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REGIONAL ILEITIS

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IT IS THE PURPOSE OF THIS PAPER to report a series of cases of regional ileitis which, while not large, has been of such variation that it suggested the desirability of selecting those cases which might be utilized to outline a possible sequence of events from the standpoint of gross pathology. Many of the observations are largely confirmatory of the information already available in the voluminous literature on this subject. However, additional emphasis has been placed upon those aspects which appear to warrant it.

In their original article (1932) Crohn, and his associates[3], reported a series of chronic inflammatory lesions which consistently involved the terminal ileum, stopping abruptly at the ileocecal valve; their observations suggested that they were dealing with a definite clinical entity. Since that time contrary-minded individuals have reported somewhat similar lesions at higher levels in the small intestine, together with occasional manifestations in the large bowel. In all our cases, with the exception of Case 5, the localization has been as Crohn originally described it. He suggested that the ileocecal valve appears to function as a barrier to extension into the cecum. While reported cases may tend to refute this, several of ours were of some interest in this connection. We were privileged to carry out exploratory operations and resection in two cases (Cases 3 and 7) in which observations at operation six and eight years previously had indicated that the process stopped abruptly at the ileocecal valve. Examination of the resected specimen and examination at operation showed no further progression of the process into the cecum. However, in Case 3 the ileocolostomy might have been a limiting factor. In any event, about 80 to 90 per cent of the lesions reported have been limited to the terminal ileum.

From the clinical standpoint, Crohn, and his associates, divided the condition into four phases: First, the earliest manifestations of abdominal discomfort which may be vague or indefinite but in other instances may very closely simulate acute appendicitis. Second, the ulcerative stage, which is characterized by varying degrees of abdominal cramps and diarrhea accompanied on occasions by some anemia and loss of weight. Third, the fibrosing or stenotic phase which is typified by cramps which may be obstructive in

origin, together with intermittent episodes of diarrhea. On many occasions a mass is palpable in the right lower quadrant, and the patient may have a considerable degree of anemia and emaciation. Fourth, the phase characterized by fistula formation, which fistula may be internal or external. The former may be established between loops of small or large bowel, particularly the sigmoid (our experience is outlined in Figure 5). External fistulae may appear in the abdominal wall or perineum.

In attempting to coordinate the preceding with a subsequent classification, the first two phases probably represent acute and subacute manifestations, while the last two are definitely chronic; however, as mentioned elsewhere in this paper, the subacute stage may be the phase of actual perforation and beginning fistula formation. It should be emphasized that the progression may extend over years, and that on occasions there may seem to be a marked disparity between the severity of the symptoms and the extensive changes revealed by operation. Furthermore, in isolated instances the stenotic phase may manifest itself without any satisfactory history suggestive of progression through the early phases.

In an effort to establish the sequence of progression, we have selected Cases 1, 2, 5 and 9 because of the distinctive gross appearance of the lesions as revealed by operation. Case 1 (Fig. 1), because of the marked edema and abscence of accompanying local signs of inflammation, was thought to represent the earliest manifestations and is largely a question of lymphatic block. Case 2 (Fig. 2) would seem to be quite comparable with Case 1, there being, however, further superimposed signs of local inflammation, but still characterized by lymphatic block. Case 5 (Fig. 3), while the most striking, is surrounded with uncertainties from the standpoint of classification. Although in this case there was involvement of the terminal ileum, there was in addition segmental involvement; one area involved was the third part of the duodenum. Involvement of the duodenum grossly appeared comparable with the findings in Case 1, *i.e.,* marked edema with a paucity of inflammatory findings. It is reasonable to assume that the segmental areas had a similar origin though varying markedly in gross appearance. Whether we are entirely justified in classifying this manifestation with regional ileitis may be open to question. Except for the duodenal involvement, grossly, this case is identical with several cases described by Jackman[8] under the caption of "localized hypertrophic enteritis." The gross description and illustrations have much in common, and our information concerning the microscopic picture is drawn from this report. In any event, from the standpoint of history and microscopic findings we can definitely place it between Cases 2 and 9. Case 9 (Fig. 4) is obviously of considerable chronicity and typical of the obstructive and stenotic phase.

In using the terms "acute," "subacute" and "chronic," we are employing them in a strictly clinical sense, without implications as to the microscopic findings. This would seem particularly desirable because in some instances the chronic lesions may show superimposed acute inflammation, while the

so-called subacute case probably shows the most active inflammatory lesion microscopically.

If it is assumed that there is justification for utilizing the terms "acute," "subacute" and "chronic," it would seem desirable to review the available data in regard to the gross and microscopic pathology of regional ileitis. Grossly, the acute forms are characterized by their sharp demarcation, their sponge-rubber-like consistency, the marked edema which varies from white to pink, and the enlargement of mesenteric nodes of the involved segment. There is usually an accompanying accumulation of intra-abdominal fluid in the acute form. Grossly, the so-called subacute type is characterized by spongy consistency, sharp demarcation, and desquamation of the mucosa—in some instances in its entirety. The mucosa has been replaced by an hemorrhagic exudate, which, together with engorgement, is visible through the more or less normal peritoneum and which accounts for the fiery red appearance of the lesion grossly. Its appearance at operation may suggest recent strangulation or some embolic phenomenon. The bowel may be friable, and the two specimens of the subacute type reported in the literature (Jackman) were obtained incidental to perforation through handling. Hence, in all likelihood perforation and fistula formation may frequently occur spontaneously during this phase. After having passed through this reaction, it would seem that an intestine so affected must necessarily continue ultimately to the stenotic or fistula stages, there being little possibility of spontaneous subsidence. Grossly, the chronic forms are characterized by their thickening, rigidity and tumor formation either because of their altered character or because of adhesions between adjoining loops or extensive inflammatory reaction in lymph nodes or the adjacent mesentery. The mucosa is extensively involved by ulceration, varying in depth, but largely distributed along the mesenteric border of the intestine, with areas in which the lumen is markedly diminished in caliber. There is little or no accumulation of intra-abdominal fluid in the chronic form.

From the microscopic standpoint, there is nothing which is characteristic of this lesion. In view of the fact that practically all specimens obtained are of the chronic or subacute types, we have less conception of the microscopic appearance of the acute forms, particularly the edematous type. However, one might assume that, microscopically, the acute forms might reveal slight ulceration of the mucosa with marked thickening of all layers of bowel due to associated edema and with an infiltration of cellular elements dependent upon the severity of the reaction. Histologically (Jackman), the subacute condition is characterized by the absence of mucosa with substituted hemorrhagic exudate and an underlying submucosal reaction which almost borders on abscess formation. The peritoneum is relatively uninvolved, but intermediary layers reveal some degree of fibrosis indicative of previous inflammation. However, there is no demonstrable evidence of thrombosis, which is of interest in view of its gross appearance. Histologically, the chronic forms reveal ulceration of the mucosa of varying extent and depth with thickening

of walls and stenosis due to fibrosis, and with an infiltration of inflammatory cells which may vary depending upon the severity of the reaction. Giant cells may be present.

From the standpoint of etiology, rather exhaustive attempts have been made to determine some specificity, but to date there is nothing that has proved convincing. Tuberculosis has been fairly well excluded. Experimentally, Reichert and Mathes[16] are said to have injected the corresponding lymphatics with a sclerosing agent and thus produced a lesion in the bowel which simulated the acute edematous lesion. In connection with the established observation that the process frequently stops abruptly at the ileocecal junction, one may refer to recent studies of the ileocecal region by Bargen, Wesson and Jackman.[1] They concluded that, mechanically, the ileocecal region functioned as a valve and that there was a marked diminution or actual interruption of the communications of the submucosal lymphatics in the region of the labia of the valve. Since, at least in the acute phase, its most striking and most obvious manifestation is in the form of lymphatic block, the preceding may explain the tendency for localization proximally.

The question of differential diagnosis in the acute phase is extremely difficult, and if exploration is carried out it is usually undertaken with a diagnosis of acute appendicitis. At the moment, we are referring to those instances in which the first symptoms have not extended back more than 36 or 72 hours. In our experience, it may present any of the variations of symptoms associated with acute appendicitis. Thus far, we have found no differential point which would justify a clinical distinction, although in some instances there is a history of a slight change in bowel habits for three to six months before the attack. On occasions, there has been more in the way of cramps than we usually associate with appendicitis; vomiting infrequent. However, we wish to emphasize that from a practical standpoint the differential diagnosis probably cannot and should not be attempted. While we are not certain, we are inclined to believe that roentgenologic studies would be of little value in the acute stages and, in general, would be contraindicated.

In our experience, roentgenologic studies in the acute cases, six to eight weeks following the establishment of the diagnosis by operation, have failed to reveal any findings that were diagnostic. To be sure, in most instances there had been a complete subsidence of symptoms postoperatively. However, this may either indicate inadequacy of roentgenologic diagnosis in the acute phase or the absence of roentgenographic findings may accompany subsidence of the lesion. The latter possibility certainly supports conservative therapy in the acute phases when encountered at operation.

In the instance referred to as subacute, roentgenography might show narrowing; however, in view of the associated friability this might well be undesirable. Otherwise, our single case was characterized by cramps, an elevated white blood cell count, and the passage of several grossly bloody stools.

The chronic forms present much less of a problem from the diagnostic standpoint, but do require distinction from malignant growths and specific

granulomata. However, for practical reasons surgical intervention would probably prove to be the method of choice in any event. Roentgenologic studies in this type can be extremely helpful, and the so-called "string sign" in many instances is almost diagnostic. Chronic ulcerative colitis may simulate regional ileitis, although the localization roentgenologically of the lesion in the colon and the presence of mucosal ulceration as revealed by sigmoidoscopic examination aid materially in making the distinction. It is of further interest that in many instances the palpable mass, at least clinically, suggested a pelvic lesion; however, roentgenograms of the gastro-intestinal tract aided in making the distinction.

There is some difference of opinion in regard to the course to follow when the acute case is encountered at operation. There is little support for immediate radical resection. It is our definite impression that some of these subside completely, or at least remain subclinical, during the period of observation. In the series of six cases of Koster, Kasman and Sheinfeld,[19] subsequent intervention was not required during the period of observation, and this coincides with our own experience. More recently, Smithy[18] has reported a series of acute cases of regional ileitis which lends additional support to conservative therapy in such instances. However, others have reported a very high percentage of ultimate interventions in acute cases. When the cecum is uninvolved (100 per cent in our series), we have routinely carried out appendicectomy, not with the idea that appendicectomy contributed therapeutically, but because it is reassuring to have removed the appendix should there be a chronic complaint in the right lower quadrant. If a radical procedure seems indicated subsequently, it can frequently be carried out more advantageously at a second operation.

Mixter[12, 13] has condemned the practice of appendicectomy in the acute cases because of the danger of fistula formation. However, in the early manifestations, in the presence of an uninvolved cecum, there should be little danger of fistula formation as a result of the appendicectomy. In any event, as Crohn, and his associates, have indicated, the fistulae frequently have their origin from the ileum rather than from the appendiceal stump. Hence, they may develop incidental to the exploration rather than as a result of the appendicectomy.

Insofar as the chronic stenosing types are concerned, there is general agreement that short-circuiting anastomotic procedures or resection should be carried out, with the latter procedure in considerable favor, although Ginzburg and Garlock[5] have recently presented excellent evidence in favor of ileocolostomy, with exclusion. In the majority of instances great benefit follows the aforementioned procedures, although it is not uncommon for those patients who secure a satisfactory result to have two to three soft stools a day. Recurrences of symptoms are quoted in the neighborhood of 10 to 15 per cent, while Cutler[4] mentions a much higher figure, and is pessimistic as to the benefits of surgical intervention. However, in view of the occasional segmental involvement recurrences might well be anticipated.

Our experience with the chronic stenotic phases has been limited to seven cases, all except one of which have been treated by primary resection of the terminal ileum and cecum, with lateral anastomosis between the ileum and ascending colon. In a single instance an ileocolostomy had been carried out elsewhere two years previously, and we performed resection of the isolated loop. The foregoing procedures have been effected without mortality, and in five of the seven cases the results are quite satisfactory to date. Of the unsatisfactory, one was considered quite satisfactory for a period of four years, after which time a severe macrocytic anemia and a marked rectal stricture, of undetermined origin, developed. The remaining patient (with initial ileocolostomy), although maintaining her nutrition, continued to complain of cramps and diarrhea, and was considered to have an unsatisfactory result.

We have attempted to arrange the more characteristic examples of our cases in the sequence in which we believe the condition progresses, recognizing the hazard of doing so with a no more reliable basis than their gross appearance. We have further classified them as acute, subacute and chronic. It would seem that there is adequate support for conservative therapy in the acute manifestation. The subacute stage, because of its friability and tendency to perforation, might well require resection. We believe the chronic stenotic phase to be definitely amenable to surgical treatment, with primary resection as the procedure of election in our cases.

CASE REPORTS

Case 1.—J. L., white, male, age 21, was admitted to Lakeside Hospital, April 14, 1933, with a history of abdominal cramps of three to four days' duration; the pain had ultimately tended to localize in the right lower quadrant. There had been several liquid stools at the onset but subsequently the bowel movements were normal. There had been no vomiting. There was no history of previous similar difficulty. The patient was very muscular and well nourished. There was some tenderness in the right lower quadrant with marked rebound tenderness, but little, if any, spasm. Rectal examination was essentially negative. Temperature 38.5° C., pulse 90; white blood cell count 7,000; uranalysis negative.

The patient was observed for six hours, after which time an exploratory operation was carried out, through a McBurney incision. Some fluid was encountered. The terminal 12 to 14 inches of ileum was found to be markedly thickened and edematous; it was a white edema, and there was no injection (Fig. 1). The nodes of the involved segment were enlarged. The process stopped abruptly at the ileocecal valve. The cecum and appendix were not involved. No other abnormalities were noted. Appendicectomy was performed. The wound was closed without drainage. No pathologic diagnosis was made. Convalescence was uneventful. Stool cultures and agglutination tests were negative for *B. typhosus para* A and B. During the subsequent year the patient had no further trouble; after that we were unable to follow him. *Diagnosis:* Regional ileitis (acute).

Case 2.—H. K., white, female, age 31, began experiencing generalized abdominal cramps about 24 hours before admission to Lakeside Hospital, April 30, 1937. The discomfort subsequently localized in the right lower quadrant. There was some nausea but no vomiting or diarrhea. She had had some slight abdominal discomfort two weeks previously, but otherwise no similar previous difficulty, although for the preceding six months she had had several soft movements daily, when previously there

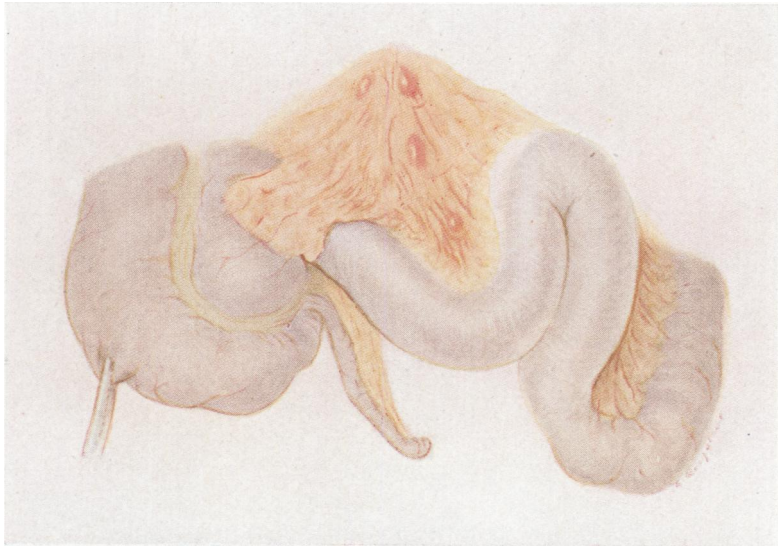

FIG. 1.—Case 1: Color drawing of operative findings: Primarily lymphatic block, characterized by edema, and peritoneal fluid, but with no other signs of inflammation. Classified as acute regional ileitis upon basis of history and findings.

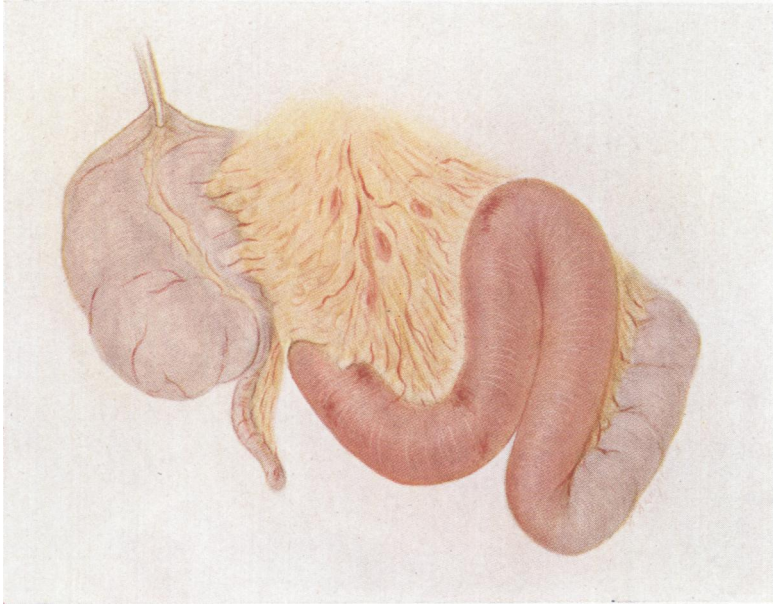

FIG. 2.—Case 2: Color drawing of operative findings: Lymphatic block not so obvious but inflammatory reaction extreme. Little fluid, but segmental, inflammatory involvement of ileum striking, suggesting recent embolic phenomena or strangulation; contrasted with edematous manifestations in duodenum comparable to Figure 1. Classified as subacute and acute regional ileitis upon basis of history and associated duodenal manifestation of an obviously acute nature. Only case in series with grossly bloody stools, although there is a history of gross hemorrhage in Case 7.

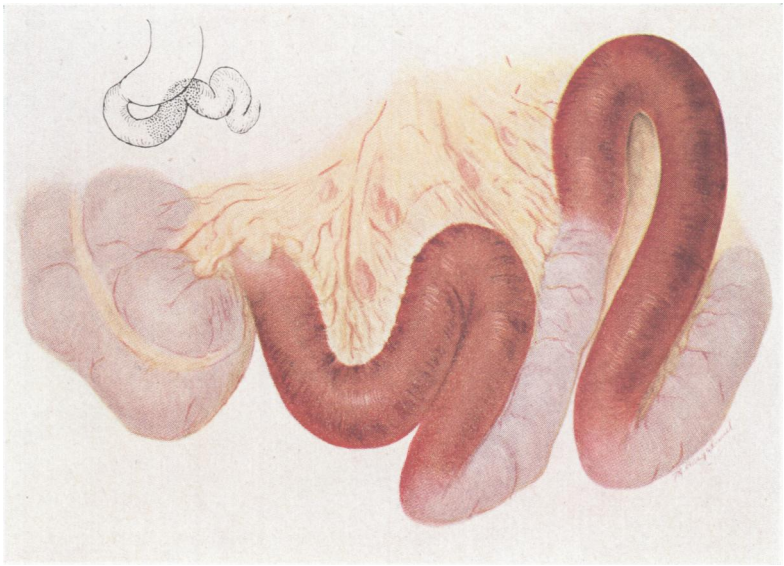

FIG. 3.—Case 5: Color drawing of operative findings: Lymphatic block with superimposed signs of moderate inflammation, characterized by edema, peritoneal fluid, and redness. Classified as acute regional ileitis upon basis of history and additional signs of early inflammation.

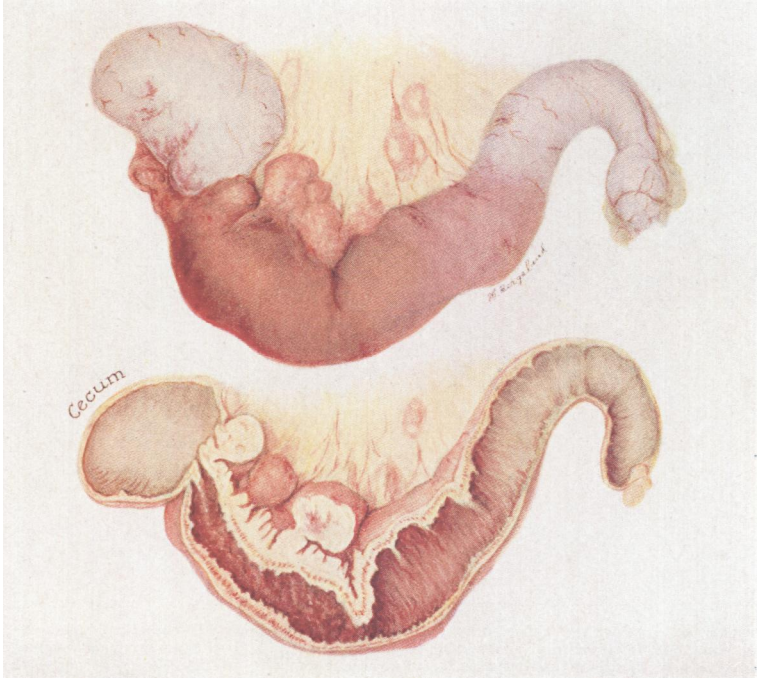

FIG. 4.—Case 9: Color drawing of resected specimen: Little evidence of lymphatic block; lesion of obvious chronicity, with fibrotic changes constituting a definite tumor.

had been but one. A questionable diagnosis of gastric ulcer had been made nine years before.

Examination revealed a well-nourished individual, not appearing acutely ill. There was definite tenderness in the right lower quadrant but no spasm. Rectal and vaginal examinations were essentially negative. Temperature 37° C.; white blood cell count 9,000 to 13,000; urine essentially negative. The patient was observed for four hours, and it was then deemed advisable to rule out appendicitis.

The patient was operated upon through a McBurney incision. A large amount of free fluid was encountered. The terminal ileum for a distance of 14 inches from the ileocecal valve was thickened, edematous and of a reddish-pink color (Fig. 2). The nodes in the corresponding segment of the mesentery were enlarged. The process stopped abruptly and did not extend beyond the ileocecal valve. The cecum and appendix were not involved. Appendicectomy was performed. No pathologic diagnosis was made.

The hospital course was uneventful. The patient had roentgenograms of the gastrointestinal tract, July 29, 1937, April 27, 1940 and September 9, 1941, with essentially identical findings, *viz.*, hypermotility and hyperperitalsis of small intestines, without deformity in terminal ileum or elsewhere. The patent's general health to date has been excellent, with no noteworthy abdominal symptoms. *Diagnosis:* Regional ileitis (acute).

Case 3.—L. W., white, female, age 26, was admitted to Lakeside Hospital, August 6, 1935, with the complaint of abdominal cramps and diarrhea. The patient apparently had been in good health until seven years before, at which time she began having cramps and diarrhea. Five years before admission she was admitted to another hospital, observed and operated upon for anal abscess and fissure. One year later she returned to the same institution and an abdominal exploration was carried out. A bilateral salpingectomy, left oophorectomy and appendicectomy were performed. Further exploration revealed a regional ileitis involving the terminal 18 inches and stopping abruptly at the ileocecal valve. A lateral anastomosis was performed about the lesion. The patient experienced marked benefit for a period of two years, when a recurrence of symptoms occurred which continued to time of admission to this hospital.

There had been some recent loss of weight and stools five to ten times a day, but no pus or blood were noted. The patient was well nourished. The general physical examination was negative save for some tenderness in the right lower quadrant. Laboratory data were negative except for hemoglobin of 60 per cent, and red blood cell count of 3,700,000. A barium enema revealed a functioning anastomosis, and findings in the terminal ileum suggestive of ileitis. In view of recurrence of symptoms, exploration was thought justifiable. Many adhesions were encountered, and a process was found in the terminal ileum characterized by thickening and edema, stopping abruptly at the ileocecal valve and extending up to about eight inches from the anastomosis. There was no fluid. Exploration of the remaining small and large intestine showed no involvement. Without disturbing the anastomosis, the short-circuited intestine (60 cm.) was resected to include a small portion of cecum. Grossly, the resected portion was comparable with findings in chronic regional ileitis, and the histologic examination was consistent with that diagnosis. The lesion did not extend beyond the ileocecal valve.

The postoperative course was uneventful. The patient was readmitted to the hospital one year later, with the history that, while there had been temporary benefit following operation, at the time of admission there was a recurrence of cramps and diarrhea. However, there had been no loss of weight and the previous moderate anemia had disappeared. *Diagnosis:* Regional ileitis (chronic). Result unsatisfactory. Recently readmitted for further resection.

Case 4.—J. W., white, male, age 30, was admitted to Lakeside Hospital, March 15, 1937, with a complaint of abdominal cramps and loose bowel movements of two

or three days' duration. Although discomfort was rather diffuse, there was a tendency to localization to the right of the umbilicus. There had been no nausea or vomiting. There was a history of episodes of diarrhea of very brief duration for several years, but at no time had there been cramps of the present severity.

The patient was a well-nourished, almost obese male. Examination of the abdomen revealed rather diffuse tenderness, most marked to the right of the umbilicus. There was no spasticity. There was definite rebound tenderness. Temperature 38° C., white blood cell count 16,000; urine essentially negative. The patient was observed for 12 hours, during which time discomfort increased and there was some further localization in the right lower quadrant. Prior to operation the temperature was 38.2° C.; white blood cell count 24,000.

Exploration was carried out through a McBurney incision, with a diagnosis of questionable acute appendicitis. Considerable fluid was encountered. The terminal ileum, for a distance of 16 inches, was quite red, thickened and edematous. The process terminated abruptly at each end and stopped abruptly at the ileocecal valve. There were enlarged nodes in the segment of mesentery of the involved bowel. The cecum and appendix were not involved. An appendicectomy was performed. No pathologic diagnosis was made.

The subsequent hospital course was uneventful. Roentgenograms of the gastrointestinal tract, September 8, 1937, revealed no abnormalities. The patient has had no further trouble to date. *Diagnosis:* Regional ileitis (acute).

Case 5.—F. S., white, male, aged 27, was admitted to Lakeside Hospital, April 2, 1934, with a history of having been in good health until five days before admission. At this time he experienced abdominal pain, more marked in the left lower quadrant than the right, and accompanied by nausea and vomiting. There had been obstipation but the patient had passed flatus. An appendicectomy had been performed through a right rectus incision four years before, and a few months thereafter a bilateral inguinal herniorrhaphy.

Examination showed a slightly undernourished and pallid appearing individual, not acutely ill. The abdomen was possibly slightly distended but there was no visible peristalsis. There was some tenderness in the left lower quadrant but no spasm. There were scars of a right rectus incision and of bilateral inguinal herniorrhaphy. Temperature 37.8° C.; white blood cell count 21,000; urine essentially negative. Our impression was partial intestinal obstruction. A barium enema revealed no abnormalities, and because of persistence of vomiting in the absence of distention, we suspected a high obstruction. A small amount of barium by mouth revealed partial obstruction in the region of the second and third part of the duodenum. The patient was observed for nine days, after which time he passed several grossly bloody stools.

Exploration was immediately carried out, with a diagnosis of partial intestinal obstruction. The right rectus scar was excised and the peritoneal cavity was entered. A small amount of slightly cloudy fluid was encountered. After freeing many adhesions, we encountered two striking areas of segmental involvement of ileum measuring 12 to 18 inches in extent, one of which extended up to, and stopped abruptly at the ileocecal valve (Fig. 3). The bowel over the involved area was a fiery red color with no extension of the process into the mesentery. There was some segmental thickening and enlargement of nodes in the mesentery. Our first impression was that it was some embolic phenomenon or a recently released volvulus, but the condition of the mesentery ruled this out. Exposure of the third part of the duodenum (indicated in the roentgenogram) revealed marked edema involving the peritoneum and that partion of the duodenum observed. It was a white edema and in marked contrast to the process at previously described levels. In view of the extent of the process, resection was not contemplated.

The postoperative course was quite uneventful save for a continuance of bloody diarrhea for several days and a moderate parotitis. The patient was followed for about two and one-half months after operation, during which time he gained considerable weight and was entirely free of the symptoms which brought him to the hospital. We were unable to follow him after this time. *Diagnosis:* Regional ileitis (subacute).

Case 6.—M. T., white, female, age 34, was first admitted to Lakeside Hospital, July 1, 1935, with a history of diarrhea (5 to 15 stools daily) and vague abdominal discomfort of some four years' duration. There had been an accompanying loss of weight. Following investigation, her condition was diagnosed as enterocolitis of undetermined origin, although in view of many sensitivities it was considered as possibly allergic in origin. The patient was apparently somewhat improved until six months before the present admission, at which time there was an exacerbation of symptoms, *i.e.*, diarrhea (4 to 8 stools daily) and cramps of increasing severity.

At the admission on September 13, 1937, the patient was moderately well-nourished, and did not appear acutely ill. The general physical examination was essentially negative save for lower abdominal tenderness in both quadrants, more marked on the right where there was a definite, tender palpable mass. Barium enema revealed a typical "string sign" of the terminal ileum. This was confirmed by roentgenograms of the gastro-intestinal tract. Hemoglobin 78 per cent; white blood cell count 8,000; red blood cell count 4,200,000; urinalysis essentially negative. Stools: No entemeba, benzidine 2–3 +++. In view of the progressive symptoms and obvious early obstruction, resection was deemed advisable.

At operation, the terminal two and one-half feet of ileum presented the typical picture of chronic ileitis, with the process stopping abruptly at the ileocecal valve. The cecum and appendix were not involved grossly. The involved portion of the ileum and part of the cecum were resected, and a lateral ileocolostomy was carried out. Microscopically, the lesion was consistent with the usual picture of chronic regional ileitis. The process stopped at the ileocecal valve, although there was some slight involvement of the cecum, but merely what one might anticipate of tissues in juxtaposition to such a process.

The postoperative course was uneventful. Following discharge from the hospital the patient did exceedingly well, gained weight and was quite comfortable. She had two or three soft formed stools a day. *Diagnosis:* Regional ileitis (chronic).

About July 17, 1941, the patient complained of dizziness, weakness, shortness of breath and pain upon defecation. Investigation revealed an hemoglobin of 35 per cent; red blood cell count of 1,400,000; and white blood cell count of 3,350. Proctoscopic examination revealed a stricture about two inches from the anus. Biopsy of this was negative. Several Frei tests were inconclusive. *Diagnosis:* Macrocytic anemia due to deficient absorption; stricture of rectum of undetermined origin. Result unsatisfactory.

Case 7.—A. K., white, female, age 40, was admitted to Lakeside Hospital, July 29, 1936, with a history of abdominal discomfort for some ten years. At onset, ten years previously, an appendicectomy was carried out at another hospital, which procedure was followed by a fistula. Some time thereafter the fistulous tract was excised, and it was found to communicate with a lesion in the terminal ileum, which was described as typically tuberculous, although there was no histologic confirmation. Some type of resection was carried out. The patient did fairly well until three or four years before the admission to Lakeside Hospital, at which time she experienced abdominal cramps, diarrhea and loss of weight. Two years before admission she had had a severe hemorrhage. The aforementioned symptoms persisted, and the patient followed a downhill course until the admission to Lakeside Hospital.

The patient was quite emaciated and obviously chronically ill. General examination was negative save for abdominal findings. There was a small hernia in the supra-

pubic scar, but no mass was palpable. However, on pelvic examination there was a definite mass filling the pelvis which was difficult to separate from the uterus. Hemoglobin 35 per cent, red blood cell count 2,000,000; white blood cell count 4,000. Roentgenograms revealed deformity of the terminal ileum, and suggested that the mass in the pelvis represented the terminal ileum. Although the patient was a bad risk, exploration was thought advisable.

At operation, the mass in the pelvis was delivered readily and was found to consist of a mass of agglutinated small bowel, apparently centering about the terminal ileum. There was one loop of jejunum so intimately involved that resection and end-to-end anastomosis were carried out (Fig. 5A). Following this it was feasible to resect the terminal 45 cm. of ileum and the cecum, a lateral ileocolostomy being carried out.

The patient's course was stormy for several days after operation but uneventful thereafter. She was completely relieved of all symptoms, and gained 45 pounds in the first year. The patient continues to have two to three soft movements a day, but they are not accompanied by discomfort. She remains well to the present time. *Diagnosis:* Regional ileitis (chronic).

Case 8.—M. L. H., white, female, age six years, was admitted to Glenville Hospital in September, 1936, with a history of periumbilical and right lower quadrant cramps of 48 hours' duration. There was no history of any similar previous difficulty. Bowel movements had been regular.

Examination revealed a moderately well-nourished white female, who did not appear seriously ill. There was some tenderness in the right lower quadrant but neither rigidity nor distention. Temperature 38° C.; white blood cell count 11,000; urine negative. In view of the persisting cramps it was deemed advisable to carry out an exploratory operation, with a diagnosis of acute appendicitis or some type of partial obstruction.

Under gas-oxygen-ether anesthesia, a short right rectus incision was made. The peritoneal cavity contained considerable clear fluid, the appendix was normal. However, the terminal five inches of ileum was markedly edematous and of a pinkish color; nodes in the involved segment were definitely enlarged; the cecum was not involved. Appendicectomy was performed. No pathologic diagnosis was made.

The subsequent hospital course was uneventful. Insofar as can be ascertained the child has had no further trouble. *Diagnosis:* Regional ileitis (acute).

Case 9.—S. B., a white, female, age 20, was admitted to Lakeside Hospital, December 28, 1937. Four years previously she had been admitted to the hospital with a history of vague abdominal complaint of some four days' duration, localizing in the right lower quadrant, unaccompanied by nausea or vomiting. An appendicectomy was performed, without abdominal exploration. The histologic report was chronic appendicitis. Following this, the patient continued to have episodes of abdominal cramps accompanied by distention. In general, the discomfort increased in severity and was, on occasion, accompanied by fever and gradual loss of weight. More recently, there had been some relation to the menses, particularly the last, which began some ten days previously, and was accompanied by fever and the finding of a mass in the right lower quadrant, which was thought to have its origin in the pelvis.

The patient was operated upon on the Gynecological Service, with the diagnosis of possible ovarian cyst.

At operation, the mass was found to have its origin in the terminal 12 inches of the ileum, with extensive involvement of nodes in the corresponding segment of the mesentery. The lesion was obviously chronic and the site of fibrous changes (Fig. 4). There was no fluid. The ileum and a portion of the cecum were resected and a lateral ileocolostomy was carried out.

Histologic Report: Pathologic findings consistent with chronic regional ileitis.

The postoperative course was uneventful for the first week. On the tenth postoperative day the patient was operated upon again because of intestinal obstruction. An adhesion to the midline scar had produced complete obstruction of the small intestine at a level about four feet above the anastomosis. The subsequent course was uneventful. Since that time, the patient has gained considerable weight and, in general, is quite comfortable. She does have from one to three soft stools per day; when under nervous strain this may border upon diarrhea. *Diagnosis:* Regional ileitis (chronic).

Case 10.—W. H., white, male, age eight, was admitted to Lakeside Hospital, August 2, 1938. Three days before admission he began having abdominal discomfort, more marked on the right side than on the left. There had been no nausea, vomiting or diarrhea. There had been some abdominal discomfort one year previous to admission.

Examination revealed a moderately well-nourished boy, who did not appear acutely ill. There was some tenderness in the right lower quadrant but no spasm. Temperature 38° C.; white blood cell count 8,600; urine negative. The diagnosis was indefinite, but after 18 hours' observation there was no change in the findings and exploration was carried out through a McBurney incision. (The patient's family had had a recent unfortunate experience with peritonitis from a ruptured appendix).

At operation a moderate amount of fluid was encountered. The terminal three inches of ileum was thickened and edematous, but only slightly injected. A number of enlarged nodes were palpated in the mesentery. The process stopped abruptly at the ileocecal valve. The cecum and appendix were not involved. The latter was removed. There was no pathologic diagnosis.

The postoperative course was uneventful. The patient had roentgenograms of the gastro-intestinal tract, April 29, 1939, with no unusual findings. His general condition to date has been excellent, with no recurrence of symptoms. *Diagnosis:* Regional ileitis (acute).

Case 11.—L. D., white, female, age 30, was admitted to Lakeside Hospital, March 2, 1939. She had apparently been in excellent health until six months before admission, when she began experiencing vague abdominal discomfort characterized by a feeling of distention; there had been no diarrhea. For the preceding eight weeks there had been a continuance of the foregoing symptoms with the addition of night sweats and intermittent elevation of temperature. About ten days before admission there had been a severe episode of abdominal pain, which localized in the right lower quadrant, with accompanying nausea and vomiting. Upon admission to the hospital the patient appeared chronically ill.

General examination revealed no abnormalities. Examination of the abdomen revealed a firm, somewhat tender mass in the right lower quadrant, measuring 8 x 6 x 6 cm. It was slightly movable and could be readily palpated on vaginal examination. Temperature 39°C.; hemoglobin 80 per cent, red blood cell count 4,300,000; white blood cell count 23,000; urine essentially negative. In view of the history, an appendiceal abscess was considered, but the impression rather favored regional ileitis. The temperature subsided in two weeks and a barium enema revealed a "string sign." A diagnosis of chronic regional ileitis was made. The patient was readmitted several weeks later for operation. Signs of inflammation were entirely absent; otherwise the findings were the same.

At operation, an inflammatory mass was found in the right lower quadrant, consisting primarily of thickened and fibrosed terminal ileum but further contributed to by adhesion of an adjacent loop of small bowel, omentum and the transverse colon (Fig. 5 B). There was no fluid. The terminal ileum and a portion of the cecum were resected, and an ileocolostomy was carried out. Grossly, the cecum was not involved; however, the ileocecal valve projected into the cecum in a cervix-like fashion. Microscopically,

there were the usual findings in the ileum with only the degree of reaction in the cecum that would occur in any stricture in juxtaposition. The postoperative course was uneventful. There was some diarrhea for several weeks following discharge. At the present time the patient's condition is excellent. She has gained weight. She does have two or three soft movements per day. *Diagnosis:* Regional ileitis (chronic).

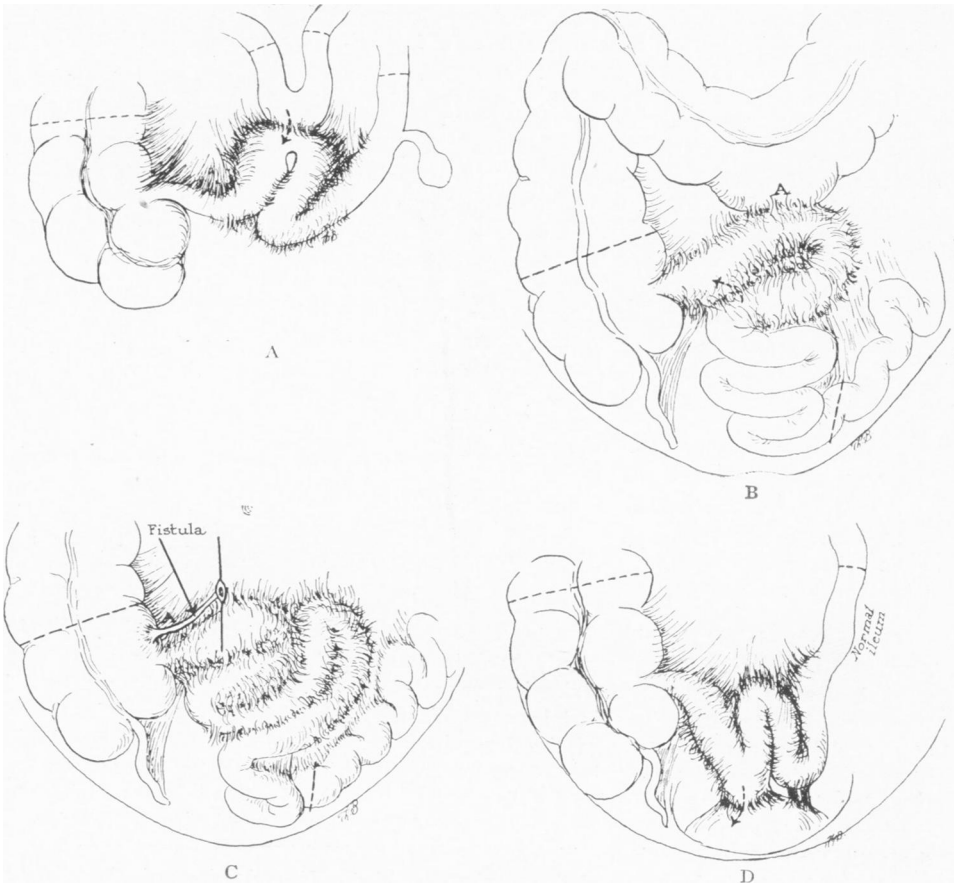

FIG. 5.—Examples of potential and actual internal and external fistulae. (A) Case 7: Between loops of ileum and jejunum. (B) Case 11: Potential at (A), minute communications at arrow. (C) Case 12: Between cecum and exterior, following biopsy. (D) Case 13: Between ileum and bladder at arrow.

Case 12.—Y. F., white, female, age 32, was admitted to Lakeside Hospital, October 1, 1941, with a history that 11 months previously she had experienced cramps and a feeling of distention. This continued for five months, when a mass was noted in the right lower quadrant and pelvis. By this time there was some loss of weight and a moderate degree of anemia. The mass was considered an ovarion cyst by her attending physician and exploration was carried out. An inflammatory mass was found, consisting of terminal ileum and a portion of cecum, and a biopsy was taken from the latter. Following operation a sinus appeared in the wound. The patient continued to have abdominal discomfort until the time of admission to Lakeside Hospital. The patient was moderately well-nourished. There was a sinus tract in the midline scar. There was a palpable mass in the right lower quadrant which was slightly tender and could be palpated on bimanual (vaginal) examination. Barium by rectum and

mouth revealed a lesion which apparently involved not only the terminal ileum but also a portion of the cecum. Laboratory data were essentially negative. There was no anemia at this time. A diagnosis of chronic regional enteritis was made.

The patient was operated upon through a right rectus incision, and the fistulous tract was found to extend to the cecum (Fig. 5C). The terminal 16 inches presented a typical appearance of chronic ileitis, although, for the first time in our series, the process definitely extended beyond the ileocecal valve. The terminal ileum and cecum were resected, with lateral ileocolostomy. Grossly, the specimen showed involvement of a portion of the cecum. Histologic findings were consistent with chronic ileitis and confirmed the involvement of the cecum.

The subsequent course was uneventful. The patient has gained weight, is in excellent health, and has no complaints. *Diagnosis:* Regional ileitis (chronic).

Case 13.—J. K., white, female, age 40, was first admitted to another hospital about 18 months prior to admission to Lakeside Hospital. She complained of lower abdominal discomfort and burning upon urination of several weeks' duration. Operation shortly after admission to the other hospital is said to have revealed extensive inflammation in the pelvis, the abdomen having been closed following exploration. Following the operation urinary symptoms became exacerbated, and some time thereafter the patient noted passage of brown, semisolid material per urethra. At the time of admission to Lakeside Hospital (on the Genitourinary Service), October 13, 1941, the patient had sustained a loss of 20 pounds in weight. It was thought that the patient had an enterovesical fistula. Cystograms were normal, but cystoscopy revealed an inflammatory process involving the posterior wall of the bladder. No fistula was demonstrable. Pelvic examination showed a mass in the right vault extending into the right lower quadrant. A barium meal revealed contrast medium passing into the bladder apparently from the region of the terminal ileum. Thus, an enterovesical fistula was demonstrated, which was thought to be associated with a chronic regional enteritis.

Operation revealed an inflammatory mass in the right lower quadrant consisting of agglutinated folds of the terminal ileum, one of which was firmly adherent to the posterior surface of the bladder (Fig. 5 D). There was no fluid. The bladder was thickened in a manner comparable to the adjacent bowel. The bowel was freed from the bladder and the opening in the bladder was closed. The terminal two and one-half feet of the ileum and the cecum were resected, and a lateral ileocolostomy was done. Grossly, the specimen was typical of chronic ileitis, the process stopping abruptly at the ileocecal valve. Histologic report was consistent with the diagnosis of regional ileitis.

The patient was kept on catheter drainage for one week. The postoperative course was uneventful. The patient has gained considerable weight, has no bladder symptoms, and is progressing satisfactorily to date. *Diagnosis:* Regional ileitis (chronic).

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