THE GASTRO-ILEAL REFLEX IN CHRONIC APPENDICITIS *

BY

A. BRUCE MACLEAN, M.D.,

DIRECTOR, X-RAY DEPARTMENT, ROYAL INFIRMARY, GLASGOW ;
LECTURER, MEDICAL RADIOLOGY, GLASGOW UNIVERSITY

The gastro-ileal or gastro-ileo-caecal reflex appears to have been described first of all by the late Sir William Macewen. In 1904, in his Huxley Memorial Lecture, he described how, in a patient who had had a portion of the lower abdomen and a part of the caecum shot away as a result of an explosion, the taking of food into the stomach influenced the ileum to eject its contents into the caecum. Hurst described the same reflex in 1909, and to some extent focused attention on this interesting physiological happening. During x-ray examinations by means of the Haudek double-meal test it is often found that, while most of the first meal may be in the ileum in five or six hours after it has been taken, a few minutes after the ingestion of the second meal the ileum becomes active and the propulsion of its contents into the caecum begins. Haudek's double-meal technique is seldom necessary as a routine method of examination, and although in some cases it has certain advantages, in the work that I am about to describe it has the disadvantage that the head of the second meal may mingle with the last portion of the first, and so preclude the possibility of estimating the time of evacuation of the ileal contents into the caecum. In a great many cases of gastro-intestinal examination by means of the barium meal no barium enters the caecum, it may be, four, five, or even six hours after the taking of the meal, provided the patient remains fasting, although the head of the meal may have reached the ileo-caecal valve in one or two hours. As Hurst remarks, "Ileal stasis is thus a normal physiological condition of the utmost importance for adequate digestion." How long the meal might remain in the terminal portion of the ileum in the fasting condition is uncertain, but it does seem to remain until the taking of another meal establishes the reflex between the stomach and ileum, when the food (barium) rushes from the ileum into the colon, a process which is complete in about an hour's time.

Since there is no doubt as to the existence of the reflex, which can be elicited with the greatest of ease in any normal individual, it would seem that the reflex must, like other reflex actions, be subject to variations, not only in its normal behaviour, but also to variations brought about by pathological conditions which might, on the one hand, lead to a diminution or loss of the reflex, and, on the other, to an exaggeration. This is the underlying idea of a series of investigations I have made for some months past with the object of ascertaining if such variations occur during disease. The method employed is as follows. Four hours after the barium meal has been taken the patient is instructed to take a light meal of any ordinary kind (the excitor meal)—for example, soup and fish, or tea and biscuits. He is examined one hour from the commencement of this meal—that is, five hours after taking the barium—when it will be found that normally practically all of the barium has entered the caecum and colon, in some cases only a few inches of the ileum showing. At this stage the head of the meal will have reached the hepatic flexure or just beyond the flexure.

VARIATIONS IN THE BEHAVIOUR OF REFLEX

Such, then, is the normal reaction to this simple test. When there is an inhibition of the reflex action, it will be found that no barium has entered the caecum one hour after the excitor meal has been given, or, in partial inhibition, only a fraction of the meal, perhaps one-third or one-half. It is difficult to say whether or not the reflex is ever exaggerated. In some cases it will be found that the head of the meal has reached the rectum, but it is likely that there is some irritability of the colon which is responsible for urging the meal onwards. Another type of reaction is seen in some cases; the head of the meal has reached the iliac colon or even rectum, yet quite a large proportion of the barium is still present in the ileum, perhaps as much as about one-half of the total amount administered. The diseased condition which gives rise to these changes in the behaviour of the reflex is chronic appendicitis, and all the cases in which I have been able to obtain surgical data that the reflex was inhibited have proved at operation to be cases of chronic appendicitis. I have therefore come to regard total or partial inhibition of the reflex elicited in this manner as a reliable sign of a diseased appendix, even in the absence of other signs, either clinical or radiological, provided the patient has other abdominal symptoms, gastric or duodenal in type. Appendicular dyspepsia is now well recognized as a clinical entity, and it is in such cases that this test has proved of most service. There is a very close relation between the appendix and ileo-caecal valve on the one hand, and the stomach, pylorus, and duodenum on the other.

Barclay pointed out some years ago that there is a reflex which we might call ileo-pyloric, since in a case of ileal obstruction a well-marked pylorospasm existed. The best example of pylorospasm that I have seen was in a boy with a subacute appendicitis. The pylorospasm lasted for at least forty minutes, up to which time no barium had left the stomach. Clinically, there was no doubt concerning the condition of the appendix, but symptoms were present so markedly duodenal in type that the barium meal was given to settle the question as to ulcer. No sign of ulcer was found, and at operation the following day (appendicectomy) the duodenum was seen to be normal. Pylorospasm in a less severe degree is not uncommon. Frequently there is barium in the stomach at the five-hour examination, and such residues may be merely smears of barium along the lower pole of the stomach, or may consist of as much as one-third of the barium ingested. Such residues, in the absence of gastric or duodenal ulcer, are always good indications of the likelihood of some appendicular mischief, and they are commonly seen where there is inhibition of the gastro-ileal reflex. Pylorospasm is mostly seen in young patients, generally in those under twenty, who are suffering from chronic appendicitis. The duodenal deformities which occur in cases of chronic appendicitis are not infrequently mistaken for duodenal ulceration, and are another indication of the close nervous relation which exists between the pylorus, duodenum, terminal ileum, and ileo-caecal valve.

CAUSES OF INHIBITION OF REFLEX

Inhibition of the gastro-ileal reflex appears to be due to a spasm of the ileo-caecal valve and not to anything of an obstructive nature, such as kinks, bands, or adhesions; such findings were rare in my series of cases. Sometimes a spastic terminal ileum can be felt on palpation, and may be mistaken for the thickened appendix, but this point can easily be settled radiologically. In cases of partial obstruction of the terminal ileum due to

* Read in the Section of Radiology at the Centenary Meeting of the British Medical Association, London, 1932.

adhesions the symptoms are usually fairly severe. The condition of slight ileal stasis which I have described is apparently a spasm of the sphincter brought about by the local irritation of a chronic appendicitis, and is quite sufficient to justify a diagnosis of such a condition. Unfortunately, all cases of chronic appendicitis do not give the inhibition of the reflex, and a considerable number of cases show the reflex to be what is probably normal in type.

A series of over 300 cases has been examined in hospital by giving the patient the excitator meal four hours after the liquid barium meal. In practically all of these cases a diagnosis of chronic appendicitis was made. So far, only in forty of these cases are the operation findings available. All were proved at operation to be cases of chronic appendicitis, and in twenty-one inhibition of the reflex was found in that either no barium had entered the caecum—as in most of the cases—or the barium was just commencing to enter the caecum. In nineteen cases sometimes as much as all the barium was in the caecum and colon—a normal reflex action; in some of the others a few inches of the pre-caecal ileum could be seen. Since more than half of such cases show a disturbance of the gastro-ileal reflex, it is a reasonable conclusion that about half the cases of chronic appendicitis show this type of ileal stasis, due most likely to spasm of the ileo-caecal valve, brought about by local irritation, the real cause of the inhibition of the reflex. A diagnosis of chronic appendicitis can be made from this type of ileal stasis alone, even in the absence of the other radiological signs which we seek and of clinical signs which point to the appendix as the seat of disease. This I have proved in a number of private patients suffering from obscure dyspepsia where there was nothing in the history or clinical examination to suggest the presence of chronic appendicitis.

In a recent case a man was acutely ill, suffering from abdominal pain and rigidity, mostly in the epigastric region; there was high temperature, sweatings, and jaundice (toxic). The clinical picture was that of a gastric or duodenal perforation which had become shut off by adhesions. The surgeon had decided on laparotomy, but, before operating, requested me to make a barium meal examination, to see if the stomach or duodenum showed any change. The stomach and duodenum were apparently normal. The patient was given an excitator drink (he was on liquids) at five hours, and at six hours all the barium was in the ileum, even although the patient had been suffering from a troublesome diarrhoea. The following day the colon was well outlined. No actual diagnosis was made here, but in view of the ileal stasis I suggested that attention should be given to the appendix at the operation. The condition found was a fairly large appendix abscess walled off by adhesions. This case is of interest because it shows that even gross disease of the appendix may be symptomless so far as the localizing signs are concerned, yet stasis of the ileum here, as in the chronic cases, pointed to the appendix as the seat of the disease.

SUMMARY

1. Three hundred cases of chronic appendicitis have been examined radiologically.
2. Forty cases have been operated upon.
3. The gastro-ileal reflex is elicited by giving ordinary food, as an excitator meal, four hours after the barium meal, and noting the amount of barium in the colon one hour later.
4. Chronic appendicitis causes delay in the filling of the colon in about 50 per cent. of cases.
5. Delay in the filling of the caecum under such conditions can be regarded as a sign of chronic appendicitis.

Memoranda

MEDICAL, SURGICAL, OBSTETRICAL

IMPACTED MANDIBULAR THIRD MOLAR

It may not be out of place to draw attention to a cause of persistent cranial neuralgia which is frequently overlooked. The treatment belongs properly to the domain of dental surgery, but the patient is often first seen by a medical man.

CASE I

A female, aged about 55, had been subject to intermittent attacks of neuralgia on the right side of her face since the age of about 20. Four years previously she had noticed that she was cutting another tooth in the region of 8; more recently she had been conscious of a nasty taste in her mouth. On examination the wisdom tooth was found partly exposed and impacted in the horizontal position, with its crown almost completely carious. After removal of the tooth the immediate symptoms subsided, and the patient has been free from neuralgia ever since—two years ago. The wisdom tooth on the left side was in its normal position.

CASE II

A male, aged 17, had been suffering from almost intolerable paroxysms of severe neuralgia on the right side of the face and head. He had been treated for nearly a year with large doses of quinine, which gave temporary relief. On dental examination no obvious cause for the neuralgia could be found, but the dental *x*-ray films showed both lower wisdom teeth deeply impacted in the disto-angular position. Although there had been no symptoms on the left side both teeth were dealt with at the same time; there have been no paroxysms of pain since.

In all cases where no obvious cause of cranial neuralgia is apparent the condition of the mandibular third molar should be ascertained. If it is not visible and no history of its extraction—or of the lower first permanent molar—can be obtained, dental *x*-ray films should be taken. If the missing tooth is impacted in a favourable position and the second molar is carious and not likely to last long in the mouth the latter may be extracted, but if the second molar is a good tooth the impacted mandibular third molar only should be removed. This is by no means such a trivial operation as ordinary tooth extraction. These cases usually occur in persons of 16 to 25, but Case I shows that older patients are not exempt.

G. GRAHAM MACPHEE, M.A., M.B.,
Ch.B., L.D.S.

Liverpool.

PERFORATION OF THE ILEUM IN A CASE OF LATENT TYPHOID FEVER

Sporadic cases of typhoid fever often escape recognition during the first week, before the signs of the disease are fully developed. It must be very unusual, however, for a case to perforate, and after operation to proceed to full recovery, with none of the common manifestations of the disease occurring.

A man of 40, who gave a history of typhoid ten years previously, was taken ill on June 9th, 1932. For some days he was in bed, with a temperature of about 100° F., and had slight headache and pains in the back. His tongue was clean, his bowels regularly open, and there were no abdominal symptoms of any kind. Suddenly, on June 18th, he was seized with severe abdominal pain, resembling in many ways that of a perforated duodenal ulcer. Board-like rigidity developed, with slight hypogastric distension. Maximum tenderness was in the right iliac fossa.

A laparotomy was performed four hours later, and, on opening the abdomen, a quantity of blood-stained fluid escaped. The whole lower ileum was thickened and inflamed.