

**PRELIMINARY COLOSTOMY  
IN THE MANAGEMENT OF  
GASTROCOLIC AND GASTROJEJUNOCOLIC FISTULAE**

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AT A MEETING of the American Surgical Association in May, 1939, Pfeiffer,<sup>8</sup> of Philadelphia, and Kent, of Norwich, reported a method of handling patients suffering with gastrojejunocolic fistulae which throws a new light upon the pathologic physiology of this condition, and suggests the possibility of lowering the high mortality of surgical treatment. They happened upon this procedure almost by accident. One of their patients who had a gastrojejunocolic fistula was given a barium meal which failed to pass from the stomach into the colon. However, barium given by enema passed readily into the jejunum and stomach, demonstrating a ball-valve type of fistula. At operation, the fistula was found to be surrounded by dense adhesions and marked inflammatory reaction. It was decided to perform a preliminary colostomy, on the theory that since the flow through the fistula was in one direction only, namely, from colon to stomach, a colostomy would divert the fecal stream and make subsequent operation upon the fistula easier. After an ascending colostomy was performed the diarrhea ceased entirely, and the patient picked up surprisingly in weight and strength. This was not in accord with the accepted theories regarding the cause of diarrhea in these cases, namely, that it is due to the emptying of acid stomach contents into the colon. Rather, it would appear that regurgitation of colonic contents into the upper gastro-intestinal tract sets up a severe enteritis and consequent diarrhea. A few months later, at operation, the inflammatory reaction around the fistula was found to have subsided almost completely, the tissues were in more nearly normal condition, and the operation for correction of the fistula was carried out more simply than it could have been previously. After simple closure of the gastro-enterostomy, colonic and jejunal fistulae, the patient made an uneventful recovery. The colostomy was closed at a later date. These authors reported one other patient of their own and one of Dr. Ralph Colp's, both with similar courses following preliminary colostomy. Our interest in this subject began in September, 1939.

**ILLUSTRATIVE CASES**

**Case 1.**—V. S., white, male, age 59, entered the San Francisco Hospital, May 13, 1936, complaining of continuous vomiting of foul material for two months, diarrhea with as many as 16 bowel movements daily, and loss of 50 pounds in weight. He had had a posterior gastro-enterostomy in May, 1930, for a persistent duodenal ulcer. He was well for two years following the gastro-enterostomy when he suddenly experienced severe epigastric pain lasting about 24 hours associated with abdominal tenderness. Subsequently

there occurred nocturnal diarrhea, and he noted large amounts of undigested food in the stools, followed by extreme weakness and a loss of 50 pounds in weight. A gastro-jejunal fistula was demonstrated by barium enema.

*Operation.*—June 11, 1936: The fistula was found and was repaired by dissecting the colon free from the gastro-enterostomy and closing the fistulous openings in the colon and in the jejunum. The patient was left with the original gastro-enterostomy. After a stormy convalescence he was free from diarrhea but continued to have marginal ulcer symptoms, regardless of diet.

Upon reentry to the San Francisco Hospital in September, 1939, he weighed 97 pounds (his best weight had been 180 pounds). Physical examination revealed a pallid, dehydrated, markedly emaciated adult male with evidence of generalized arteriosclerosis. Peristalsis was hyperactive visually and audibly. There was an old healed upper midline scar extending from the xiphoid to the umbilicus. There was a healed right inguinal scar and a McBurney incision scar which herniated with increased intra-abdominal pressure. Urinalysis, complete blood chemistry, blood Wassermann and Kahn were negative. Examination of the blood at first showed evidence of marked dehydration and later a mild secondary anemia. Barium enema revealed a fistulous communication between the mid-portion of the transverse colon and jejunum which filled the stomach and jejunum with barium simultaneously. Gastroscopic examination did not disclose the fistula. Barium by mouth emptied through the gastro-enterostomy and passed from the jejunum into the colon.

*First Operation.*—On October 10, 1939, the cecum was brought out of the abdomen, and was opened on October 11. With the opening of the cecostomy the diarrhea immediately stopped. Charcoal given by mouth appeared in the cecostomy after 15 hours. The patient began to gain weight and strength immediately and all vomiting stopped. Barium by mouth, October 30, 1939, 20 days following the cecostomy, revealed the gastrojejunal fistula, and so did a barium enema given December 29, 1939, two months later. The patient gained from 97 pounds upon entry to 131 pounds in less than two months. All of the patient's symptoms had disappeared.

*Second Operation.*—January 16, 1940: Under cyclopropane anesthesia, the upper midline abdominal scar was excised and the abdomen opened. There were many adhesions. The stomach was found to be large and dilated; the duodenum was very narrow, fibrous and contracted, measuring less than 1 cm. in diameter. Palpating through the stomach wall, a stoma could be felt between the stomach and a loop of proximal jejunum and also between the transverse colon and jejunum. The inflammatory changes usually found about this type of lesion were completely absent. A jejunal fistula measuring about 3 mm. in diameter was found. The colon was dissected free and closed transversely with chromic sutures. The gastro-enterostomy was taken down and, after resection of three-quarters of the stomach, a Pólya type of posterior anastomosis was made, using the combined opening in the jejunum left by the previous gastro-enterostomy and jejunal fistula. The patient made an uneventful recovery. On February 13, 1940, the cecostomy was closed. The patient has since remained well.

**Case 2.**—W. A., white, male, age 42, entered the San Francisco Hospital, January 2, 1940, complaining of severe pain in the epigastrium relieved by vomiting of fecal material and belching of gas with fecal odor, both of two months' duration. During the past month he had had five to six liquid bowel movements daily, and had lost 17 pounds in weight. He was so weak he could not walk. From the age of 14 he had suffered with stomach trouble, characterized by burning epigastric pain and sour eructations relieved by soda. In 1923, a gastro-enterostomy was performed in the Buffalo City Hospital. He was well for one year after which his symptoms returned. In 1932, 1934, and in 1937 he had suffered with severe gastric hemorrhages, requiring transfusions.

*Physical Examination.*—The patient was markedly emaciated, and his fingers were slightly clubbed. The breath was very foul. The thorax was poorly nourished, with poor expansion of both sides. There was impaired resonance over both apices. Both bases were hyperresonant. No râles were heard. Blood pressure 120/80. Heart negative. The

abdomen was scaphoid, with an oblique right upper quadrant scar and a transverse right lower quadrant scar. Both upper quadrants were slightly rigid and tender to pressure, especially on the left. Peristalsis was markedly hyperactive. *Laboratory Data:* Blood chemistry negative. Mild secondary anemia. Blood Wassermann and Kahn negative.

Gastroscopic examination revealed an atrophic gastric mucosa. No pyloric activity was seen. The gastro-enterostomy could not be seen. A barium meal, January 8, 1940, revealed a gastrojejunal fistula. Methylene blue given by mouth appeared in the stool after one hour and 30 minutes. Gastric analysis disclosed a complete absence of free HCl, and a highest total acid of 20° at ten minutes. On January 13, 1940, the gastrocolic fistula was demonstrated by barium enema.

*First Operation.*—Under local anesthesia, a loop-colostomy was performed on the right side of the transverse colon, which was opened in bed a few days later. The diarrhea stopped immediately following the opening of the colostomy. In spite of an advanced bilateral pulmonary tuberculosis this patient gained 18 pounds after the colostomy was performed.

*Second Operation.*—August 1, 1940: Under spinal anesthesia, the abdomen was opened through a left paramedian upper abdominal incision. Although many adhesions were encountered, there was a remarkably small amount of inflammatory reaction about the old gastro-enterostomy. A small fistula was found connecting the anterior margin of the gastro-enterostomy opening and the posterior wall of the colon. The colon was freed and the fistulous opening closed with chromic gut. The gastro-enterostomy was taken down and the opening in the jejunum closed with chromic catgut. A gastric resection was then performed, removing about three-quarters of the stomach.

In spite of the fact that this patient was suffering with an extensive pulmonary tuberculosis, the postoperative course was not remarkable. On the fourth postoperative day he started taking nourishment by mouth, and after the sixth postoperative day he remained afebrile. The abdominal wound healed by first intention.

Because of some difficulty experienced with the colostomy in this patient, we were able to observe the influence of stool in the distal segment of the colon upon the frequency of bowel movements both by rectum and colostomy. Whenever the distal segment of colon was free of stool the diarrhea stopped. This seemed to us to be rather conclusive proof that Pfeiffer was right in his contention that the diarrhea in these patients was not due to gastric contents getting into the colon but rather due to colonic contents regurgitating into the upper gastro-intestinal tract causing hyperperistalsis in the small bowel and consequent diarrhea. The fact that methylene blue taken by mouth appeared in the stool after one hour and 30 minutes would also make one believe that it had passed through the gastro-intestinal tract very rapidly rather than directly from the stomach into the transverse colon.

**Case 3.**—J. D., white, male, age 39, entered the San Francisco Hospital, January 31, 1940, complaining of diarrhea of two months' duration. In 1929, he had had a sudden severe onset of epigastric pain and was operated upon for a perforated peptic ulcer. A gastro-enterostomy was performed and the ulcer was closed. Since that time the patient suffered with continuous ulcer symptoms. In 1938, he reentered the hospital and a marginal ulcer was demonstrated but he was not operated upon. About two months before his last entry a diarrhea suddenly developed which gradually increased in severity. With the onset of diarrhea all pain disappeared but he began to belch fecal-smelling gas and had occasional attacks of vomiting.

*Physical Examination.*—The patient was thin and pallid, with a scaphoid abdomen which showed two celiotomy scars. Peristalsis was violently hyperactive. Barium enema

revealed a gastrojejunocolic fistula. Barium meal failed to demonstrate the fistula but showed very rapid filling of the small bowel both through a gastro-enterostomy opening and through the pylorus. The barium was seen to enter the large bowel after 30 minutes.

*First Operation.*—February 3, 1940: A loop-colostomy was established in the right side of the transverse colon, which was opened in bed four days later. The diarrhea stopped immediately following the opening of the colostomy. Five weeks after the colostomy the patient had gained from 103 pounds to 119½ pounds.

*Second Operation.*—March 21, 1940: The abdomen was opened through the old midline upper abdominal incision. Many adhesions were encountered but the region of the gastrojejunocolic fistula was remarkably free of inflammatory reaction. A very large fistulous opening was found between the jejunum and colon, apparently beginning at the margin of the gastro-enterostomy. The opening in the large bowel measured about 5 cm. The colon was dissected free and closed transversely with chromic sutures. The gastro-enterostomy was then taken down and, after resection of about three-fourths of the stomach, a posterior Pólya type of anastomosis was made, using the original opening in the jejunum for the anastomosis. An old healed scar of a marginal ulcer was removed from the edge of the opening in the jejunum before the anastomosis was undertaken.

This patient did well following the resection, with the exception that the proximity of the colostomy to the midline wound caused some infection and delayed healing. On April 5, 1940, about two weeks following the gastric resection, a barium enema revealed some narrowing of the transverse colon at the site of the previous fistula. Barium flowed from the superior margin of the distal end of this narrowed segment into what appeared to be a sinus tract leading upward toward the greater curvature of the stomach, but no barium entered the stomach.

*Third Operation.*—May 23, 1940: The colostomy was closed.

This patient demonstrated three important points: First, that barium given by mouth passes very rapidly through the irritated small bowel; second, that even though some leakage may occur from the site of repair in the colon, preliminary colostomy will prevent disaster from this leakage; and third, that diarrhea will occur in these patients even though a fistula cannot be demonstrated by giving barium by mouth.

In their original article reporting this procedure, Pfeiffer and Kent mentioned that upon reviewing the literature a single instance was found in which colostomy was employed as a preliminary measure to the correction of gastrojejunocolic fistula: *viz.*, Colucci<sup>4</sup> reported a cecostomy performed upon a patient with symptoms suggesting intestinal obstruction. A gastrocolic fistula was later demonstrated, and was apparently the result of spontaneous perforation of a gastric ulcer into the colon. The symptoms of bowel obstruction in this case brought to mind a patient seen at the San Francisco Hospital in October, 1938. He had been transferred to us from another hospital where he had undergone an appendectomy because of vague gastro-intestinal symptoms, with local findings suggesting appendicitis. The appendix was found to be normal but the cecum was indurated at its base, suggesting a previous rupture, with abscess formation. Following appendectomy there developed generalized peritonitis and, later, intermittent attacks of bowel obstruction and a left lower quadrant abscess. The abscess was drained. A fecal fistula developed in the appendectomy wound and in that following drainage of the abscess. At no time did this patient have diarrhea. Three

days after entry to the San Francisco Hospital a gastrocolic fistula was demonstrated, both by barium enema and with barium given by mouth. Tissue removed from the walls of the fecal fistulae showed tuberculous granulation tissue and tubercle bacilli. Roentgenologic examination of the chest revealed bilateral pulmonary tuberculosis, with cavitation. The patient died in the Tuberculosis Division about three months after entry, without ever experiencing diarrhea.

Autopsy revealed an opening in the greater curvature of the stomach, about 5 mm. in diameter, which communicated with a sinus tract leading to a circular opening in the transverse colon. The sinus tract also communicated with two other openings into the colon, one into the transverse colon about 4 cm. from the first opening and the other into an ulcer in the cecum about 4 cm. above the ileocecal valve.

The absence of diarrhea in this case led us to study other gastrocolic and gastrojejunal fistulae in the records of the San Francisco Hospital. We were able to find the histories of six instances of gastrojejunal fistulae, all secondary to marginal or jejunal ulcers perforated into the transverse colon. These all occurred from two to 15 years after a gastro-enterostomy. In all of these patients, as in the three reported, the outstanding symptoms were diarrhea, and loss of weight and strength.

One of these patients had a gastro-enterostomy performed in 1915. He was well until 1923, eight years later, when he entered the University of California Hospital complaining of severe diarrhea and loss of weight and strength. A gastrojejunal fistula was demonstrated and repaired at operation by taking down the gastro-enterostomy and restoring the normal continuity of the bowel. The patient was well for one and one-half years when all of his original ulcer symptoms reappeared. Six months later he entered San Francisco Hospital complaining of pain in the abdomen and belching of foul-smelling gas. He had no diarrhea. Barium by mouth revealed a gastrocolic fistula. The small bowel was not involved. This patient had a gastrojejunal fistula at one time associated with a severe diarrhea and later a gastrocolic fistula with no diarrhea.

Six other cases of interest were reviewed. One case of rupture of a carcinoma of the stomach into the transverse colon, one carcinoma of the transverse colon into the stomach, and one gastrocolic fistula secondary to an abdominal abscess following trauma to the upper abdomen. In all of these cases a gastrocolic fistula was demonstrated roentgenologically, and in two, confirmed at autopsy. All three patients complained of belching of foul-smelling gas and of fecal vomiting; in none was a diarrhea present.

The other three cases reviewed, represented enterocolic fistulae; two carcinomata of the colon with rupture into the small bowel, and one carcinoma of the ileum ruptured into the large bowel. In all three of these patients, violent diarrhea was the outstanding symptom after the fistula had become established. In one patient the symptoms were those of a bowel obstruction

until the fistula appeared six days after entry into the hospital. Diarrhea was followed by relief of pain and vomiting.

Although diarrhea is said to be an outstanding symptom of gastrocolic fistula, a review of the cases reported in the literature would cast some doubt upon this contention. It is true that certain cases reviewed had diarrhea as an outstanding symptom but in most of these, the gastrocolic opening was very large or there was some obstruction to the normal flow of gastric contents through the pylorus. In a large number of the case histories reviewed, constipation rather than diarrhea was the rule. On the other hand, gastrojejunocolic fistulae and enterocolic fistulae in which a segment of small bowel is present and patent distal to the fistulae, diarrhea is invariably present.

These facts would tend to indicate that the low threshold of irritability of the small bowel has something to do with the development of diarrhea in these patients, and certainly tends to disprove the popular idea that the emptying of stomach contents into the large bowel is the etiologic factor. At any rate, there can be little doubt that short-circuiting the fecal stream, proximal to the fistulous opening, promptly alleviates all of the symptoms and restores the patient to normal health.

It is not the author's purpose here to discuss the choice of procedure after colostomy except to say that our review would indicate that simple restoration of continuity is frequently followed by return of the original ulcer symptoms and that simple closure of the colonic fistula is apt to lead to recurrence. Preliminary colostomy makes any subsequent procedure simpler and safer and, as indicated by the first three patients reported here, allows one to undertake extensive gastric resection.

#### SUMMARY

(1) Nine cases of gastrojejunocolic fistulae have been studied together with four cases of gastrocolic fistulae and three cases of enterocolic fistulae.

(2) Three cases of gastrojejunocolic fistulae treated by preliminary colostomy are presented in detail.

#### CONCLUSIONS

(1) Colostomy as a preliminary procedure in the treatment of gastrojejunocolic fistulae not only stops the diarrhea immediately and completely, allowing the patient to regain his body weight and normal fluid balance, but greatly facilitates the surgical correction of the fistula at a subsequent operation by correcting the inflammatory reaction usually seen about these fistulae.

(2) The diarrhea experienced in gastrojejunocolic fistulae is, definitely, the result of a reflux of colonic contents into the upper gastro-intestinal tract, rather than the influx of gastric contents into the large bowel.

(3) Diarrhea is a symptom of gastrojejunocolic fistula but not necessarily a symptom of gastrocolic fistula.

(4) Right-sided transverse colostomy, in our experience, is preferable to cecostomy in these patients.

## REFERENCES

- <sup>1</sup> Allen, A. W.: *Surgery* **1**, 338, March, 1937.
- <sup>2</sup> Balfour, D.: *ANNALS OF SURGERY*, **82**, 421, September, 1925.
- <sup>3</sup> Braun: *Verhandl. d. deutsch. Gesellsch. f. Chir.*, **28**, Part 2, 94, 1899.
- <sup>4</sup> Colucci, C.: *Policlinico (sez. chir.)*, **40**, 439, August, 1933.
- <sup>5</sup> Estes, W. L., Jr.: *ANNALS OF SURGERY*, **96**, 250, 1932.
- <sup>6</sup> Katzoglu, P.: *Deutsch. Ztschr. f. Chir.*, **1**, 221, 1929.
- <sup>7</sup> Lahey, F. H.: *Am. Jour. Digest. Dis. and Nutrit.*, **2**, 673, February, 1936.
- <sup>8</sup> Pfeiffer, D. B.: *ANNALS OF SURGERY*, **110**, 659, October, 1939.
- <sup>9</sup> Waters, J. T., and Priestly, J. T.: *Proc. Staff Meet., Mayo Clinic*, **8**, May, 1933.
- <sup>10</sup> Wilkie, D. P. D.: *ANNALS OF SURGERY*, **99**, 401, 1934.