X-RAY STUDIES OF THE APPENDIX.

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X-Ray studies of the ileocaecal region have proven an important factor in determining the pathology of this portion of the intestine. Case¹ in his studies has called attention to the not infrequent occurrence of incompetency of the ileocaecal valve, and a method of diagnosing same. The presence or absence of ileocaecal adhesions, the demonstration of the bismuth filled appendix, and the reflex disturbances of the stomach produced by these factors have been checked up with the operative findings with favorable results.²

The writer in this paper desires to limit himself to the discussion of the appendix from a Roentgenographic and Roentgenoscopic standpoint. The Roentgenogram is considered only half of the examination, as the presence and extent of adhesions cannot be determined with any degree of accuracy without the use of the Roentgenoscope.

The facts to be determined from the Roentgen-ray investigation of the appendix are first, if the appendix is of the patulous type; if so, whether functioning or non-functioning. Second, the presence or absence of adhesions, and if adhesions are present whether they are sufficient to produce symptoms. In some cases adhesions may be demonstrated associated with a normal motility of this portion of the intestine, but the patient complains of a discomfort in the right side. In such cases, if adhesions are found and are associated with the above symptoms they should be considered an important diagnostic point.

Another question to be determined is what technique should be employed in the study of the appendix? First, the writer considers the nature of the test meal employed very impor-

Fig. 1. Functioning Appendix.

The gastric symptoms were so marked in this case that the patient first consulted a stomach specialist. The X-Ray findings of the stomach were marked pylorospasm, negative for ulcer. Ileocaecal region, slight stasis in ileum and patulous appendix with no stasis. Operation—Appendectomy. Symptoms relieved.

tant. Second, the thoroughness with which the examination is conducted by means of a number of Roentgenograms and by the use of the Roentgenoscope. As to the habits of the patient the writer does not believe in interfering with these. If he is accustomed to taking a laxative every night this is permitted. No special preparation of the patient is made for the examination. The regular breakfast is omitted and the test meal substituted for this.

The technique of the examination may be summarized as follows: The patient is given a meal of 70 grams of bismuth subcarbonate in 400 C. C. of buttermilk. Four hours later the first Roentgenogram is made at which time the meal will be observed passing through the terminal ileum, and possibly in the caecum for a short distance. From this time a Roent-

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Fig. 2. Non-functioning Appendix.

The clinical symptoms in this case were referable to both the stomach and the appendix. The X-Ray finding of the stomach were hyper-peristalsis and a spastic filling defect of the duodenal cap. Ileo-caecal region, patulous appendix with stasis. Operation—Appendectomy. Symptoms relieved.

genogram is taken every hour until six are taken. This method enables the operator to study the motility of the caecum and terminal ileum very closely, and at the same time he is given a good opportunity to detect the bismuth filled appendix. This procedure of taking consecutive Roentgenograms is important as often it is difficult to locate the entire outline of the appendix. It may soon be covered by some portion of the intestine filled with bismuth, and will probably if it is the functioning type empty earlier than the bismuth of the intestine.

The Roentgenograms are taken in the prone position. At intervals during the examination Roentgenoscopic observations are made. The writer considers this a necessary procedure in the formation of a correct diagnosis. The value of the Roentgenoscopic examination is

Fig. 3. Chronic Appendicitis, with Adhesions.

The diagnosis in this case was not based on the demonstration of a patulous appendix, but rather on the fact that the transverse colon was bound to the caecum by a mass of adhesions. Operation—Appendectomy. Symptoms relieved.

due to the fact that the intestine can be observed from different angles, the patient can be turned in any position desired, and different views of the intestine obtained while being palpated. If adhesions are present, the intestine can be moved from one position to another, and by manipulating the abdomen, the extent of the adhesions can be determined. Also the appendix being frequently covered by some portion of the colon filled with bismuth is more readily detected by the Roentgenoscope. After it is located by this method a Roentgenogram may be taken.

In the study of acute appendicitis the X-Ray is seldom employed. The writer has examined only one case of this type. In this one the appendix was found filled with bismuth, and had not emptied in three days. The patient was operated upon on the fourth day after the bismuth meal, and a gangrenous appendix filled with bismuth was found.

It has been suggested by some of my colleagues that probably the presence of bismuth in an appendix would excite an acute attack where a chronic inflammation already existed. In my experience I have discovered no aggravation of symptoms from the bismuth in the appendix.

The study of chronic appendicitis constitutes a more useful field for the X-Ray. If the appendix shadow is detected a number of facts can be obtained. It can be determined whether there exists a stasis in the appendix, kinks or adhesions. If the lumen of the appendix has been obliterated then we are forced to form our conclusions from the adhesions and the degree of stasis present in the caecum.

First, we will discuss the detection of the patulous appendix and its significance. Until a few years ago the Roentgen-ray detection of a patulous appendix by means of an opaque meal was considered an accident. This was due partly to the nature of the opaque meal employed and to the fact that close observation of the ileocaecal region was not systematically made. Early investigators employed opaque meals, consisting of bismuth subcarbonate mixed with cereals. This bismuth being mixed with solid material rendered the appendix less likely to be filled. A preparation consisting of an opaque substance suspended in buttermilk or some of the various artificial milks gives a liquid meal and one more suitable for a study of the appendix. With such a medium radiographic detection of the appendix is possible in a larger number of cases.

Considerable discussion³ has been elicited as to how much stress should be laid on a patulous or leaking appendix—that is, an appendix which receives material from the large intestine. Often this material is discharged by the peristalsis of the appendix, but frequently it is not discharged, being retained for varying lengths of time. It is generally conceded that an appendix which is unable to functionate or discharge should be regarded as dan-

gerous. However, the danger of one that is able to functionate or discharge is not agreed upon. Case⁴ in the discussion of this subject states that he does not assert that every appendix which permits the entry of bismuth is in need of surgical attention; that there are many cases in which surgery is distinctly not indicated, for instance, when the contents of the appendix have disappeared by the time the colon is emptied.

In the writer's experience he has found the reverse to be true. The functioning patulous appendix has been found invariably associated with symptoms in the right quadrant of the abdomen. In some cases the symptoms were reflex, being more referable to the stomach, duodenum or some other portion of the abdomen. The removal of the appendix was followed by relief of symptoms. The cases that have been operated on seem to support the theory that a functioning patulous appendix is capable of producing symptoms, and should be removed. The writer's cases are too few, however, to form a statistical opinion. He has now under observation several cases in which a patulous appendix has been demonstrated that has not been removed. The symptoms are mild, and are those that are usually termed chronic indigestion. So far medical treatment has failed to produce permanent improvement.

In the examination of these cases it was observed that the patulous appendix was very often associated with adhesions of the terminal ileum, simple ptosis of the transverse colon, or adhesions of this part to the ascending colon or caecum, and chronic constipation was nearly always found. In some individuals the appendix was found freely movable; in others, tied down by adhesions.

The appendix may be retrocaecal, and by the time the caecum has emptied possibly very little bismuth will be found in the appendix. In this type it is possible that the tip, or a small portion may be seen. By careful search with a number of Roentgenograms and by Roentgenoscopic observation frequently

the entire outline can be detected. Following the technique as has been described, the writer has demonstrated a patulous appendix in 25 per cent of the intestinal cases referred to him for examination. In these cases the time required by the appendix to empty varied from four hours to seventy-two, and in some cases longer.

Second, the question of ileocaecal adhesions: Adhesions in this region producing stasis in the terminal ileum, constriction of caecum, or a pull on the transverse colon binding it down in a mass to the caecum are manifestations of previous appendicular or peri-appendicular inflammation. These are readily detected by the combined method of Roentgen-ray examination. This examination determines whether simple ptosis or adhesion is the factor in producing the pathology that is present.

The behavior of the stomach in Roentgenographic studies of the appendix is also to be noted. Cases in which a diseased appendix can be demonstrated by the X-ray very frequently show reflex disturbance of the stomach, and if the Roentgenographic examination should be confined to it alone it is possible a diagnosis of a duodenal ulcer would be made. In such cases the stomach frequently shows a retention of bismuth longer than six hours, and a hyperperistalsis. This condition, on investigating the ileocaecal region, is explained by the pathology of the appendix.

Conclusions:

1. A patulous appendix, functioning or non-functioning, is capable of producing symptoms.
2. The X-ray constitutes a valuable means of diagnosing lesions of the ileocaecal region.
3. As a routine procedure in the study of obscure abdominal cases Roentgenographic examination of the appendix should be adopted

¹Case, *American Quarterly of Roentgenology*, November, 1912.

²Jordan, *British Medical Journal*, June 1, 1912, No. 2683. Quimby, *New York Medical Journal*, October 11, 1913.

³Groedel, Case, Quimby.

⁴Case, *Journal A. M. A.*, Vol. LXI, No. 20.

THE TREATMENT OF ECLAMPSIA.

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By the terms eclampsia, puerperal eclampsia, and puerperal convulsions is meant, in modern medicine, an acute morbid condition, making its advent during pregnancy, labor, or the puerperal state, which is characterized by a series of tonic and clonic convulsions, affecting first the voluntary and then the involuntary muscles, accompanied by complete loss of consciousness, and ending in coma or sleep. The disease may eventuate in death or recovery (Charpentier).

The etiology and pathology, although the subject of much painstaking research in various parts of the world during recent years, have not been cleared up. The autotoxic state, which more frequently manifests itself in a severe form in the latter months of pregnancy, reacting as a rule chiefly on the kidneys, producing a fatty degeneration of the parenchyma and giving the much-discussed kidney of pregnancy, is doubtless the chief etiological factor in most cases of eclampsia. At present this autotoxic state is believed to be closely related to the ordinary toxemia of pregnancy, as manifested generally in the early months, but occasionally persisting throughout pregnancy. By some the liver is thought to be the chief organ at fault, and at autopsy of fatal cases this organ has been found to be the seat of more or less marked degenerative changes, but whether these changes were of primary or secondary origin it is impossible to say. In other instances marked degenerative changes have been noted in the kidneys and the liver found practically normal.

However, there is doubtless a cholemic type of eclampsia, in which the liver is the chief organ at fault, although in the fatal cases thought to be of this type the kidneys usually show degenerative changes also. Cerebral lesions, hyperemia, oedema, thrombosis and hemorrhages, as well as myocardial degenera-