they appear late, and they may be present with chronic gastric ulcer. The ordinary methods of palpation, percussion, and auscultation give evidence of very limited value. In cases of gastric and duodenal ulcer there may be an area of deep tenderness of limited extent, and the position of such an area of tenderness may aid in making a differential diagnosis between the two. Again, with chronic cholecystitis there is generally deep tenderness over the gall bladder, which may be best shown by the presence of Murphy's sign. The enlarged gall bladder or a tumour of the stomach may be easily palpable. These last two symptoms are, however, often absent, and, in fact, the presence of a palpable tumour in the stomach points to the disease being far advanced although not necessarily inoperable.

If the stomach is distended and hypertrophied it may be felt or actually seen if the abdominal walls are thin, and active peristalsis may be visible as waves passing from left to right. In the majority of cases, however, there is absolutely nothing to be ascertained by palpation or inspection.

Hertz¹⁸ has shown that the methods of percussion and auscultatory percussion are useless to determine either the size or the position of the stomach. This is, indeed, what one would expect when one considers that even if distended the stomach may contain solids and no gas, and my own experience is in complete accord with this statement of his. Radiography of the stomach and duodenum after administration of a bismuth meal may, however, be of considerable value, but here again it must be realized that there is considerable difficulty in interpreting the results aright. Cunningham⁶ and Birmingham² showed by anatomical studies that the usual shape of the stomach was not that of a simple sac, as was previously believed, but that it was divided into a cardiac part, which was more or less saccular, and a tubular pyloric portion separated at the incisura angularis. These observations have been supported by Cannon and Blake⁴ and by Pfahler⁴⁹ by means of x-ray photographs taken after a bismuth meal. They have also been very fully investigated and supported by Gray,^{12,13} who has shown that food is retained in the sacular portion for an appreciable interval; and, although Barclay¹ has thrown doubt upon them, there is no doubt that such a division must be recognized in the normal stomach. With an atonic and distended stomach the division may be lost. Care, therefore, must be taken not to mistake a normal stomach for one with an hour-glass deformity. As regards the condition of the duodenum, there appears to be divergence of opinion. Jordan^{21,22} has described a condition of obstruction of the duodenal outlet which may be followed by duodenal ulcer, if it is not

indeed always present with it. Moynihan⁴⁴ has, however, for the last two years examined all his cases of duodenal ulcer by this method, and finds that the food shoots rapidly through this portion of the intestine. There is, in fact, the very reverse of any delay or obstruction, but in a few cases the local arrest of the bismuth has led to a correct diagnosis of a pouch caused by the irregular contraction of an ulcer.

In every case of doubt a test meal should be given, as support may thereby be given to one or other of the possible diagnoses. As regards the value of the results, Willcox⁵⁷ states that the active hydrochloric acid is nearly always increased with gastric and duodenal ulcer, whilst it is markedly diminished with gastric carcinoma. Tidy and Panton,⁴⁶ from their exhaustive analysis of 331 cases, find a diminution of free HCl with carcinoma unless there is a previous history of ulcer, whilst with chronic ulcer alone there is on the average a slight increase, but with duodenal ulcer the increase is much more definite. There are, however, many exceptions to the above facts, and, as Sherren⁵¹ has shown, too much stress must not be attached to the test meal. He has found in his series that, "in those cases in which most help is needed . . . namely, those with many years' history, which may be chronic ulcer or may have overstepped the line and become malignant, no information is given of any value." He has, moreover, reported several cases in which the condition verified at operation and by microscopic examination was directly contrary to what the test meal would have led one to expect. This method, therefore, must be regarded only as a valuable aid to diagnosis, and not as a certain means of deciding it.

Of the methods of direct vision I shall say but little. Of the ultimate value of the ingenious instrument invented and described by Souttar,⁵⁸ and the later one described by Hill,¹⁹ which has the advantage of being passed in its whole length by direct vision, it is too early as yet to speak with any certainty. With both an admirable view of the gastric mucosa can be obtained; but, although with both the pylorus can be viewed, the stomach alone can be investigated, and those conditions which I have been describing, and which may so closely simulate stomach lesions, will pass entirely unnoticed. Moreover, the two stomach lesions which are so difficult to distinguish are chronic ulcer and gastric carcinoma, and not uncommonly it is impossible to recognize them with the naked eye, even when the diseased areas are fully exposed, the diagnosis resting upon the feel or even upon the microscopic examination. It must be remembered also that in most cases the passage of these instruments necessitates the administration of a general anaesthetic, and since, in careful hands, the sole danger to-day of an exploratory operation is the small one of the anaesthetic, the patient will thereby be exposed to the same risk in return for much less information.

The final and most certain method of diagnosis is that of exploratory laparotomy. It must be understood, however, that in all the above lesions the only satisfactory treatment is an operative one, and thus laparotomy is not performed for the purpose of making a diagnosis alone. It is the first step in the operative treatment. I have attempted to show how in the majority of cases a careful investigation will lead to the diagnosis of the presence of one of the above lesions. In a certain number the actual nature of the lesion is also clear, but there are a few cases in which one can say with certainty that one of the lesions is present, but it is impossible to say which. This is the type of case in which exploratory operation is desirable, or rather operative treatment is still demanded, but the exact nature of the operation can only be determined after the abdomen is opened. It is rarely that a true exploratory operation is done, and nothing is more to be deprecated than a tendency to slur over the clinical investigation on the plea that all will be made clear at operation. In the greater number of cases a certain diagnosis can be made. For the remainder it is all the more essential that a careful examination be made in order that further knowledge be gained, so that even they may be separated one from another.

What, then, are the indications for operation? It must always be borne in mind that the most important is the possibility, even if remote, of carcinoma being present. This in the early stages is quite capable of cure, but if left

is certain to become inoperable. It is in this stage that diagnosis is difficult. W. J. Mayo⁸³ states that "gastric cancer itself does not give rise to diagnostic symptoms during the curable stage." The other lesions are, however, not only so intractable to any other form of treatment and are so readily relieved by surgical measures, but if left are so likely to be associated later with severe or fatal complications that valuable time should not be lost. I would regard, then, the indications for operative treatment as follows:

1. Any case where the symptoms are such that one of the above lesions can be diagnosed with tolerable certainty.
2. Any case commencing after the age of 35, which is not markedly relieved by a few weeks' adequate medical treatment.

3. Any case where symptoms have recurred after previous attacks relieved by medical treatment, especially if the symptoms have changed from those typical of a chronic gastric ulcer.

4. Any case in which the stomach shows definite evidence of distension, whether the symptoms are those of ulcer or carcinoma.

5. Any case in which a tumour is present suggesting any of the above conditions.

6. Any case with repeated haemorrhage.

I would lay special stress upon the fact that if rapid progress is not made with adequate medical treatment operation should early be resorted to. With our present knowledge it affords the only certain method of diagnosis and cure, and if undertaken early many of the more hopeless complications can be entirely prevented. Also in cases of this nature no operation must be considered complete unless the stomach, duodenum, gall bladder, and appendix have all been examined.

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A CONGENITAL DEFORMITY OF THE FOREARM AND ITS OPERATIVE TREATMENT.

BY

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THE deformity which is the subject of this article has never, as far as I am aware, been described in any English textbook or journal; indeed it is doubtful whether the condition has ever received recognition at the hands of modern surgeons. I have, however, been told that it has been described in America, but I have not been able, so far, to obtain any more exact information concerning it. I think, therefore, that the case which has come under my care should be reported as fully as possible, together with a description of the operative treatment which has been followed out.

The patient is a lady, aged about 33, and the deformity a congenital one, consisting of fixation of the forearms in a position of complete pronation with some slight bowing of the radius in its lower third, the convexity of the bow being backwards and outwards (presuming the limb to be in the correct anatomical position, palms to the front and thumbs out). The condition affects both arms equally, causing very great limitation to the usefulness of the arms and hands. The carpal bones are unusually movable one upon the other, and the ligamentous attachments uniting them are very lax, this allowing of a certain amount of rotation of the hand on the forearm, much more than is normally the case, and is doubtless due to constant efforts at supination acting on the only part of the limb capable of any rotatory movement. The deformity is not very noticeable when anything is taken in the hands, and no effort at supination is attempted; but if an effort is made to hold anything with the palm turned uppermost, a most awkward exposure of the deformity results, the elbow being pressed firmly to the side, and the hand rotated into an almost spiral attitude. A younger brother is also the subject of the same deformity, both right and left arms being perfectly fixed in the position of pronation, with even more marked bowing of the radius and more laxity of the intercarpal ligaments, and their maternal grandmother also suffered from the same condition, although it was not supposed to be so extreme, thus showing the strong hereditary tendency such bony deformities have. Some radiographs here reproduced as engravings show the fixation to be due to bony union between the radius and ulna extending from the elbow downwards along the shafts for about 2½ in.; the two bones are quite free below at the inferior radio-ulnar articulation, the space between them being seen quite distinctly on the fluorescent screen, though the bones were very close together and the joint cavity very small. The head of the radius, instead of being the normal mushroom shape, was rounded off and laterally fused with the ulna. On considering operative treatment the question naturally arose that, supposing the bones were completely separated, could the movements of supination and pronation be effected by means of the usual supinating and pronating muscles? The biceps flexor cubiti was the only supinating muscle that had hitherto been functionally active, the others might have become completely atrophied owing to their never having been used. On careful examination the supinator longus and pronator radii teres muscles could be made out, though they appeared much smaller and thinner than normal, and during the operations which followed this was found to be the case, the former being very poorly developed, both the muscle and tendon thin and weak. The pronator radii teres was also very weak and its tendinous insertion into the radius was as thin as paper.

Treatment and Progress.

However, operation was decided upon, and the first step was to remove the bridge of bone uniting radius to ulna; this was done through a curved incision at the back of the arm just below the elbow, the attachments of the extensor muscles being separated as far as the posterior border of the ulna. No