

SURGERY

: Shafiroff,  
Autonomic  
Gastroen-

on, J. W.:  
Ulcerative

S.: Sterility  
I. A. M. A.

eman, S. T.,  
Rectum in  
nd Rectum,

v. Resection  
mpulla for  
cteric Func-

nd Kurzweg,  
th Sphincter  
Midrectum,

nd Simeone,  
tem, Ed. 3,  
952.

ck, R. H.:  
ctomy with  
Sex Func-  
51.

R. E.: The  
tic Nervous

# Benign Duodenocolic Fistula

THOMAS E. STARZL, Ph.D., M.D., Miami, Fla.; THOMAS W. DORR, M.D., Tampa, Fla., and  
WILLIAM H. MEYER Jr., M.D., Miami, Fla.

Duodenocolic fistulas are uncommon and are most frequently secondary to carcinoma of the colon.<sup>3</sup> Duodenocolic fistula due to an underlying benign disease is very rare, the world literature containing accounts of only 23 such cases.

It is the purpose of this report to document an additional case of benign duodenocolic fistula, which was thought to have been a complication of a duodenal ulcer, and to review the clinical features, etiology, pathogenesis, and treatment of this and the previously described cases.

Submitted for publication Nov. 14, 1958.

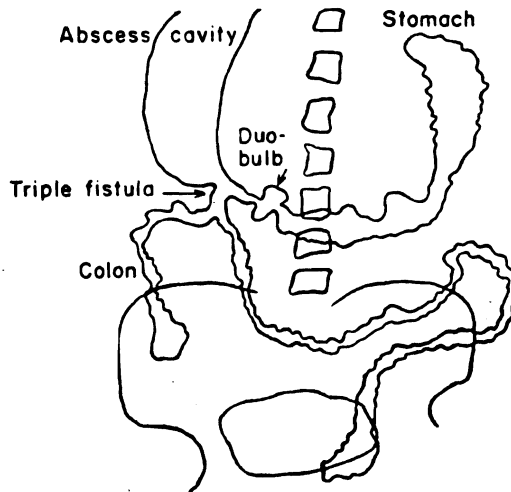
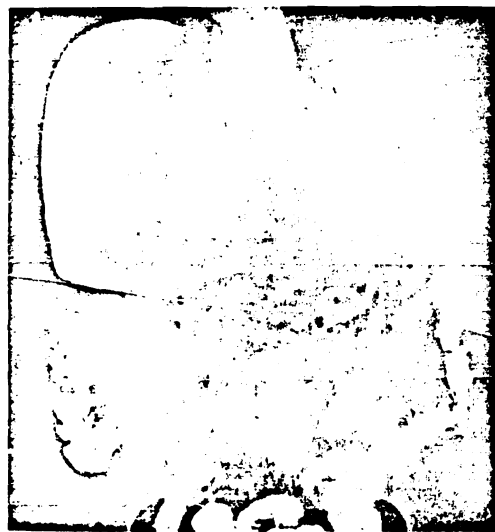
Present address (Dr. Starzl): Department of Surgery, Northwestern University Medical School, Chicago. U. S. Public Health Service Trainee No. 904 (Dr. Meyer).

From the Department of Surgery, University of Miami School of Medicine, Coral Gables, Fla., and the Department of Radiology and Surgery, Tampa General Hospital, Tampa, Fla.

## Report of a Case

A 64-year-old white woman was admitted to the surgical service on Oct. 15, 1957, with abdominal pain, vomiting, and weight loss. She had been well and without gastrointestinal complaints until six months before admission. At this time she developed epigastric pain, which gradually became continuous and which was not related to food ingestion. One month before admission she developed persistent nausea with marked increase in epigastric pain. Shortly thereafter, she described the onset of vomiting of foul-smelling material and invariably provoked by eating. Three weeks before admission the pain shifted to the right upper quadrant, with radiation to the tip of the right scapula. During the two weeks preceding admission she suffered from chills, fever, and night sweats. She had lost a large but undetermined amount of weight. For 10 days prior to admission she had been in another hospital, where she received supportive care. She did not have diarrhea at any time during the illness.

*Physical Examination.*—The patient was an emaciated, dehydrated white woman, who appeared to be chronically ill. Temperature was 38.4 C



BARIUM ENEMA (EVACUATION)  
10-16-57

Figure 1

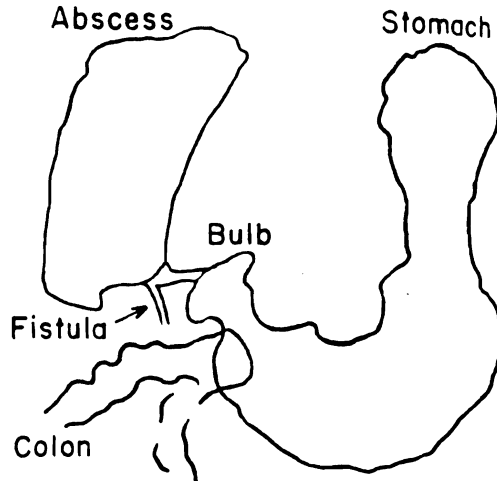
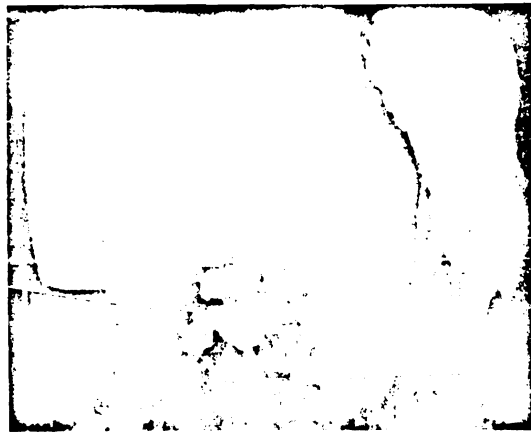


Figure 2

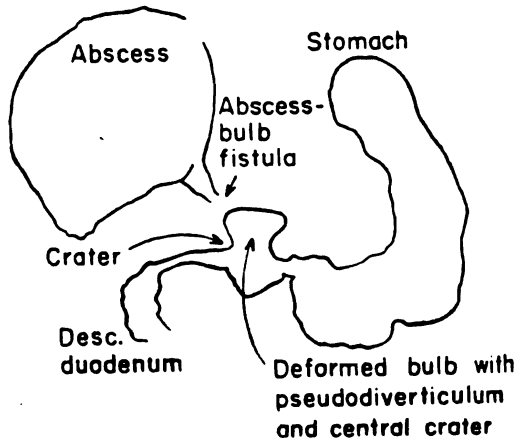
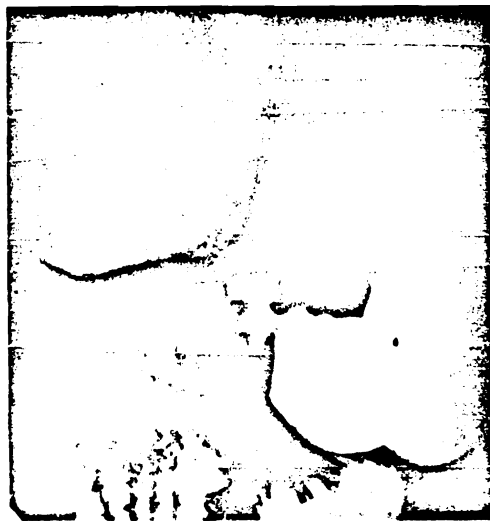
(101.1 F). Abdominal examination revealed tenderness in the right mid- and upper abdomen with involuntary muscle spasm. No definite mass could be felt. The rest of the physical examination was essentially normal.

*Laboratory Data.*—Urinalysis normal. Heino-gram: Hbg 8.8 gm. %; hematocrit 30%, and WBC 14,350 per cubic millimeter. BUN, CO<sub>2</sub>, chlorides, bilirubin, amylase, alkaline phosphatase, and thymol turbidity were normal. The chest x-ray was normal.

A barium enema study was performed. As the dye reached the hepatic flexure, it passed outside the lumen into a fistulous tract which communicated with a large right subphrenic abscess and with the second portion of the duodenum (Fig. 1). A gastrointestinal series confirmed the presence of the triple fistula (Fig. 2). There was no evidence

of malignancy either in the colon or in the upper gastrointestinal tract. Except for the fistula, the only abnormality was a duodenal ulcer, from which the fistula seemed to originate (Fig. 3).

*Course in Hospital.*—A blood transfusion of 1,000 cc. was given preoperatively. A 48-hour neomycin bowel preparation was carried out and a Miller-Abbott tube passed into the jejunum. On Oct. 18 she was taken to the operating room and the upper abdominal abscess drained through a right subcostal incision. The free peritoneal cavity was not entered. The abscess involved the subhepatic and anterior subphrenic spaces, which communicated around the lateral margin of the right lobe of the liver. It was not possible to identify any fistulous openings, although the abscess cavity contained a large amount of barium, feces, and bile-stained duodenal contents. The



GI SERIES  
10-17-57

Figure 3

TABLE 1.—Duodenal Ulcer

Author	Age, Yr.	Complaints	Duration	Physical Findings	X-Ray Diagnosis	Location of Fistula	Therapy	Outcome	Comments
--------	----------	------------	----------	-------------------	-----------------	---------------------	---------	---------	----------

the upper fistula, the from which

fusion of A 48-hour out and a unum. On room and through a meal cavity the subes, which gin of the possible to ough the of barium, ents. The

ulb with iculum crater

TABLE 1.—Duodenal Ulcer

Author	Age, Yr.	Complaints	Duration	Physical Findings	X-Ray Diagnosis	Location of Fistula	Therapy	Outcome	Comments
1. McPeak <sup>10</sup> (1940)	58	Vomiting, diarrhea, and weight loss	3 yr.	Emaciation	Ba enema showed fistula; G. I. series did not show fistula but showed duodenal ulcer	Transverse colon to 1st part of duodenum	Excision fistula; gastroenterotomy	Good	
2. McPeak <sup>10</sup> (1940)	46	Diarrhea, weight loss, ravenous appetite	1 yr.	Emaciation	Ba enema showed fistula; G. I. series did not show fistula but was suggestive of duodenal ulcer	Transverse colon to 2d part of duodenum	Excision fistula	Died (Infection)	One year previously had episode suggestive of duodenal perforation
3. McClinton <sup>9</sup> (1944)	47	Pain, vomiting, diarrhea, and weight loss	2 yr.	Emaciation	G. I. series did not show fistula; Ba enema not done	Transverse colon to 2d part of duodenum	Excision fistula	Good	Two years previously had episode suggestive of duodenal perforation
4. Rallion <sup>11</sup> (1948)	45	Pain and weight loss	7 7 yr.	Emaciation; RUQ tenderness	Ba enema not done; G. I. series showed fistula	Transverse colon to 1st part of duodenum	Stomach transected; exclusion gastroenterotomy	Fistula closed; marginal ulcer developed	An abscess was present in fistula tract
5. Krock <sup>8</sup> (1950)	68	Vomiting, diarrhea, and weight loss	7 23 yr.	Emaciation	Ba enema showed fistula; G. I. series not done	Hepatic flexure to 2d part of duodenum	Excision fistula	Good	
6. Rife <sup>12</sup> (1951)	45	Diarrhea and weight loss	4 yr.	Emaciation	Ba enema and G. I. series both showed fistula; G. I. series suggestive of ulcer	Undescended cecum to 2d part of duodenum	Right colectomy; closure of duodenal defect	Good	
7. Nash & Deland <sup>11</sup> (1956)	39	Pain, vomiting, and weight loss	2 yr.	Slight emaciation; RUQ tenderness	Ba enema showed fistula; G. I. series did not show fistula	Right transverse colon to 2d part of duodenum	Segmental colectomy; gastrojejunostomy; drainage of abscess	Good; marginal ulcer developed later	
8. Starzl, Dorr, & Meyer (1958)	64	Pain, vomiting, weight loss, and fever	1 mo.	Emaciation; RUQ tenderness	Ba enema and G. I. series both showed fistula; G. I. series showed ulcer	Right transverse colon to 1st part of duodenum	Drainage of subphrenic abscess	Good	Abscess communicated with the fistula tract

TABLE 2.—Biliary Disease

Author	Age, Yr.	Complaints	Duration	Physical Findings	X-Ray Diagnosis	Location of Fistula	Therapy	Outcome	Comments
1. Lowell <sup>7</sup> (1947)	55	Pain, vomiting, and weight loss	3 mo.	Emaciation; RUQ tenderness	Ba enema and G.I. series both showed fistula	Right transverse colon to 1st part of duodenum to gallbladder	Excision fistula; gastroenterostomy; drainage subphrenic abscess	Good	Previously known to have cholecystitis
2. Bucaille <sup>1</sup> (1962)	81	Pain	Not stated	Not stated	Ba enema showed fistula; G.I. series not done	Transverse colon to 2d part of duodenum to gallbladder	Cholecystectomy; closure of fistula	Good	--
3. Neville <sup>10</sup> (1964)	Not stated	Pain, vomiting, and weight loss	1 wk.	RUQ tenderness	Ba enema showed fistula; G.I. series not done	Hepatic flexure to 2d part of duodenum to gallbladder	Cholecystectomy; segmental colon resection; closure of duodenal fistula	Good	Had chronic cholecystitis for years
4. Rosenqvist & Sjöberg <sup>11</sup> (1965)	61	Pain, diarrhea and weight loss	2 mo.	Not stated	Ba enema showed fistula; gallbladder did not visualize; G.I. series not done	Right transverse colon to 1st part of duodenum to gallbladder	Cholecystectomy; excision fistula	Good	Symptoms of cholecystitis for 9 yr.
5. Plattner & Goldschlay <sup>12</sup> (1956)	76	Pain, vomiting, diarrhea and weight loss	4 yr.	Not stated	Ba enema and G.I. series both showed fistula; gallbladder did not visualize	Right transverse colon to 1st part of duodenum to gallbladder	Not operated	Alive	Fistula persisted on x-rays taken over 4-yr. period

TABLE 3.—Appendicitis and Ulcerative Colitis

Table 3—Appendicitis and Ulcerative Colitis

Ulcerative Colitis									
Author	Age, Yr.	Complaints	Duration	Physical Findings	X-Ray Diagnosis	Location of Fistula	Therapy	Outcome	Comments
1. Ormandy & Bergen (1939)	31	Pain, vomiting, bloody diarrhea, fever, and weight loss	2 mo.	Emaciation; generalized tenderness	No studies done	Transverse colon to 2d part of duodenum	Supportive	Died	Diagnosis was not supported until autopsy
2. Ransom (1931)	28	Bloody diarrhea and weight loss	Not stated	Not described	Ba enema showed fistula and ulcerative colitis; G. I. series did not show fistula	Transverse colon to duodenum	Ileostomy; colotomy and closure of fistula	Good	
2. Ransom (1931)	12	Bloody diarrhea and weight loss	Not stated	Not described	Ba enema showed fistula and ulcerative colitis; G. I. series not done	Transverse colon to duodenum	Ileostomy; colotomy and closure of fistula	Good	At surgery, 2d fistula found between jejunum and transverse colon
Appendicitis									
1. Clayton & Thornton (1933)	48	Lower abdominal pain, diarrhea, weight loss, and fever	6 wk.	Emaciation; right midabdominal tenderness	Ba enema showed fistula; G. I. series not done	Base of appendix to 2d part of duodenum	Colectomy; closure of fistula; drainage of abscess	Good	Surgical specimen disclosed benign polyp in cecum
2. Marchaccio, Putignano, & Viterbo (1933)	38	Epigastric pain, vomiting, diarrhea, and weight loss	4 yr.	Emaciation; tender right parumbilical mass	Ba enema not done; G. I. series did not show fistula until dye reached cecum, when reflux occurred into duodenum	Cecum to 3d part of duodenum	Right colectomy; excision abscess; closure of fistula	Good	Diarrhea started a few weeks after original appendectomy

TABLE 4.—Miscellaneous Causes

Author	Age, Yr.	Complaints	Duration	Physical Findings	X-Ray Diagnosis	Location of Fistula	Therapy	Outcome	Comments
1. Ram <sup>10</sup> (1933)	62	Epigastric pain, vomiting, and weight loss	8 mo.	Upper abdominal tenderness	Ba enema not done; G. I. series showed barium reflux into biliary tree	Transverse colon to 2d part of duodenum	Closure of fistula	Good	Thought by author to be due to typhoid 32 yr. previously
2. Ogilvie <sup>12</sup> (1950)	52	Diarrhea and weight loss	32 yr. (Intermittent symptoms)	Emaciation	Ba enema and G. I. series both showed fistula	Ascending colon to 3d part of duodenum	Closure of fistula	Good	Casating node found in relation to fistula was thought by author to be the cause
3. Ogilvie <sup>12</sup> (1950)	54	Vomiting, diarrhea, and weight loss	3 mo.	Emaciation	Ba enema showed fistula; G. I. series not done	Ascending colon to 3d part of duodenum	Closure of fistula	Good	Casating node found in relation to fistula thought by author to be the cause
4. Winfield <sup>13</sup> (1951)	Not stated	Diarrhea and weight loss	Not stated	Not stated	Ba enema showed fistula; G. I. series did not show fistula	Sigmoid colon to duodenum	Closure of fistula	Not stated	No explanation advanced for fistula
5. Bessalle <sup>1</sup> (1952)	43	Vomiting, diarrhea, fever, weight loss, and RUQ pain	6 mo.	RUQ and flank tenderness; emaciation	Ba enema showed fistula	Right transverse colon to 2d part of duodenum	Closure of fistula	Good	Injury to colon and duodenum occurred 6 mo. previously at surgery; fistula occurred through sites of repair of these injuries
6. Romqvist & Sjoberg <sup>11</sup> (1955)		Vomiting, diarrhea, and weight loss	1 yr.	Not stated	Ba enema showed fistula; G. I. series not done	Right transverse colon to 2d part of duodenum	Closure of fistula	Good	Thought by authors to be due to perforation of foreign body; no foreign body recovered

BENIG  
gallbladder  
drains  
spaces,  
subhepa  
After  
improve  
of distal  
cecal :  
tube wa  
days 1-  
oral fec  
rapidly  
hydroge  
Elevate  
was ref  
normal.  
the pre  
fistula.  
normal  
normal  
12th po  
As :  
wound  
was cor  
an ulc  
x-ray :  
months  
normal.  
formed  
demons

The  
tula is  
cases  
ulcer  
diseas  
were  
two fi  
Other  
culous  
eign-b  
The  
ranger  
preser  
those  
to the  
plaina  
consic  
etiolog  
cept  
been  
magn  
pressi  
Of th  
ing, a  
Starzl

## BENIGN DUODENOCOLIC FISTULA

gallbladder was not identified. Multiple Penrose drains were left in the subphrenic and subhepatic spaces, and a sump drain was placed in the subhepatic space. The wound was left open.

After this procedure, her condition rapidly improved. Initially, there was a profuse discharge of duodenal contents into the sump drain, but this ceased abruptly after 36 hours. The Miller-Abbott tube was employed for feeding purposes for a few days postoperatively, after which she resumed oral feedings. The subphrenic abscesses responded rapidly to a regimen of multiple flushings with hydrogen peroxide solution.

Eleven days after surgery, the barium enema was repeated and the findings found to be entirely normal. A repeat gastrointestinal series confirmed the presence of duodenal ulcer with closure of the fistula. A subsequent cholecystogram revealed a normal gallbladder. She was discharged on the 12th postoperative day.

As an outpatient, the granulating subcostal wound closed rapidly and nine weeks after surgery was completely healed. She has been maintained on an ulcer diet and has gained 25 lb. Follow-up x-ray studies were obtained in May, 1958, seven months after surgery. Barium enema findings were normal. A gastrointestinal series showed a deformed duodenal bulb, but no ulcer crater could be demonstrated.

### Comment

The etiology of benign duodenocolic fistula is varied. More than half the reported cases have been complications of duodenal ulcer (eight cases, Table 1) or gallbladder disease (five cases, Table 2). Three fistulas were secondary to ulcerative colitis, and two followed acute appendicitis (Table 3). Other causes were a typhoid ulcer, tuberculous adenitis, operative trauma, and foreign-body perforation (Table 4).

The patients with duodenocolic fistula ranged in age from 12 to 81 years. They presented with two groups of complaints: those referable to the fistula and those due to the underlying disease. Symptoms explainable on the basis of the fistula showed considerable uniformity irrespective of the etiology. All patients had weight loss except one (and in this case the fistula had been present for only one week). The magnitude of weight loss was usually impressive, being as much as 100 lb. In 14 of the 24 reported cases there was vomiting, and frequently this was fecal in char-

acter. Seventeen had diarrhea, and in a number of cases the feces contained undigested food. Thirteen patients had upper abdominal pain, which was usually located in the right hypochondrium. The duration of the fistulas was 1 week to 32 years.

The outstanding physical finding in these patients was emaciation, which was present in all documented cases but one. Tenderness over the site of the fistula was present in slightly less than one-half the cases. In a few instances a mass was palpable, and this was usually indicative of an abscess which communicated with the fistulous tract.

Eighteen of the patients had a barium enema, and in each instance the fistula was demonstrated. In 14 cases a gastrointestinal series was done, but the fistula was seen in only 6 of these. The lack of success in demonstrating the fistulas with antegrade dye studies lends support to the concept<sup>15</sup> that the diarrhea is partly due to retrograde fecal flow through the fistula, with a resultant jejunitis or duodenitis.

In the group of fistulas associated with duodenal ulcer (Table 1), some cases had a history suggestive of acute duodenal perforation. Symptoms of the fistula appeared shortly thereafter,<sup>9,10</sup> and in these cases it is probable that a subhepatic abscess formed, which secondarily perforated into the colon. This is the probable pathogenesis in the present case. In other cases, however, it appears that erosion had occurred slowly.

In the therapy of fistulas due to duodenal ulcer, various surgical procedures have been employed which have provided either excision of the fistula or establishment of an environment in which closure would occur spontaneously. In the present case a large abscess in the right upper quadrant which communicated with the fistula was drained, and the fistula closed almost immediately. In three reported cases simple excision of the fistula was done, with good results (Table 1). In two cases excision of the fistula was combined with colectomy. In three cases a gastrojejunostomy was performed as primary therapy<sup>17</sup> or as an

adjuvant to closure of the fistula.<sup>10,11</sup> Two of these three patients demonstrated the activity of their ulcer diathesis by the formation of marginal ulcers in the early post-operative period.

The state of nutrition in this group of patients was so poor that it is surprising that fecal diversion has not been used to improve the metabolic state before attempting a definitive attack on the fistula, as described by Pfeiffer<sup>15</sup> and modified by Lahey and Marshall.<sup>6</sup> This was not done in any case reviewed in this report.

Only five documented cases of duodenocolic fistula secondary to gallbladder disease have been reported (Table 2). That this figure may be falsely low is suggested by the report of Judd and Burden,<sup>4</sup> in which 4 duodenocolic fistulas were tabulated among 153 cases of cholecystenteric fistulas. In the cases reviewed here, the primary diagnosis of cholecystitis was either established in the past or entertained preoperatively. In all cases brought to surgery the duodenocolic fistula was closed, and in all but one instance cholecystectomy was carried out.

The treatment of the cases associated with ulcerative colitis was total colectomy and closure of the duodenal defect (Table 3). In the cases secondary to appendicitis the excision of the fistula was combined with appendectomy or right colectomy. All other cases (typhoid ulcer, foreign body, tuberculous lymph nodes, postoperative fistula, and unknown cause) were treated by simple excision of the fistula, with a good result (Table 4).

Obviously, it is worth considerable effort to establish the etiology before operation, since the surgical therapy will depend to a large extent on the underlying cause. In general, the information obtained with a careful history and physical examination, a gastrointestinal series, and barium enema will allow an accurate opinion about the causative disease. If the fistula is between an otherwise normal transverse colon and the first or second part of the duodenum,

and there is no evidence of gallbladder disease, the etiology will usually be duodenal ulcer. If the fistula is in this location, and there is reflux of barium into the biliary tree, or if there is other evidence of cholecystitis, the etiology will usually be gallbladder disease. The fistulous openings in more unusual cases, due to other diseases, have frequently been to other portions of the colon, or to the third or fourth portion of the duodenum.

In planning therapy, the most important single consideration is to obtain closure of the fistula either by direct or by indirect attack in the simplest possible way. The nutritional state of this group of patients is extremely poor. With closure of the fistula their condition can be improved dramatically. It has been said (Ogilvie<sup>13</sup>) that there is no more grateful patient in surgical practice than the one with a successfully closed duodenocolic fistula.

### Summary

The eighth recorded case of benign duodenocolic fistula due to duodenal ulcer is presented, and the clinical features, pathogenesis, and treatment of benign duodenocolic fistulas from this and other causes are reviewed.

Irrespective of the etiology of the fistula, the patients present a common syndrome, which may include weight loss, emaciation, vomiting (often fecal), diarrhea, and abdominal pain and tenderness.

The single most useful study in demonstrating the fistula has been barium enema. In establishing the etiologic factor responsible for the fistula, it is mandatory that a gastrointestinal series be obtained.

An accurate preoperative diagnosis is necessary, since the surgical therapy will be influenced by this knowledge.

In almost all cases, direct closure of the fistula or procedures designed to allow the fistula to close spontaneously have been successful.

Jackson Memorial Hospital, Miami, Fla. (Dr. Meyer).

1. Bucaille, Arch. mal.
2. Clayton, Duodenocol.
3. Hersh, Duodenocol 1951.
4. Judd, Biliary Fist.
5. Krock, Surgical M. plicated Pr & Obst. 76.
7. Lovell, South. Surg.
8. Marin, F.: Contri coliche ber 1953.
9. McClintock, Colonic Fis.
10. McPhee, Fistula, wit 1940.
11. Nash, Duodenocol 1032, 1956.



BENIGN DUODENOCOLIC FISTULA

REFERENCES

1. Bucaille, M.: Les Fistules duodéno-coliques, *Arch. mal. app. digest.* 41:643, 1952.
2. Clayton, R. S., and Thornton, W. L.: Benign Duodenocolic Fistula, *Radiology* 60:832, 1953.
3. Hershenson, L. M., and Kirsner, J. B.: Duodenocolic Fistula, *Gastroenterology* 19:864, 1951.
4. Iudd, E. S., and Burden, V. G.: Internal Biliary Fistula, *Ann. Surg.* 81:305, 1925.
5. Krock, F., in discussion on Ogilvie.<sup>13</sup>
6. Lahey, F. H., and Marshall, S. F.: The Surgical Management of Some of the More Complicated Problems of Peptic Ulcer, *Surg. Gynec. & Obst.* 76:641, 1943.
7. Lovell, D. L.: Internal Biliary Fistulas, *South. Surgeon* 13:152, 1947.
8. Marinaccio, G.; Putignano, T., and Viterbo, F.: Contributo allo studio delle fistole duodenocoliche benigne, *Policlinico (sez. chir.)* 60:371, 1953.
9. McClinton, J. B.: Non-Malignant Duodeno-Colonic Fistula, *Canad. M. A. J.* 51:434, 1944.
10. McPeak, C. N.: Benign Duodeno-Colic Fistula, with Report of 2 Cases, *Radiology* 34:343, 1940.
11. Nash, H. E., Jr., and Daland, E. M.: Benign Duodenocolic Fistula, *New England J. Med.* 254:1032, 1956.
12. Neville, W. E.: Duodenocolic Fistula Due to Acute Cholecystitis, *Am. J. Surg.* 87:300, 1954.
13. Ogilvie, H.: Non-Malignant Duodeno-Colic Fistula; Report of 2 Cases, *Ann. Surg.* 131:899, 1950.
14. Ormandy, L., and Borgen, J. A.: Thrombo-Ulcerative Colitis Associated with Cologastric and Coloduodenal Fistulas, *Proc. Staff Meet. Mayo Clin.* 14:550, 1939.
15. Pfeiffer, D. B.: Value of Preliminary Colostomy in the Correction of Gastrojejunocolic Fistula, *Ann. Surg.* 110: 659, 1939.
16. Plattner, H. C., and Goldschlag, H.: Fistule duodéno-colique bénigne avec myocardose dysprotéïnémique, *Rev. med. Suisse Rom.* 76:792, 1956.
17. Railton, S. V.: Benign Duodeno-Colic Fistula, *Canad. M. A. J.* 59:267, 1948.
18. Ransom, H. K., in discussion on Rife.<sup>20</sup>
19. Rees, C. E.: Duodenocolic Fistula with Incompetent Sphincter of Oddi, *J. A. M. A.* 100:496, 1933.
20. Rife, C. S.: Benign Duodenocolic Fistula, *A. M. A. Arch. Surg.* 62:876, 1951.
21. Rosenqvist, H., and Sjöberg, S. G.: Duodeno-Colic Fistulas, *Acta chir. scandinav.* 109:293, 1955.
22. Winfield, J. M., in discussion on Rife.<sup>20</sup>