Cecal Volvulus

Analysis of 50 Patients with Long-term Follow-up

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Fifty patients operated upon for cecal volvulus were analyzed. The ages ranged from 14 to 88 years and averaged 53 years. Eighteen were males and 32 were females. The presentation was acute, requiring urgent surgery in 41 patients; nine patients presented with chronic symptoms and were operated upon electively. In 14 patients (28%) the cecal volvulus was temporally related to another acute medical problem. The diagnosis was made radiographically in 22 patients (44%) and at operation in 28 patients (56%). Cecal volvulus was correctly diagnosed by barium enema in 20 of the 29 patients (69%) undergoing the study. Eighteen of the patients were treated by cecopexy, 14 by resection, 12 by detorsion alone, and six by tube cecostomy. Mortality was 12% (6/50) and was associated with gangrenous cecum (33%, 3/9), other systemic diseases (24%, 5/21), age over 50 years (19%, 6/31), and acute presentation (15%, 6/41). In the absence of gangrenous cecum, enterotomy was associated with subsequent wound infection in 23% (7/30), as compared to none (0/11) when enterotomy was not performed. There were no recurrences of cecal volvulus in the entire series during follow-up which extended to 17 years, averaged 5.7 years, and was complete in 96% (42/44) of survivors. When gangrenous cecum is present, resection is the treatment of choice. In the absence of gangrenous bowel, cecopexy is recommended because of a low mortality (0/18), low morbidity (3/18), low recurrence rate (0/18) and absence of need to open the unprepped bowel.

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vulus, compares different operative procedures and evaluates long-term results of operative management.

Clinical Management

Fifty patients were operated upon for cecal volvulus at The Johns Hopkins Medical Institutions, The Union Memorial Hospital and The Greater Baltimore Medical Center between 1955 and 1977. Ages of the 50 patients ranged from 14 to 88 years and averaged 53 years. Age distribution through the decades was fairly even (Fig. 1). Eighteen patients were male and 32 were female.

The most common presenting symptoms were abdominal pain (45/50, 90%), nausea and vomiting (34/50, 68%), obstipation (30/50, 60%) and diarrhea (12/50, 24%). The presentation of 41 patients was characterized by acute symptoms requiring urgent operation. The duration of acute symptoms prior to presentation ranged from 12 hours to 10 days with an average duration of 2 days. The remaining nine patients presented with chronic intermittent symptoms and were operated upon electively. These chronic symptoms ranged in duration from six weeks to four years and averaged 1.5 years.

Significant medical illnesses were present in 21 patients. These problems included cardiovascular disease in 11 patients, arthritis in four patients, renal failure in two patients and hepatic insufficiency in two patients. One patient had diabetes mellitus, and one had Cushing's disease. Nineteen of the patients had undergone a total of 40 intra-abdominal operations prior to developing cecal volvulus. Thirteen of these 19 patients had undergone a previous appendectomy. Six

VOLVULUS OF THE CECUM is a relatively uncommon form of intestinal obstruction. The diagnosis of cecal volvulus can be difficult, delays in treatment are common, and mortality has remained high. In addition, the operative management of cecal volvulus is controversial. Comparison of different operative procedures has been difficult because most series have evaluated small numbers of patients without long-term follow-up. This report characterizes the clinical presentation of a large series of patients with cecal vol-
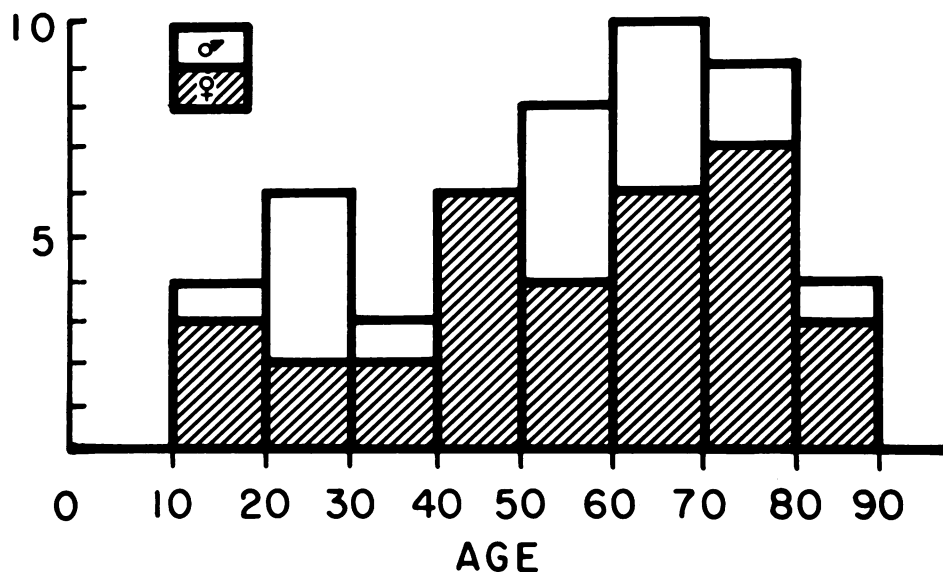
NUMBER OF PATIENTS

FIG. 1. Age and sex distribution of 50 patients with cecal volvulus.

of the appendectomies were for uncomplicated acute appendicitis, two were for ruptured appendix and five were performed incidentally during another intra-abdominal procedure. One patient had previously undergone cecopexy elsewhere for cecal volvulus. One patient had cerebral palsy, and two elderly patients were institutionalized for psychiatric problems. Chronic constipation was an infrequent complaint with only three patients admitting to chronic use of a laxative. Cecal volvulus was temporally related to some other acute medical problem in 14 patients. Three pregnant patients developed cecal volvulus within one week of delivery. Five patients developed cecal volvulus within three days of unrelated surgery. Cecal volvulus occurred during hospitalization for an acute nonsurgical condition in the remaining six patients.

At the time of admission five patients had a rectal temperature above 38.0°. Forty-one patients had abdominal tenderness which was generally diffuse and mildly to moderately severe. There was no tenderness in five patients with a chronic presentation, in one comatose patient, and in three patients with an acute presentation. Marked abdominal distention was noted in 31 patients. Ten patients had a palpable abdominal mass which was usually compressible but variable in size and location. Bowel sounds were hyperactive in 12 patients, absent in eight, and either normal or slightly diminished in the remaining 30 patients. Physical signs of peritoneal irritation were present in seven patients, yet these findings correlated poorly with the subsequent presence or absence of ischemic necrosis of the cecum. Of nine patients with gangrenous cecum, only two (22%) had signs of peritoneal irritation, whereas five of 41 patients (12%) without gangrenous changes had peritoneal signs. Of 21 patients tested for occult blood in the stool, only four had positive results. White blood cell counts ranged from 2,500 to 24,000/ml. In the 41 patients subsequently proven to have no gangrenous changes, 19 patients (46%) had either a leukocytosis or leukopenia. In the nine patients subsequently proven to have gangrenous cecum, the white cell count was abnormal in seven patients (78%).

Plain abdominal roentgenograms were performed in eight of the nine patients with a chronic presentation and all were normal. Plain abdominal films were obtained in 40 of the 41 patients with an acute presentation (Figs. 2 and 3). These films revealed dilatation of small bowel in 12, proximal colon dilatation in 11, and combined small bowel and proximal colon dilatation in 15 patients. Although 38 of the 40 patients who had plain abdominal x-rays and presented with acute symptoms had abnormal films, the preoperative diagnosis of cecal volvulus was made on the basis of plain abdominal films alone in only two patients.

Twenty-nine patients had preoperative barium enemas. The study was interpreted as normal in six patients. In 16 patients the study revealed an abrupt cut-off or a tapered narrowing of the barium column in the ascending colon (Figs. 2 and 3). However, two of these studies were misinterpreted as showing obstruction secondary to neoplasm. Barium enema in six patients demonstrated a mobile cecum and in association with the clinical findings at presentation afforded the correct preoperative diagnosis. Barium enema in the
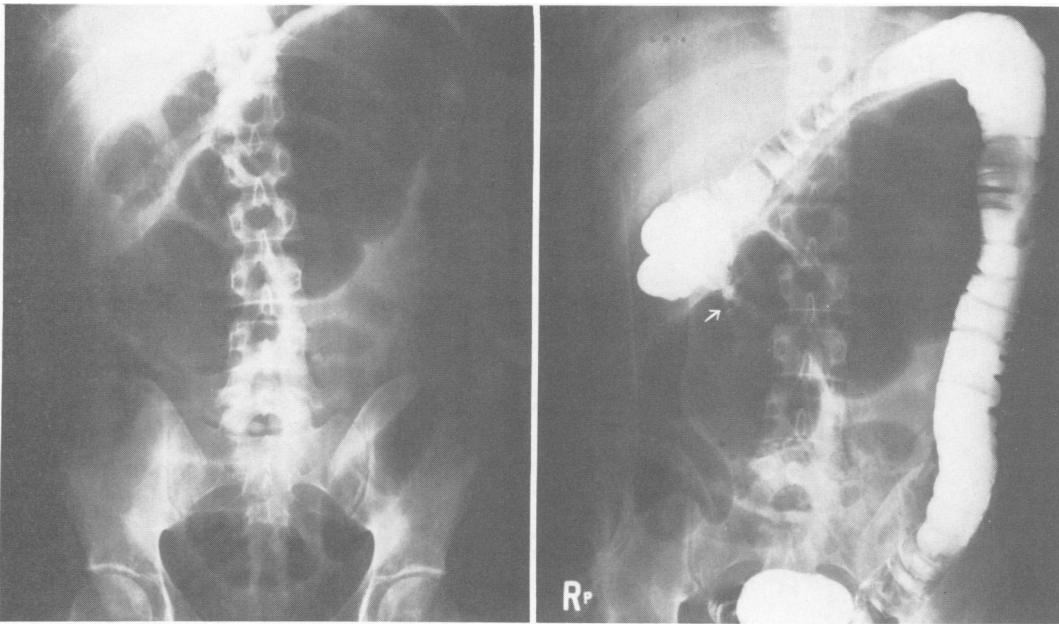
FIG. 2. (a, left) Plain abdominal film of a 31-year-old man demonstrating a characteristic picture of cecal volvulus with the cecum in the left upper quadrant. (b, right) Barium enema of the same patient demonstrating the classic beak sign (arrow) at the site of axial rotation in the ascending colon.

remaining patient was terminated prior to completion because of suspected extravasation at the splenic flexure; operation revealed cecal volvulus without perforation. Therefore, the diagnosis of cecal volvulus was made preoperatively by barium enema in 20 of the 29 patients (69%) who had the study. Diagnosis was made radiographically in 22 patients before operation, whereas 28 patients required exploratory laparotomy for diagnosis. Diagnosis was delayed beyond 24 hours of the time of presentation in 11 of the 41 patients (27%) with acute symptoms. The average delay was 4 days, and three of these patients had a gangrenous cecum when operation was performed.

Clinical Management

All 50 patients were operated upon. A freely mobile cecum was found in each of the 50 patients. Thirty-four patients had an axial twist of the terminal ileum, cecum and proximal ascending colon. In five additional patients the cecum was folded acutely in front of the ascending colon resulting in obstruction at the site of the transverse fold (Fig. 4). The remaining 11 patients had a mobile cecum with inflammatory edema or dense fibrosis and a long cecal mesentery, indicative of recent or chronic intermittent cecal volvulus. Three of these 11 patients presented with acute symptoms and presumably had reduced a cecal volvulus spontaneously immediately prior to operation. Nine patients had gangrenous cecum at the time of surgery. In two of these patients there was free perforation of the cecum and generalized peritonitis. Eight of the nine patients with gangrenous bowel had axial rotation, and the other

had a transverse fold of the cecum. Distal colon obstruction was an associated finding in only one patient. This was a 14-year-old girl who had a congenital band at the hepatic flexure causing partial obstruction of the colon. In nine patients there was a peritoneal adhesive band from prior surgery which acted as a fulcrum at the site of volvulus. One patient had an adenocarcinoma of the cecum with liver metastases. Another patient remarkably had herniation of a cecal volvulus into the lesser sac through the foramen of Winslow.

Presence of Gangrenous Bowel

Of the nine patients found to have nonviable cecum at the time of operation, seven underwent right hemicolectomy and primary anastomosis (Table 1). Two of the seven patients died from septic complications. One other patient developed a pleural effusion as a postoperative complication. One of the five survivors required lysis of adhesions for small bowel obstruction 10 months after operation. The remaining two patients with nonviable bowel were not resected. One had imbrication of a 1 cm area of necrosis of the cecum and insertion of a cecostomy tube through the stump of the appendix. She recovered without complication. The second patient had a small perforation of the cecum with generalized peritonitis. She underwent closure of the perforation and insertion of a tube at a separate site in the cecum. This patient died 1 week later with sepsis secondary to ischemic necrosis of the cecum.

Thus, there were three hospital deaths among the nine patients with nonviable bowel. There was one postoperative complication, and among the six sur-

vivors there was one late small bowel obstruction during follow-up which ranged from 1.7 to 13.3 years and averaged 6.5 years.

Absence of Gangrenous Bowel

Of the 41 patients with cecal volvulus who had no gangrenous changes at the time of surgery, four underwent tube cecostomy alone (Table 2). One of these patients died 3 weeks after operation from pneumonia and hepatic and renal insufficiency. Two additional patients developed postoperative complications. One developed respiratory failure, and another patient had a wound infection and a persistent fecal fistula after removal of the cecostomy tube requiring operative closure 2.5 months postoperatively. This latter patient required lysis of adhesions for small bowel obstruction 6 months later. Follow-up in the three survivors ranged from 2.5 to 6.9 years, with an average of 4.0 years.

Seven patients underwent resection and primary anastomosis. There were no deaths. However, postoperative complications occurred in three patients and included wound infection (all three), pleural effusion (two patients), pneumonia and small bowel obstruction requiring surgery. Late small bowel obstruction occurred in two of the seven patients, two months and ten months postoperatively. Follow-up for the seven patients ranged from five months to 10.3 years and averaged 4.7 years.

FIG. 3b. The barium enema of this patient shows a smooth cut-off in the ascending colon with a small amount of barium entering the cecum and distal ileum.

Twelve patients underwent detorsion alone with two hospital deaths. One patient died of a massive stroke one week following surgery. The other death occurred in a patient with longstanding severe alcoholic cirrhosis and renal failure; he expired five days after operation of multiple system failure. Three of the ten survivors in the detorsion group developed postoperative complications. Wound infections occurred in two patients, and respiratory insufficiency requiring mechanical ventilation developed in the other. There were no late complications in the ten survivors with follow-up that ranged from 1.5 to 17.0 years and averaged 8.0 years.

Cecopexy was performed in 18 patients. The method of cecopexy was simple broad fixation of the mobile cecum to the abdominal wall with nonabsorbable sutures. There were no deaths in this group. Postoperative complications occurred in three patients and included a wound infection, a urinary tract infection, and mechanical small bowel obstruction requiring reoperation nine days postoperatively. Two patients developed late small bowel obstruction five weeks and 18 months after operation. Follow-up in
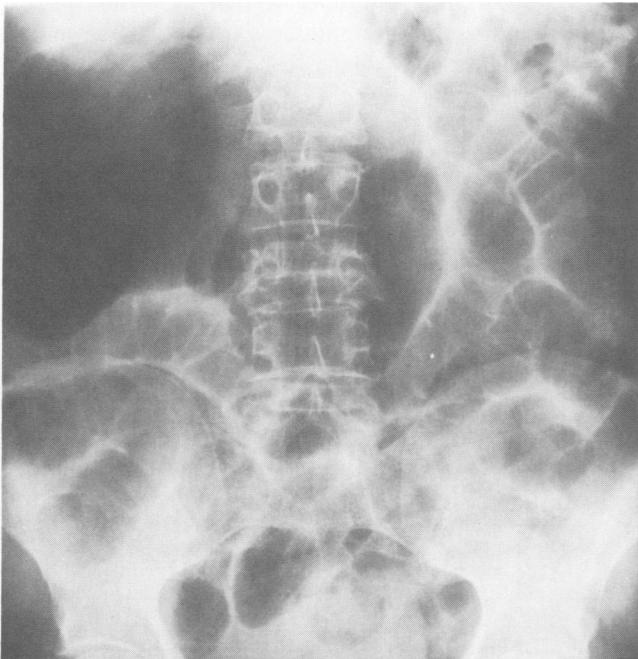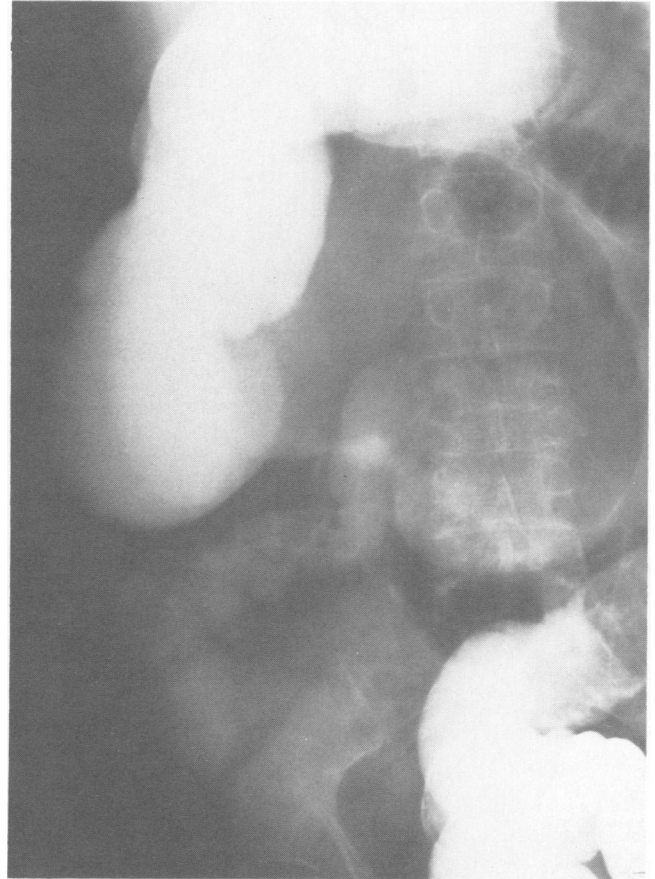

FIG. 3a. Plain abdominal film of a 63-year-old man demonstrating combined small bowel and proximal colon dilation. Distended small bowel occupies the usual position of the cecum in the right lower quadrant.
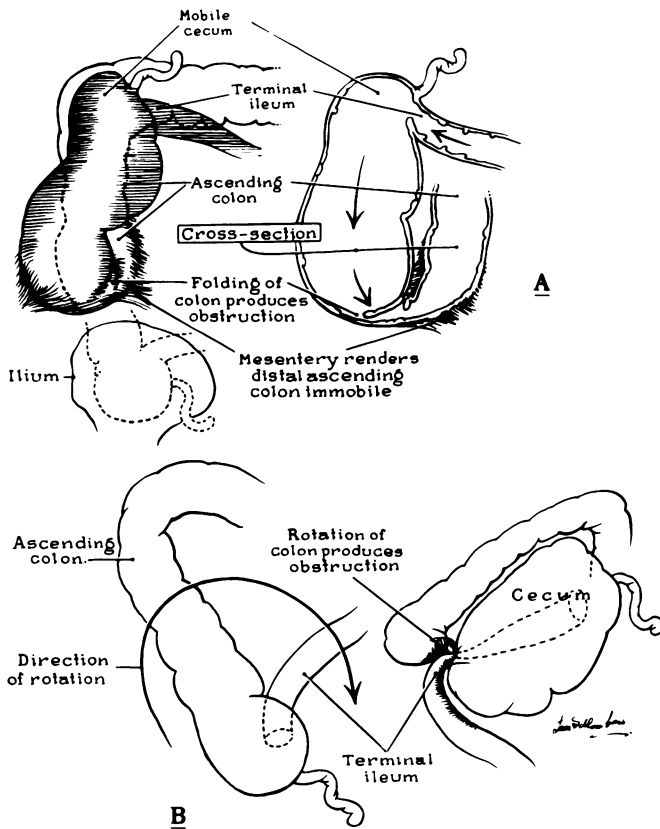
FIG. 4. (A) Diagrammatic representation of cecal volvulus caused by an anterior cephalad displacement of the cecum resulting in obstruction at the site of transverse folding. *Dotted lines* show usual position of the cecum in relation to the ilium. (B) Demonstration of cecal volvulus produced by a clockwise rotation of terminal ileum, cecum and ascending colon.

these 18 patients ranged from one month to 14.3 years and averaged 4.8 years.

Therefore, of the 41 patients without gangrenous changes of the cecum, there were three hospital deaths (7%) and 14 postoperative complications (34%). In the 38 survivors there were five instances of late small bowel obstruction (13%), with follow-up until death or the present time in all but two patients. The duration of follow-up ranged from one month to 17 years and averaged 5.6 years.

Of 30 patients who underwent either cecopexy or detorsion alone, wound infection occurred in three of the 19 patients (16%) who also had either incidental appendectomy or decompressive enterotomy and in

none of the 11 patients who had neither of these additional procedures. Considering all 41 patients without gangrenous bowel, wound infection was a complication in seven of the 30 operations (23%) which involved entering the lumen of the bowel in the process of performing resection, appendectomy, cecostomy or decompressive enterotomy. There were no wound infections in the remaining 11 patients in whom the bowel was not opened. It should be noted, however, that decompressive enterotomy was necessary in several patients for safe detorsion of the volvulus or for satisfactory closure of the wound.

Entire Series

There were six hospital deaths among the 50 patients giving a 12% mortality. Average age of those who died was 63 years as opposed to an average age of 52 years for survivors. There were no deaths among the 19 patients younger than 50 years of age, whereas six of the 31 patients (19%) older than 50 years died. Five deaths occurred in the group of 21 patients (24%) with a history of a major medical illness; only one of the 29 patients (3%) without a major medical illness died. Each of the six patients who died were among the 41 patients (15%) with acute symptoms, while there were no deaths in the group of nine patients with a chronic presentation. Three deaths occurred in the group of nine patients (33%) with areas of ischemic necrosis in the cecum, while the other three deaths were among the 41 patients (7%) without gangrenous changes.

Follow-up was complete until death or the present in 42 of 44 patients surviving operation (96%). Average duration of follow-up was 5.7 years with a range of one month to 17 years. There were 18 postoperative complications (36%), and among the 44 survivors there were six instances of late small bowel obstruction (14%). No patient in the entire series developed recurrent cecal volvulus.

Discussion

Cecal volvulus accounts for 25–40% of cases of volvulus of the colon[5,14] and about 1% of all instances of intestinal obstruction.[11] Cecal volvulus usually occurs with an axial twist of the cecum, ascending colon and terminal ileum. Occasionally, however, the cecum

TABLE 1. *Results of Surgery in Nine Patients with Cecal Volvulus with Gangrenous Bowel*

Operation	Hospital Mortality	Postoperative Complications	Late Small Bowel Obstruction	Recurrence	Average Follow-up
Cecostomy	1/2 (50%)	1/2 (50%)	0/1 (0%)	0/1	1.7 yrs
Resection	2/7 (29%)	3/7 (43%)	1/5 (20%)	0/5	7.5 yrs
Total	3/9 (33%)	4/9 (44%)	1/6 (17%)	0/6	6.5 yrs

TABLE 2. *Results of Surgery in 41 Patients with Cecal Volvulus Without Gangrenous Bowel*

Operation	Mortality	Postoperative Complications	Late Small Bowel Obstruction	Recurrences	Average Follow-up
Cecostomy	1/4 (25%)	3/4 (75%)	1/3 (33%)	0/3	4.0 yrs
Resection	0/7 (0%)	3/7 (43%)	2/7 (29%)	0/7	4.7 yrs
Detorsion only	2/12 (17%)	5/12 (42%)	0/10 (0%)	0/10	8.0 yrs
Cecopexy	0/18 (0%)	3/18 (17%)	2/18 (11%)	0/18	4.8 yrs
Total	3/41 (7%)	14/41 (34%)	5/38 (13%)	0/38	5.6 yrs

folds acutely in an anterior and cephalad direction onto the ascending colon, thus creating obstruction at the site of the transverse fold (Fig. 4). This type of cecal volvulus, referred to by Weinstein[13] as cecal bascule, was present in 10% of cases in this series. A prerequisite for the development of cecal volvulus is free mobility of the cecum. This mobility results from either incomplete embryologic rotation of the bowel or improper developmental fusion of the mesentery of the cecum and ascending colon with the posterior parietal peritoneum. Wolfer and others[16] showed in postmortem studies that sufficient mobility of the cecum to allow for volvulus is present as an anatomic variant in 11.2% of adults. Given a mobile cecum, certain factors can precipitate the development of cecal volvulus. These include concomitant acute medical problems, pregnancy, distal colon obstruction and a previous laparotomy. Distal colon obstruction occurred in only one patient in this series. However, 38% of patients had undergone previous laparotomy, and 28% developed cecal volvulus in association with some other acute medical problem or in relation to pregnancy. Previous surgery presumably results in adhesions that can act as a fulcrum for cecal volvulus. Pregnancy results in marked displacement of the cecum, which may predispose to volvulus. Cecal volvulus may also be precipitated by proximal colon dilatation caused either by distal colon obstruction or by an ileus related to an acute medical illness.

The patient with cecal volvulus usually presents with nonspecific acute abdominal symptoms. However, in the present series nine patients (18%) had chronic complaints and were operated upon electively. An additional seven patients (14%) operated upon as an emergency had previously experienced similar episodes that resolved spontaneously. The clinical setting typical of sigmoid volvulus, an elderly institutionalized patient with a history of chronic constipation and laxative abuse, was distinctly unusual in this group of patients with cecal volvulus. Cecal volvulus was more likely to be associated with an acute medical problem, such as pregnancy, recent operation or a nonsurgical illness. Because of these associations as well as the nonspecific presenting symptoms, the diagnosis

of cecal volvulus in this series was often difficult. Diagnosis was made preoperatively in less than half of the patients, and a significant delay in diagnosis occurred in over one-fourth of the patients with acute symptoms. Radiographic studies assume an important role in diagnosis. Plain abdominal films in this series often showed a markedly dilated cecum displaced to practically any part of the abdomen, but frequently to the left upper quadrant. There was often replacement of the normal cecal outline in the right lower abdomen by distended loops of small bowel. Because of the frequently accompanying small bowel dilatation, the plain films were often misinterpreted as showing small bowel obstruction. Even though in retrospect the diagnosis of cecal volvulus can be made in many patients in this series on the basis of the plain abdominal x-rays, at the time of presentation the diagnosis was made by this means in only two patients.

Barium enema was useful in establishing the diagnosis in 20 of 29 patients (69%) who had the examination. Barium enema demonstrated the site of obstruction in the proximal colon characteristically as a spiralling or beaking of the mucosa at the site of torsion or, occasionally, as a smooth, sharply defined cutoff of the barium column. The diagnosis of chronic cecal volvulus in a patient with intermittent symptoms of intestinal obstruction is supported by demonstration on barium enema of hypermobility of the cecum. When a barium enema is done, special consideration should be given to the possibility of distal obstructive lesions associated with cecal volvulus. Barium enema should not be done when the patient is critically ill or when there is suspicion of gangrene or perforation.

Reduction of cecal volvulus by barium enema has been reported[10] and possibly occurred in several patients in our series. Also, fiberoptic colonoscopy has been suggested by Ghazi et al.[4] as a means of preoperative decompression of volvulus of the colon occurring proximal to the sigmoid. However, in contrast to the management of sigmoid volvulus, attempts to treat acute cecal volvulus by non-operative decompression could be dangerous. Physical examination and leukocyte counts in patients in this series correlated poorly with the presence or absence of gangrenous bowel.

Therefore, we feel that cecal volvulus requires prompt operative intervention to avoid delay in treatment of patients who might have clinically unsuspected gangrenous cecum.

The incidence of gangrene of the cecum varies in reported series largely according to the proportion of acute and chronic cases. Twenty-five per cent is a representative frequency of gangrenous changes[6] and is similar to the 18% incidence in the present study. Patients with gangrenous bowel require resection. Primary ileocolostomy can often be performed safely. However, if the patient is critically ill or if there is perforation and generalized peritonitis, consideration should be given to a temporary ileostomy and a distal mucous fistula with reanastomosis at a later time. Some have suggested that with a small area of ischemia in a suitable location, resection of the nonviable area and closure of the defect around a cecostomy tube is acceptable.[12] However, the potential danger of this approach is exemplified by the patient in this series who died 1 week following surgery with further gangrenous cecum initially unrecognized at the time of operation. The mortality rate of 33% for cecal volvulus with nonviable bowel as compared to 7% in the absence of gangrenous bowel emphasizes the increased risk once gangrene has occurred. Other factors associated with increased operative mortality were advanced age, acute presentation and the presence of a major illness, even though for each of these factors statistical significance was not achieved. The hospital mortality rate of 12% in the current series compares favorably with that of other recent series in which mortality ranges from 9 to 27%.[8,15]

There is considerable controversy regarding the preferred operative management of cecal volvulus in the absence of gangrenous bowel. Reduction of the volvulus as the only operative maneuver was performed in 12 patients in our series, without recurrence during an average follow-up period of 8 years. However, there was recurrence in 20% of 25 patients treated with reduction alone in the series of Inberg and coworkers.[7] Also, the propensity of cecal volvulus to spontaneously resolve and subsequently recur, as happened in the nine patients with a chronic presentation and in seven patients with acute presentations in the present series, makes reduction alone seem an unsatisfactory alternative. Cecopexy was performed in 18 patients in this series with no operative deaths and a low rate of postoperative complications (17%). There were no recurrences among these 18 patients during a follow-up that averaged 4.8 years. There were also no operative deaths in the seven patients treated by resection; however, postoperative complications developed in 43% (3/7) and late small bowel obstruction in 29% (2/7).

Since in most instances of cecal volvulus one will be dealing with unprepped bowel and because cecopexy can be performed safely and quickly without opening the bowel and with the same low recurrence rate, the results described support cecopexy as the preferred operative management of cecal volvulus. Resection appears to be unnecessary except in the presence of gangrenous bowel.

Cecostomy in the absence of gangrenous cecum opens unprepped bowel and increases the chance for wound infection. Krippaehne and others[9] have emphasized the occasional occurrence after cecostomy of the complications of abdominal wall sepsis and persistent fecal fistula requiring operative closure, both of which occurred in one patient in our series. The fact that 13 patients in our series had undergone appendectomy prior to the development of cecal volvulus suggests that cecal fixation at one small point by adhesions, as in cecostomy, may not be adequate protection against the redevelopment of cecal volvulus. Cecopexy corrects the anatomic defect which predisposes to cecal volvulus without opening the unprepped bowel. This study demonstrates that avoiding opening the bowel reduces the incidence of wound infection and is further evidence in support of cecopexy as the treatment of choice for cecal volvulus in the absence of gangrenous bowel. Cecopexy has been performed with good results in other series. However, follow-up in these series has been incomplete, and instances of recurrence of cecal volvulus following cecopexy have been reported.[1,2,10,15] These recurrences were probably related to inadequate immobilization of the cecum because of too small an area of fixation or because of a pulling through postoperatively of sutures placed in a dilated edematous cecum. Elaborate procedures to bury the cecum beneath a peritoneal flap have also been described.[3,12] However, there is no evidence to show that these procedures are more effective in preventing recurrence than standard cecopexy as used in our series.

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DISCUSSION

DR. FRANCIS C. NANCE (New Orleans, Louisiana): This is a very important study, because it's one of the largest in the literature, and as John mentioned at the beginning of his paper, most reports about cecal volvulus are anecdotal. It takes a series like this to draw some conclusions about the therapy that has been performed.

By coincidence, we have made our own review of 41 acute cases of cecal volvulus, and we come to the same conclusion, so I can only say it's a fantastic paper.

Our incidence of complications following cecopexy was 10%; when the bowel was entered by resection or tube cecostomy the incidence of intraperitoneal complications was 35%, so there is a definite difference.

One difference that we don't have similar data on is the simple detorsion. We did have two recurrences after detorsion. John did not have any in his series.

We would emphasize that cecopexy is the treatment of choice for this disease if the cecum is viable.

Dr. Cameron has emphasized that this lesion is difficult to diagnose, and virtually all series report delays in diagnosis. One striking observation in both series is that one-third of the patients are already in the hospital for something else, and the lesion tends to sneak up on you. You are taking care of the patient for something else, and they develop cecal volvulus.

One of the areas that I have had a particular interest in is the small group of patients who have chronic symptoms. I like to call this the floppy cecum syndrome. Every time I mention this in my own institution, I get guffaws and snickers, and accusations of being a quack; but we've seen almost as many patients—in fact, I think, as many patients—with the same syndrome of chronic pain that is spontaneously relieved. When these patients are operated on, they have a cecum that is flopping around in the right lower quadrant that clearly has been intermittently having volvulus; and these patients are cured by cecopexy.

Now, the problem with this group of patients is making a diagnosis, because most of them have a normal B.E., and I wonder if John would comment on this group of patients, and give us any suggestions on how you can make the diagnosis of chronic cecal volvulus in this group of patients.

DR. CHARLES S. O'MARA (Closing discussion): Complications after cecopexy were not mentioned in the presentation for the sake of time. Perhaps I can point them out here. In those patients without gangrenous changes who underwent cecopexy, there was a complication rate of 17%, as compared to a 75% rate of complications after cecostomy, a 43% incidence of complications in the postoperative period after resection, and 42% after detorsion alone. Taking this data into consideration, as well as factors that Dr. Cameron has mentioned, we feel that cecopexy is the procedure of choice.

About half of the nine patients in our series who presented with chronic symptoms were diagnosed preoperatively on the basis of a mobile cecum on barium enema. The other patients did not, as Dr. Nance has mentioned, have abnormalities on their barium enema, and their diagnosis was made at the time of operation, noting at operation a freely mobile cecum with a long ileocecal mesentery which was frequently edematous and thickened and often had hemorrhages from recent episodes of volvulus.

We would like to reiterate that the diagnosis of cecal volvulus in our series was made preoperatively in less than half of the patients, and also that there was a significant delay in diagnosis in about a fourth of the patients. These factors point out the need for a high index of suspicion in this problem, if early and appropriate management is to be instituted.