Pitfalls in the Surgical Management of Fulminating Ulcerative Colitis*

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FULMINATING ULCERATIVE COLITIS remains a serious problem to the surgeon, who is often confronted with a difficult decision regarding treatment.

Surgical treatment still involves mortality of about 45 per cent,[2, 9] but it is very helpful in the remaining cases. In contrast, conservative treatment sometimes improves the patient's condition or, rarely, brings about remission, but generally the patient continues to have the disease and later must have an elective or emergency colonic resection. Moreover, conservative treatment may expose the patient to the risk of further complications such as perforation or massive uncontrollable bleeding, with which mortality reaches 75 per cent.[7, 9]

For these reasons the treatment of fulminating ulcerative colitis is controversial. The controversy is not only one of principle, namely, whether it is worthwhile to operate in every case at the earliest possible moment, but it also concerns the type of conservative treatment and the timing and type of operation.

In a survey of the cases treated in our department, we found several which exemplify the problem. These cases were selected to emphasize the therapeutic difficulties faced in these critical situations and to warn of the "usual" surgical mistakes.

Report of Six Cases

Patient 1: A 19-year-old youth was known to have had ulcerative colitis since the age of 11 years. The diagnosis had been confirmed by rectoscopy and barium-enema studies. He had received regular treatment with steroids and Azulfidine. Over the years there had been periods of remission and periods of exacerbation, during which he was admitted to the hospital. At the time of admission in 1960 he had frequent diarrhea, loss of weight, and a fever. He was treated with intravenous fluids, antibiotics, and ACTH, but his condition continued to deteriorate. Rectoscopic examination disclosed signs of severe inflammation in the upper part of the rectum and in the sigmoid. The rectal mucosa appeared normal to 10 cm. A repeat barium-enema study indicated that the inflammatory lesion was limited to the descending and sigmoid colon. The patient was psychologically unstable, and therefore we wanted to avoid leaving him with a permanent ileostomy. It was decided to perform left hemicolectomy with an end-to-end anastomosis between the rectum and transverse colon. The postoperative course was stormy. There was leakage from the anastomosis, with a fecal fistula, and diarrhea continued. It was decided to perform ileostomy. The patient recovered from the second operation and was discharged from the hospital. His condition remained good for about a year, after which diarrhea reappeared, with a mucous discharge from the anus and a fever. It was decided to operate a third time. A subtotal resection of the colon was performed, and the rectal stump was closed as a blind pouch in the hope that an ileorectal anastomosis would be possible in the future. However, the disease continued, and after six months it was necessary to excise the rectal stump because of fever and anal pain. The postoperative course was uneventful for ten days; however, on the tenth day there was bleeding from the perianal wound, and afterwards massive bleeding from the ileostomy. The patient received 70 units of blood within two days. All clotting mechanisms were normal, but bleeding continued. Laparotomy was performed again as an emergency measure. Superficial ulceration was found along the length of all the small intestine and duodenum up to the stomach. No surgical procedure was possible. The patient continued to bleed and died of shock the day after operation.

Comment. This case indicates that partial resection of the colon is not sufficient treatment of fulminating ulcerative colitis. X-rays and macroscopic examination of the colon at the time of operation can confirm the presence of the disease, but do not define its spread. In addition, establishment of an anastomosis between seemingly-healthy intestine and the rectum is dangerous, and is liable to be complicated by leakage. The cause of the later complication of hemorrhagic diathesis in our case is not clear in the light of the normal clotting mechanism. It may be possible to connect the shallow ulcers along the small intestine with the long-

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term administration of steroids, or they may have been stress ulcers. It should be remembered, however, that this patient also had bleeding from the perineum, which cannot be explained on this basis.

Patient 2: A 63-year-old man who denied ever having had diarrhea or other illnesses was admitted to the hospital in 1963 because of constipation and anal pain of three weeks' duration. Apart from marked tenderness in the anal region, there were no abnormal physical signs. An anal fissure and thrombotic hemorrhoids were excised. Ten days after operation the patient started to have watery diarrhea 15 to 30 times a day, accompanied by temperatures as high as 102.2 F. Treatment with intravenous administration of fluids and massive doses of antibiotics was started. Tincture of opium, kaolin, and Lomotil were also administered to lessen the diarrhea. Stool and blood cultures were negative. Because there was no improvement within a few days, barium-enema studies were done; these showed an inflammatory lesion in the rectosigmoidal region (Fig. 1). Treatment with Azulfidine and enemas containing hydrocortisone was started. There was no improvement, and ACTH, 60 units/day, was given.

The patient's condition deteriorated daily. Distention of the abdomen appeared, and a plain roentgenogram showed marked distention of the sigmoid colon to diameters as great as 10 cm. This is typical of toxic segmental dilatation of the colon due to ulcerative colitis (Fig. 2).

A month after excision of the fissure and 20 days after commencement of the diarrhea, operation disclosed marked dilatation of the sigmoid and a part of the descending colon, with signs of severe inflammation of the intestine. The right colon appeared normal. A left hemicolectomy with transverse colostomy was performed. The rectal stump was closed as a blind pouch. After operation the patient remained febrile, and his condition remained poor. Intravenous fluids and massive doses of antibiotics with added steroids were of no avail. Nine days after operation the abdomen became distended again, with signs of marked peritoneal irritation and paralytic ileus. Perforation was suspected, and the patient was immediately operated upon. Operation disclosed severe peritonitis, and the remaining bowel appeared inflamed; however, to the surprise of the surgeons, no perforation was found, but rather gangrene of the gallbladder. The gallbladder was removed and the abdominal cavity was drained, but the patient's condition did not improve and he died three days after operation. Postmortem examination was not done owing to the family's objection.

Examination of the large bowel removed at the second operation revealed severe ulcerative colitis which had destroyed all of the mucosa. The inflammatory process penetrated the bowel wall into the muscle layers.

Comment. This case is interesting for a number of reasons. The sudden beginning and the fulminating course and outcome of the disease in a previously healthy person of this age are not typical.

From the etiologic point of view, it is possible to connect the fulminating ulcerative colitis with the excision of the anal fissure. Although it has been reported that an obstructive factor in the colon can aid in the development of fulminating ulcerative colitis (see Discussion), this remains a hypothesis only in this case. We suggest that other factors also could have accelerated the development of the toxic megacolon in our patient: 1) administration of opiates when the patient had diarrhea; 2) the barium-enema studies; 3) the steroids; 4) the anticholinergic drugs.

The complication of gangrene of the gallbladder is also interesting. Although cholecystitis as a complication of other abdominal surgery has been reported,[25] to the best of our knowledge no case similar to that described above has been described, and we are unable to explain its etiology. From the surgical point of view, the same problem existed as in the previous case. Retrospectively, it would have been better to resect the entire colon in one stage.

Patient 3: A 20-year-old woman was admitted to our department two weeks after the birth of her first child because of colicky abdominal pain, fever and watery mucous diarrhea 5 to 6 times a day. She also had severe tenesmus and had lost weight. She had previously been healthy. Rectoscopic examination confirmed the diagnosis of ulcerative colitis. Barium-enema studies showed ulceration of the sigmoid colon, transverse colon, and half of the ascending colon. The patient's condition improved after treatment with hydrocortisone enemas and Azulfidine, and she was discharged with a recommendation to continue taking the tablets. After a month she was readmitted because of deterioration of her condition. At this time she had temperatures as high as 103.1 F and as many as 30 watery–bloody stools a day. Administration of intravenous fluids and antibiotics and blood transfusions were started. She was given hydrocortisone, 100 mg/day, when no improvement was seen, but her condition continued to deteriorate. Toxic dilatation of the colon appeared, necessitating operation. The operation took place on the tenth day after her admission. Total proctocolectomy with a permanent ileostomy was done in one stage. Postoperatively the patient's condition improved and her fever subsided. She was discharged four weeks after operation. Now, five years after operation, she feels well and has no gastrointestinal symptoms.

Patient 4: A 23-year-old woman was admitted to our department with severe ulcerative colitis, which she had had since she was 12 years old. At the age of 14 years she had undergone ileostomy (without resection of the colon) in another hospital. Since then, for nine years, she had been well and had not had diarrhea. When she was 23 years old forceps delivery of her first child was followed by worsening of the disease. Soon after delivery she had colicky abdominal pains, rectal bleeding, diarrhea, and loss of weight. After conservative treatment with Azulfidine and steroids, her condition improved and she was sent home; however, she

continued to have diarrhea and rectal bleeding and to lose weight. A year and a half after the birth of the child she was again admitted because of deterioration of her condition and it was decided to operate. A total proctocolectomy was performed in one stage. The patient's condition improved postoperatively and she was discharged a fortnight later. Now, six years after operation, she feels well and has no symptoms related to the gastrointestinal system.

Comment. The last two cases illustrate the failure of long-term conservative therapy and the effectiveness of radical surgery in contrast to partial resection. The case of Patient 4 demonstrates that diversion ileostomy is not a sufficient operation and should be regarded as a temporary palliative procedure only. Both cases are also interesting because of the early ages at which the disease began and the stormy courses after giving birth. This relationship is described by de Dombal and associates.[3] In our two cases the relationship to childbirth was so clear that it could not have been coincidental.

Patient 5: A 34-year-old man was admitted to the hospital in 1967 because of severe ulcerative colitis. He had had the disease since the age of 23 years, and had been treated with Azulfidine, various other sulfa drugs, antibiotics, and steroids. In spite of this treatment he had suffered continually from bloody–mucous diarrhea, as many as 15 times a day, associated with colicky abdominal pain and tenesmus. At the age of 30 years the patient had refused to undergo elective resection of the colon, which had been proposed to him.

He was admitted on this occasion because of deterioration of his condition. He was treated in a medical ward with ACTH, Meticorten, tincture of opium, and papaverine, but his condition continued to worsen. The diarrhea continued, the temperature rose to 100.4 F, and the patient had tachycardia of 120/min. A barium-enema study confirmed the diagnosis but did not reveal signs of toxic dilatation of the colon. Two days after the barium-enema studies, on the seventeenth day of hospitalization, his condition suddenly worsened, with abdominal distention, tenderness, and signs of peritoneal irritation. The temperature rose to 102.2 F and the pulse to 140/min. Perforation of the colon was suspected, and an immediate operation disclosed severe peritonitis as a result of perforation of the colon. The entire colon was dilated, with signs of severe inflammation. One-stage total proctocolectomy was performed. The postoperative course was stormy, with signs of severe peritonitis, septic fever, and paralytic ileus. In spite of the administration of massive doses of several types of antibiotics, the patient's condition continued to deteriorate, and he died 20 days after operation.

Comment. This patient was operated upon too late, because he refused operation when his condition was reasonably good. Sixteen days of treatment of fulminating ulcerative colitis by conservative means, as occurred in this case, is far too long and dangerous. Barium-enema studies in the acute stage, even when there is not yet toxic dilatation, constitute an additional mistake. That the perforation occurred two days after these studies suggests that they accelerated its appearance. The administration of tincture of opium and papaverine during the acute stage is considered another mistake. The administration of steroids as a trial of conservative therapy was justified, but considering that this patient had previously received steroids, it was only to be expected that there would be no dramatic improvement. The patient should have been persuaded to agree to an operation at an earlier stage. We are unable to conclude whether the steroids hastened the appearance of the perforation, but probably they made its diagnosis more difficult at a critical moment.

Patient 6: A 38-year-old woman was admitted because of diarrhea as many as 15 times a day, loss of weight, and general weakness of 6 months' duration. Rectoscopy and barium-enema studies confirmed the diagnosis (Fig. 3). Blood and stool cultures were negative. The patient was treated with Azulfidine, infusions of ACTH, and antibiotics, with a good result. The infusions were discontinued and she was given Meticorten, 60 mg/day. After several days her condition suddenly deteriorated; the diarrhea worsened, there was a septic fever, and hemoglobin decreased to 8 g/100 ml. Despite treatment with intravenous fluids, blood, massive doses of antibiotics, and ACTH, her condition continued to deteriorate. She had abdominal distention, and a plain roentgenogram of the abdomen showed marked dilatation of the large intestine, especially the sigmoid colon (Fig. 4). Total proctocolectomy was performed in one stage.

The postoperative course was stormy. The patient lost an enormous amount of fluids and electrolytes through the ileostomy. She had hypokalemia, with a value of 2.6 mEq/l, and also hypoproteinemia. The high fever continued despite administration of antibiotics in large doses, and she had muscle twitching related to the electrolyte imbalance.

To correct fluid, electrolyte and acid–base imbalance, as much as 7 liters per day of fluids and colloids was administered, in addition to calcium, magnesium and vitamins. Steroids were administered in steadily-decreasing doses and were eventually discontinued. Within a few days the patient's condition began to improve, the temperature dropped, the twitching and diarrhea ceased, and she began to take nourishment by mouth. She was discharged three weeks after operation. Now, a year after operation, she feels well, works, and has gained weight. She has no symptoms connected with the gastrointestinal system.

Comment. This case illustrates the postoperative difficulties associated with this disease, even when the surgical treatment has been performed well and in time. The disturbance in fluids, electrolytes, and acid–base balance in these cases is delicate and demands constant attention. The administration of steroids complicates the picture even more.

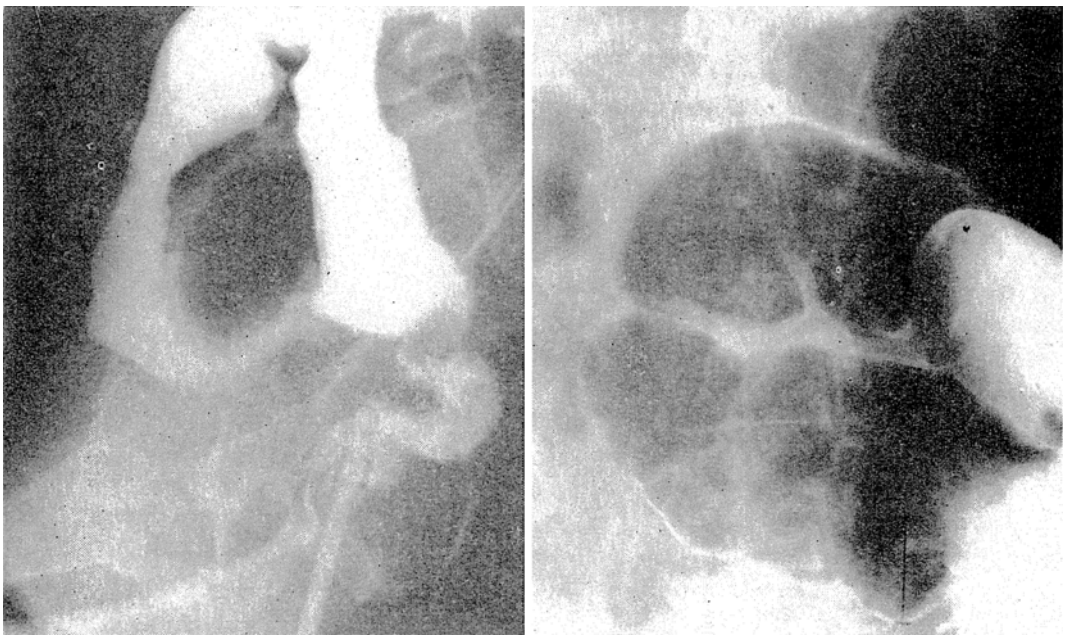

FIG. 1 *(left)*. Barium-enema study of Patient 2. Severe proctitis. The inflammatory process extends into the sigmoid region.

FIG. 2 *(right)*. Segmental toxic dilatation of the colon (sigmoid region) in Patient 2 (diameter of the distended loop, 10 cm).

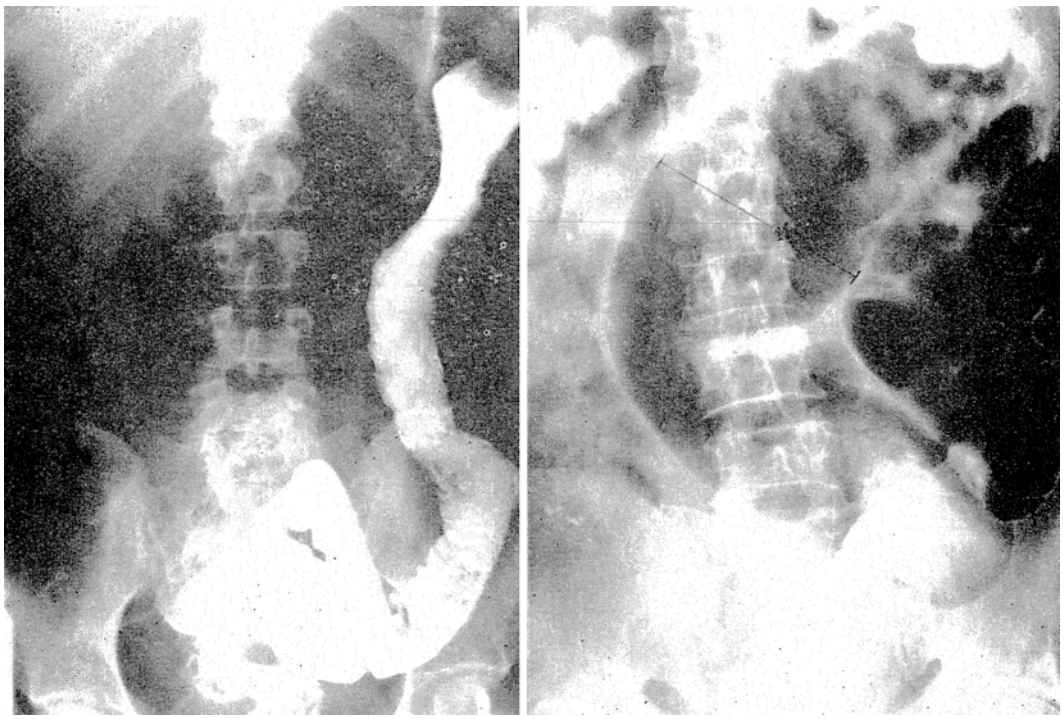

FIG. 3 *(left)*. Barium-enema study of Patient 6. Severe ulcerative colitis.

FIG. 4 *(right)*. Toxic dilatation of the colon in Patient 6 (diameter of the distended loop, 11 cm).

Discussion

The first reports of fulminating ulcerative colitis, in 1933, 1937, and 1941, were case reports published at the Massachusetts General Hospital. In 1951, Madison and Bargen[11] described the clinical picture of the disease and the x-ray appearance of toxic dilatation of the colon. Larger series of cases were described, beginning in 1955, by McConnell and associates,[13] Roth and associates,[22] Marshak and associates[12] and Peskin and Davis.[19] Nowadays, this form of ulcerative colitis is well known in the literature, but it is still considered a rare complication of the disease. Edwards and Truelove[6] found this complication in 1.6 per cent of a series of 624 patients with ulcerative colitis. McInerney and associates[15] came across it in 2.4 per cent of a series of 1,230 cases.

Three special complications are known in ulcerative colitis: 1) perforation, 2) massive hemorrhage, and 3) toxic dilatation (toxic megacolon). It is not possible to distinguish between these complications as separate entities. The state of toxic dilatation is considered to be one of impending perforation.[7, 15] Massive hemorrhage may appear during the stage of toxic dilatation. Thus, it is more logical to include the above complications under the collective name of "fulminating ulcerative colitis."

The factor that causes the development of this form of the disease is unknown. A number of precipitating factors are described in the literature. Several authors[8, 18, 24] find a relationship between the administration of opiates and the development of toxic megacolon, but this relationship is not conclusive, and considering the fact that almost every patient with diarrhea receives tincture of opium or codeine at some stage of the disease, we would expect to meet this complication far more often than it actually appears. Anticholinergic drugs and hypokalemia are recognized to be provoking factors because of their effects in lessening the muscle tone of the intestine.[10, 17] However, the frequency of administration of anticholinergics and the incidence of hypokalemia in this disease are so great that we do not believe there is a direct relationship.[15, 21] It is clear, however, that toxic dilatation is worsened by hypokalemia and by anticholinergics, and recent reports[9, 17] suggest that anticholinergic drugs and opiates not be given in the acute phases of ulcerative colitis. This recommendation still is not known to many physicians, as indicated by the fact that these drugs are still widely used for symptomatic relief of diarrhea. Distal obstruction of the colon has been described as a possible accelerating factor in the development of toxic megacolon. McInerney and associates[15] deny the existence of this relationship, but the case of patient 2, above, is very instructive in that the disease had its onset following excision of an anal fissure, suggesting a possible relationship.

There is controversy in the literature as to the advisability of administering steroids in the acute phase of ulcerative colitis. Those against their administration maintain that they may accelerate the development of toxic dilatation and encourage perforation.[7, 15, 18, 21] A second group considers that steroids are essential as a last attempt to avoid an urgent and radical operation, and recommends that they be given in large doses.[9, 10, 17] This applies especially to a first attack, and also when the patient has not received steroids previously.[2]

Barium-enema studies, when performed in the acute phase, are considered to be a further accelerating factor in the development of toxic megacolon.[7, 9, 17, 18, 24] Foley and associates[7] stress that in the acute phase barium-enema studies are not needed to confirm the diagnosis; a plain roentgenogram of the abdomen is sufficient. Moreover, Jalan and associates[9] describe two cases of perforation of the colon which occurred a few days after barium-enema studies, as in the case of Patient 5, above. Despite all the above-mentioned experience, this examination continues to be performed during the

acute phase of the disease, and we, too, made this mistake. Although the relationship between barium-enema studies and the development of toxic megacolon has not been sufficiently explained and is not certain, it is desirable to refrain from performing this examination during the acute phase.

de Dombal and associates[3] find a clear relationship between pregnancy and worsening of disease in women who have ulcerative colitis. There are not enough data in the literature concerning this point, and this relationship is not certain. However, this possibility cannot be ruled out, as was shown by the cases of Patients 3 and 4, above.

McInerney and associates[15] deny the existence of a relationship between most of the above factors and the development of dilatation. According to them, this complication is due to the propagation of the ulcerative and inflammatory process in the colon and its penetration of the muscular layers. Muscle destruction, its replacement by granulation tissue, and severe inflammatory infiltration which develops in this layer are the factors causing atony of the bowel and development of severe inflammatory penetration around the nerve plexus of Auerbach. This does not appear in ordinary colitis, only in fulminating colitis.[15, 21]

The symptoms and signs of fulminating ulcerative colitis are diarrhea, pain, anorexia, loss of weight, fever, and tachycardia. The abdomen may be distended, with diffuse tenderness and diminished bowel sounds.

Characteristically the clinical picture and the severity of disease are disproportionate[9, 15, 17]: the diarrhea may lessen during the development of megacolon, but this indicates deterioration, not improvement. The degree of fever does not clearly parallel the severity of disease. The degree of tachycardia is a better indicator. The tachycardia continues even when the electrolyte and fluid balance has been corrected. It is probably related to the increased absorption of toxins through the damaged intestine. Abdominal distention and tenderness are not especially noticeable, and there is a disproportion between the relatively mild abdominal distention and the massive dilatation of the colon visible on plain roentgenograms.[7] For this reason, physical examination cannot be relied upon and plain roentgenograms of the abdomen should be repeated to evaluate the severity of the situation. Moreover, steroids mask the picture, and sometimes a silent perforation, which is discovered only after a few days, may develop. Jalan and associates[9] describe 16 cases of perforation in their series. Only seven of these were diagnosed clinically; the others were diagnosed at operation or at autopsy.

Laboratory investigation shows that 80 per cent of the patients are anemic and have low serum protein.[9] Seventy-five per cent are dehydrated and have low electrolyte values,[1, 5] but these values do not reflect the severity of disease or prognosis. There is a great loss of electrolytes and proteins in the diarrheic stools and also into the dilated intestinal lumen. Duthie and associates[5] showed that a colon damaged by severe ulcerative colitis absorbs only 5 per cent of sodium compared with a normal colon. Protein loss can reach 50 g per day.[9] The magnesium loss is large, because 70 per cent of magnesium is absorbed in the colon.[5]

The appearance of the colon on plain roentgenograms of the abdomen is not only diagnostic in the toxic phase, but is also the best index of the severity of disease.[7, 13, 23] The diameter of the normal colon, as thus visualized, does not usually exceed 5–6 cm,[17, 22] and the widest part, the cecum, can reach 8 cm. Toxic dilatation of the colon in ulcerative colitis can involve the whole colon, or it may be segmental, with only one segment of the colon dilated. The first sign of dilatation is the appearance of a loop of colon wider than the cecum. The dilated segment may attain a diameter of 17 cm, but the average is about 9–10 cm.[15] Segmental dilatation most commonly involves the transverse colon, but the descending and sigmoid

colon are often affected, as in the cases of Patients 2 and 6. The severity of disease can be estimated by repeated measurements of the diameter of the widest loop. The appearance of a subserosal radiolucent line paralleling the colon is a bad prognostic sign. According to Simon and associates,[23] this line is caused by penetration of gas from the lumen into the wall of the colon as a result of the deepening of the ulcerative and inflammatory process. It is evidence of imminent perforation.[7] Other bad prognostic signs are thickening of the intestinal wall, the appearance of ascites, and the appearance of signs of paralytic ileus with dilatation of the small intestine and stomach.

The x-ray appearance of ulcerative colitis has been well described.[13, 23]

Concerning treatment, many investigators have recently begun to support the view that fulminating ulcerative colitis is a surgical condition, and that the patients should be operated on as early as possible, before the development of irreversible complications. In earlier series,[15, 22] the authors supported long-term conservative treatment, based on decompression and replacement and supportive therapy. This approach was acceptable because of the high mortality, as much as 75 per cent, associated with surgical treatment.[15, 18] Now, with improved surgical technics, the mortality rate has decreased, and the earlier the operations are performed, the lower the mortality rate.[2, 7, 9] Some investigators hold the extreme view that every patient who has toxic dilatation should undergo a mandatory operation,[19, 20] but most support a short attempt at conservative treatment,[2, 9, 14, 17, 18] to tide the patient over the acute phase and to permit later elective operation. Conservative treatment should not continue for more than a few days (two days according to Collier[2] and Foley and co-workers[7]: four to five days according to Neschis and associates.[17]) If decompression of the dilated colon does not occur within this time, there is an urgent need for immediate operation. Attempts at decompression by enemas or sigmoidoscopy do not succeed in these cases.[2] The administration of large doses of steroids in a short time as a trial of conservative therapy is recommended. This treatment may bring about a dramatic improvement within 48 hours, and is especially worthwhile for patients who have not previously received steroids.[2, 9] The supporters of this treatment deny that the steroids may accelerate perforation.

Unfortunately, the above-mentioned experience concerning the urgent need for operation is not sufficiently appreciated among physicians, and we still see long-drawn-out attempts at conservative therapy, which more than once have ended in disaster. This occurred in the case of Patient 5 of our series.

Opinions concerning the best operation have recently changed. In the past, a limited procedure such as colostomy or diverting ileostomy[15, 21] was recommended, to overcome the acute phase and permit elective resection of the colon later. Now it is known that the colon itself is the source of the disease and the direct cause of the toxic state, and thus the patient continues to suffer if the colon has not been removed. There is no justification for partial resection, as done in the cases of Patients 1, 2, and 4; such resections are more dangerous than a large operation performed in one stage. Many surgeons emphasize this point.[2, 7, 9, 16, 18, 20]

It was recommended in the past that the rectal stump be left at the time of operation, in the hope that an anastomosis could be performed at a future date, sparing the patient the discomfort associated with permanent ileostomy. This view has also recently been rejected. It has been proved that the disease affects the rectal stump, causing disturbances in the blood supply and in the production of collagen in the rectal wall.[4, 18] Thus, anastomosis between the rectum and another segment of intestine endangers the patient because of the possibility of leakage

(Patient 1). Moss and Keddie[16] in their survey of 93 patients in whom the rectal stumps were left, found that the disease usually continued after resection of the colon; 67 of the patients (72 per cent) needed further operations to remove the stumps.

To this day, fulminating ulcerative colitis endangers the life of every patient who has it. The most common methods of treatment are fraught with pitfalls. Many mistakes arise from feelings of "mercy" towards the patient and excessive optimism of physicians. The tendency of surgeons to shy away from mutilating procedures, especially when treating young patients, is understandable. The avoidance of these mistakes to save the life of the patient is a challenge. It should be remembered that patients with fulminating ulcerative colitis usually arrive at operation in a critical state, and the aim of the surgeon should be to "save the patient's life and not the colon."[18]

Summary

The management of fulminating ulcerative colitis remains difficult and controversial. Six cases, illustrating the therapeutic pitfalls and common surgical mistakes, are presented.

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