Fulminant ulcerative colitis is a potentially life-threatening disorder that must be expertly managed if optimal outcomes are to be achieved. This condition was once associated with a very high mortality, but medical and surgical treatments have improved dramatically, to the point where the mortality associated with fulminant ulcerative colitis is now lower than 3%. Optimal management depends on close coordination between medical and surgical therapy, and multidisciplinary strategies are essential.

Classification

The most commonly applied system of classifying the severity of ulcerative colitis has been the one devised by Truelove and Witts, who identified clinical parameters by which colitis could be categorized as mild, moderate, or severe. The Truelove-Witts classification does not, however, specify a unique category for fulminant disease. Accordingly, Hanauer modified this classification scheme to include a category for fulminant colitis (Table 1).

Unfortunately, there is no universally agreed upon distinction between severe ulcerative colitis and fulminant ulcerative colitis. Some authors use the terms severe and fulminant interchangeably, whereas others, concerned about the lack of a clear distinction between the two, recommend that the term fulminant ulcerative colitis be avoided altogether. This latter recommendation has not been widely followed: the term fulminant ulcerative colitis remains an established component of the medical vernacular, the absence of a clear definition notwithstanding.

Fulminant ulcerative colitis is certainly a severe condition that is associated with systemic deterioration related to progressive ulcerative colitis. Most authorities would agree that a flare of ulcerative colitis can be considered fulminant if it is associated with one or more of the following: high fever, tachycardia, profound anemia necessitating blood transfusion, dehydration, low urine output, abdominal tenderness with distention, profound leukocytosis with a left shift, severe malaise, or prostration. Patients with these symptoms should be hospitalized for aggressive resuscitation while clinical assessment and treatment are being initiated.

Clinical Evaluation

When a patient is admitted with severe or fulminant ulcerative colitis, a complete history and a thorough physical examination are required. The abdominal examination should focus on signs of peritoneal irritation that may suggest perforation or abscess formation. Any patient admitted with severe ulcerative colitis may have already received substantial doses of corticosteroids, which can mask the physical findings of peritonitis.

Investigative Studies

LABORATORY TESTS

Initial laboratory studies should include a complete blood count with differential, a coagulation profile, and a complete metabolic profile with assessment of nutritional parameters (e.g., serum albumin concentration). Multiple stool specimens should be sent to be tested for *Clostridium difficile*, cytomegalovirus, and *Escherichia coli* 0157:H7. It is important to rule out the presence of opportunistic infections, particularly with *C. difficile*, even in patients with an established diagnosis of ulcerative colitis; superinfection with *C. difficile* is common in such patients.

IMAGING

Abdominal films and an upright chest x-ray should be obtained to look for colonic distention (indicative of toxic megacolon) and free intraperitoneal air (indicative of perforation).

Endoscopic evaluation of the colon and rectum in the presence

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Criteria for Evaluating Severity of Ulcerative Colitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Mild Disease</td>
</tr>
<tr>
<td>Stools</td>
<td>&lt; 4/day</td>
</tr>
<tr>
<td>Blood in stool</td>
<td>Intermittent</td>
</tr>
<tr>
<td>Temperature</td>
<td>Normal</td>
</tr>
<tr>
<td>Pulse</td>
<td>Normal</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>Normal</td>
</tr>
<tr>
<td>Erythrocyte sedimentation rate</td>
<td>≤ 30 mm/ hr</td>
</tr>
<tr>
<td>Colonic features on radiography</td>
<td>Air, edematous wall, thumbprinting</td>
</tr>
<tr>
<td>Clinical signs</td>
<td>Abdominal tenderness</td>
</tr>
</tbody>
</table>
Management of Fulminant Ulcerative Colitis

Patient has severe or fulminant ulcerative colitis

Perform history and physical examination. Abdominal examination focuses on peritoneal signs (sometimes masked by corticosteroid therapy). Order investigative studies:
- Laboratory tests: CBC with differential, coagulation profile, metabolic profile, stool testing (for C. difficile, CMV, E. coli)
- Imaging: abdominal films, chest x-ray, colonoscopy (for minimum necessary distance)

Hospitalize patient. Give blood products to treat anemia or coagulopathy. Correct metabolic derangements. Optimize nutritional status (e.g., via bowel rest and TPN).

Patient is stable and has no indications for emergency surgery

Initiate I.V. corticosteroid therapy (e.g., methylprednisolone, 40–60 mg/day I.V.)

Patient is unstable or has indication for emergency surgery (e.g., findings suggestive of perforation, massive GI bleeding, or toxic megacolon)

Choose all-at-once or staged approach on the basis of experience and clinical judgment. Most patients who do not respond to maximal medical therapy are probably best treated with a staged procedure.

Colitis does not respond to I.V. corticosteroid therapy within 5–7 days

Cyclosporine therapy is not contraindicated

Initiate I.V. cyclosporine therapy, initially 4 (or 2) mg/kg/day I.V., adjusted as necessary.

Colitis does not respond to I.V. cyclosporine therapy within 4–5 days or complete remission is not achieved within 10–14 days

Cyclosporine therapy is contraindicated (e.g., because of renal insufficiency, hypocholesterolemia, sepsis, or patient refusal)

Patient is unstable or has indication for emergency surgery (e.g., findings suggestive of perforation, massive GI bleeding, or toxic megacolon)

Initiate surgical treatment. Consider laparoscopic-assisted approach as an option (except in cases of toxic megacolon).

Patient is healthy enough to undergo full procedure at once

Perform proctocolectomy with ileoanal anastomosis.

Patient has perforation, peritonitis, or sepsis

Perform a staged procedure (abdominal colectomy with ileostomy, followed later by proctectomy with ileoanal anastomosis).

Patient does not have obvious perforation, peritonitis, or sepsis but may not be healthy enough to undergo full procedure at once

Choose all-at-once or staged approach on the basis of experience and clinical judgment. Most patients who do not respond to maximal medical therapy are probably best treated with a staged procedure.
of fulminant ulcerative colitis is a controversial measure.\textsuperscript{14-16} Undoubtedly, colonoscopy with biopsy can provide useful diagnostic information in this setting, and numerous reports indicate that in experienced hands, colonoscopy poses little risk to patients with severe colitis.\textsuperscript{14,15} In general, however, it is recommended that endoscopic examination proceed no further than the minimum distance necessary to confirm severe colitis. If an endoscopic examination is to be performed, insufflation of air must be minimized; overdistention of the colon may lead to perforation or the development of megacolon. In addition to diagnostic information, endoscopy can provide useful prognostic information. In one study, the presence of deep, extensive colonic ulcerations indicated a low probability for successful medical treatment of fulminant ulcerative colitis: fewer than 10\% of patients with such ulcerations responded to medical measures.\textsuperscript{14} Thus, an endoscopic finding of deep ulcers [see Figure 1] may facilitate the decision to proceed with early operative treatment if medical therapy does not lead to rapid and significant improvement.

Management

GENERAL CARE

All patients with fulminant ulcerative colitis should be hospitalized. Blood products should be administered to treat significant anemia or coagulopathy. Metabolic derangements should be corrected.\textsuperscript{17} Patients with a perforation or massive lower GI hemorrhage are taken to the operating room for emergency surgical treatment; more stable patients are initially managed with medical therapy. Narcotics, antidiarrheal agents, and other anticholinergic medications should be avoided because they can precipitate toxic dilation of the colon.

Bowel rest typically reduces the volume of diarrhea, but whether it affects the clinical course of the fulminant colitis remains to be established.\textsuperscript{18,19} One study of patients with acute flares of ulcerative colitis reported no significant difference in outcome between those who were managed with total parenteral nutrition (TPN) and bowel rest and those who received enteral nutrition. This study, however, included patients with colitis of varying degrees of severity, and apparently, only a small number of them had fulminant ulcerative colitis.\textsuperscript{19} A subsequent study found that bowel rest and TPN did have a potential clinical advantage in patients with fulminant ulcerative colitis.\textsuperscript{18} The most common approach to nutritional management of these patients is first to place them on bowel rest with hyperalimentation, then to initiate oral feeding once the symptoms of the fulminant attack begin to be alleviated. Whether patients are being maintained on bowel rest or are receiving oral feedings, adequate nutritional support must always be ensured. Hence, TPN, if employed, should be maintained until the patient is receiving and tolerating full enteral feedings.

MEDICAL THERAPY

The standard medical approach to fulminant ulcerative colitis involves induction of remission by means of I.V. corticosteroid therapy, followed by long-term maintenance treatment (in the form of purine analogues) once remission has been achieved. If treatment with steroids fails to induce remission, I.V. cyclosporine therapy is considered.

Steroids

For decades, steroid treatment has been the frontline therapy for acute flares of ulcerative colitis. Response rates in cases of fulminant ulcerative colitis range from 50\% to 60\% when the steroids are given over a period of 5 to 10 days.\textsuperscript{20,21} Methylprednisolone, 40 to 60 mg/day in a continuous I.V. infusion, is a common regimen.\textsuperscript{5,22-24} This 5-day rule has been widely adopted, but more recent experience suggests that steroids can be safely administered for as long as 7 to 10 days to allow patients more time to respond.\textsuperscript{12} Patients who respond to I.V. therapy are switched to an oral steroid regimen (typically prednisone). It is important, however, to stress that corticosteroids should never be employed as long-term maintenance therapy.\textsuperscript{5,26} The toxic effects of corticosteroids are related to not only the dosage but also the duration of treatment. Severe complications are common with extended use of even modest doses of steroids. Accordingly, patients should be slowly but completely weaned from steroid therapy. Because symptomatic colitis recurs in 40\% to 50\% of patients who initially respond to I.V. therapy, maintenance therapy with either purine analogues or immunosalicylates should be instituted.\textsuperscript{5,20}

Unfortunately, corticosteroid dependency is frequently encountered in patients with ulcerative colitis. Often, the steroid dosage cannot be tapered without an increase in disease activity and exacerbation of symptoms. In such cases, if the patient cannot be weaned from steroids and switched to purine analogues within 3 to 6 months, surgical consultation is indicated. In addition, if complications related to ulcerative colitis or to corticosteroid therapy develop, the colitis must be treated surgically.

\textbf{Figure 1} Sigmoidoscopy demonstrates deep ulcerations in a patient with fulminant ulcerative colitis.
Cyclosporine

At one time, patients who did not respond to I.V. corticosteroid treatment were invariably referred for surgical treatment. Currently, such patients are most often treated with I.V. cyclosporine therapy. Cyclosporine is an immunosuppressant macrolide that suppresses the production of interleukin-2 by activated T cells through a calcineurin-dependent pathway. Originally employed to prevent tissue rejection after transplantation, cyclosporine has become the standard treatment of steroid-refractory severe ulcerative colitis.

The first report of the use of cyclosporine to treat ulcerative colitis was published in 1984. It was not until 10 years later, however, that a randomized, placebo-controlled trial of cyclosporine therapy for steroid-refractory ulcerative colitis convincingly demonstrated the effectiveness of cyclosporine in this setting. In this trial, patients with steroid-refractory ulcerative colitis who received cyclosporine (4 mg/kg) had an 82% response rate, compared with a 0% response rate in those treated with continued I.V. steroid therapy alone. Since this initial report, response rates ranging from 56% to 91% have been reported in the medical literature, confirming cyclosporine as a major advance in the treatment of severe and fulminant ulcerative colitis.

The beneficial effects of cyclosporine therapy are not always durable: as many as 60% of patients experience recurrence of disease after initial cyclosporine-induced remission. Fortunately, recurrence rates can be substantially lowered by means of maintenance therapy with 6-mercaptopurine (6-MP) or azathioprine. With appropriate maintenance therapy, the rate of early recurrence of symptoms after successful I.V. cyclosporine treatment may be reduced to levels as low as 22%. Even if the disease does recur, the initial success of cyclosporine therapy in aborting the acute phase of the ulcerative colitis allows patients to recover from the acute illness, so that they are in better condition to undergo elective surgical treatment at a later date if such treatment ultimately proves necessary. This is a major benefit, in that operative management of ulcerative colitis carries a much higher risk of complications when carried out on an urgent basis than when carried out in an elective setting.

The major side effects of cyclosporine treatment are renal insufficiency, opportunistic infections, and seizures. The risk of seizures appears to be highest in patients with hypocholesterolemia. Consequently, cyclosporine should not be given to patients with significant hypocholesterolemia (serum cholesterol concentration < 100 mg/dl). Hypomagnesemia is commonly seen in patients with fulminant ulcerative colitis who undergo cyclosporine treatment; accordingly, serum magnesium levels should be closely followed. Dosing regimens for cyclosporine vary. The typical starting dosage is 4 mg/kg/day I.V., which is then adjusted to achieve a whole-blood level between 150 and 400 ng/ml, as measured by high-power liquid chromatography or radioimmunoassay. Whole-blood levels as high as 800 ng/ml are considered acceptable by some investigators. If the patient shows no improvement within 4 to 5 days or if complete remission is not achieved by 10 to 14 days, surgical treatment is advised. Most of the side effects of cyclosporine therapy are dose dependent. Studies have shown that an initial dosage of 2 mg/kg/day I.V. can also be effective in achieving remission. Some physicians prefer to begin at this lower dosage and then increase it as necessary on the basis of the measured cyclosporine levels.

Concerns have been raised about the possibility that prolonging medical therapy in patients with severe colitis who have already received large amounts of corticosteroids may increase the risk of perioperative morbidity and mortality in those who respond to neither steroids nor cyclosporine therapy and thus require operative management. At present, however, there is no evidence that patients who do not respond to cyclosporine therapy are at increased risk for perioperative complications; such therapy does not appear to compromise surgical results.

Surgical Treatment

Indications

Indications for surgical treatment of fulminant ulcerative colitis have been established [see Table 2]. One such indication, of course, is the exhaustion of options for appropriate medical treatment. Because most patients with fulminant ulcerative colitis respond to aggressive medical therapy, such treatment is warranted in almost all cases. Care must be exercised, however, not to overtreat patients with fulminant ulcerative colitis who are otherwise stable. The immunosuppressive effects of high-dose corticosteroids and I.V. cyclosporine, along with the debilitation induced by prolonged severe disease, can place patients at high risk for perioperative complications. Patients who do not show significant improvement in response to I.V. steroid therapy within 5 to 7 days should be started on I.V. cyclosporine therapy or referred for operative treatment. Those who do not respond to cyclosporine therapy within 4 days or in whom remission of major symptoms is not achieved within 2 weeks should be treated surgically. Patients whose symptoms progress during the course of I.V. therapy or who show no sign of improvement at all should be considered for early surgery. Patients known to have deep longitudinal ulcerations are less likely to respond to I.V. medical therapy and thus may also be referred for early surgery. The decision regarding when to abandon medical therapy for fulminant ulcerative colitis in favor of surgical therapy is difficult and requires considerable experience and special expertise. Accordingly, patients with fulminant ulcerative colitis are best managed in a center specializing in inflammatory bowel disease.

Patients with perforation or severe GI bleeding require urgent surgical treatment. The debilitation resulting from the disease, coupled with the immunosuppression resulting from intensive medical therapy, can mask the signs and symptoms of sepsis and peritonitis associated with perforation. Perioperative mortality in cases of fulminant colitis is as much as 10 times higher when perforation occurs than when it does not. For this reason, patients with high fever, marked leukocytosis, and persistent tachycardia should be referred for early surgery, regardless of whether other indications of perforation or peritonitis are noted.

Toxic megacolon, though an uncommon complication of severe ulcerative colitis, is important in that it is associated with impend-
ing colonic perforation and therefore must be watched for and aggressively managed if present. Two specific conditions must be satisfied to establish the diagnosis of toxic megacolon. First, there must be colonic dilatation; second, the patient must be in a toxic state. Patients with mild symptoms of ulcerative colitis may experience a degree of colonic dilatation, perhaps in conjunction with colonic ileus. This condition is distinctly different from and considerably less worrisome than toxic megacolon. Patients admitted to the hospital with fulminant ulcerative colitis will, by definition, exhibit some degree of toxicity. Colonic dilatation in these patients is a very worrisome phenomenon, in that it completes the picture of toxic megacolon. Accordingly, in all patients with fulminant ulcerative colitis, an abdominal x-ray should be obtained to look for colonic dilatation. Those in whom abdominal distention develops or who experience a sudden decrease in the number of bowel movements without signs of significant clinical improvement should also be assessed for colonic dilatation and toxic megacolon.

In patients with toxic megacolon who are otherwise stable, conservative management, consisting of elimination of narcotics and anticholinergic agents, may be briefly tried. Changes in patient position may be tried as well: moving the patient from side to side, from supine to prone, and into the knee-elbow prone position is thought to facilitate expulsion of colonic gas. Patients with toxic megacolon should be kept on a nilh. per os (NPO) regimen, and broad-spectrum I.V. antibiotics should be given. Endoscopic decompression is to be avoided. Blind placement of rectal tubes is ineffective and may be harmful. Patients who do not rapidly respond to conservative management and those who show signs of peritonitis or are otherwise unstable require urgent surgical treatment.

**Preparation for Operation**

With patients who are stable but are not responding to medical therapy, there may be time for preoperative preparation. Patients who are not on NPO status should be maintained on clear liquids, then kept on an NPO regimen for 6 to 8 hours before operation. On occasion, a patient may be able to tolerate mild bowel preparation with either polyethylene glycol or Fleet Phospho-soda (Fleet Pharmaceuticals, Lynchburg, Virginia). Any bowel preparations that are used need be employed only until bowel movements are free of residue. If time allows, the patient should be counseled by an experienced enterostomal therapist, and an optimal site for the ostomy should be marked on the abdomen. Prophylactic antibiotics should be given before the the surgical incision is made, and appropriate stress-dose steroids should be administered.

**Surgical Strategies**

The operative strategies for treating fulminant ulcerative colitis are controversial. Ultimately, almost all patients end up undergoing a restorative proctocolectomy with ileoanal anastomosis [see 5:33 Procedures for Ulcerative Colitis]. In most cases, however, the final surgical goal is achieved in multiple steps. Performing an extensive resection in conjunction with a prolonged and delicate reconstruction in an acutely ill patient is a procedure of questionable safety. Accordingly, many surgeons elect first to perform a total abdominal colectomy with an ileostomy, leaving the rectal stump as either a Hartmann pouch or a mucous fistula, then to perform a restorative proctectomy with ileoanal anastomosis at a later date. This staged approach allows the patient to recover from the acute illness, to be weaned from immunsuppressive agents, and to achieve improved nutritional status. Although the remaining rectal stump continues to be affected by ulcerative colitis, the fecal diversion greatly diminishes disease activity, so that almost all patients can be completely weaned from steroids and other immunsuppressive medications. It is then possible to perform the proctectomy with ileoanal anastomosis in more controlled conditions.

The exact circumstances in which it is best to follow a staged approach have not been clearly defined. It is universally accepted that a staged procedure is mandatory in patients with perforation, peritonitis, or sepsis, but beyond this point, there is no clear consensus. The studies published to date have been inconclusive on this issue: either they included only a small number of patients, they did not clearly define what constituted fulminant colitis, or they did not directly compare the results of the two alternative strategies (i.e., staged colectomy and immediate ileoanal anastomosis). A 1995 study reported excellent long-term results and acceptable short-term morbidity in 12 patients undergoing immediate restorative proctocolectomy with ileal pouch–anal anastomosis (IPAA) for fulminant colitis. These 12 patients, however, represented an extraordinarily small percentage of the total number of ileoanal procedures performed by the authors. In addition, this study used a somewhat liberal definition of fulminant colitis and thus might have included a number of cases that would not have qualified as fulminant colitis—or, possibly, even as severe colitis—according to the criteria cited earlier [see Table 1]. Finally, the study provided no data on the experience of patients undergoing a staged procedure for the management of severe or fulminant colitis.

A 1994 study also reported excellent long-term results and exceptionally low perioperative morbidity in 20 patients undergoing restorative proctocolectomy with IPAA for urgent treatment of ulcerative colitis. Another study from the same year, however, reported a 41% anastomotic leakage rate in 12 patients also undergoing an urgent ileoanal procedure for ulcerative colitis, compared with an 11% leakage rate in patients undergoing ileoanal anastomosis under more controlled conditions. On the basis of these results, the authors counseled against ileoanal anastomosis in the urgent setting. A later study also noted a higher incidence of anastomotic leakage (36%) in patients undergoing urgent ileoanal anastomosis. These authors likewise advised against ileoanal anastomosis in the urgent setting.

The fact of the matter is that the distinction between severe and fulminant ulcerative colitis may be little more than an academic exercise. At one end of the disease spectrum, there is a small subset of patients who have symptoms severe enough to necessitate hospitalization yet are healthy enough to undergo a primary ileoanal anastomosis without undue risk. At the other end of the spectrum, there is a subset of severely ill patients with fulminant colitis for whom a staged procedure is mandatory. The middle of the spectrum remains something of a gray area. Because specific criteria for quantifying the risk have not been defined, the decision whether to follow a staged operative approach ultimately is made on the basis of the experienced surgeon’s clinical judgment. It has been our experience, however, that the majority of patients who fit the criteria of fulminant colitis [see Table 1] and who do not respond to maximal medical therapy are best managed with a staged approach.

**Technical Considerations**

Surgical exploration is performed via either a midline or a transverse incision. The abdomen is carefully examined, with particular attention paid to the small intestine in an effort to detect any signs of Crohn disease. The colon often shows the changes typical of colitis: serosal hyperemia, corkscrew vessels, and edema [see Figure 2].
Colectomy may be performed in the standard fashion, with mesenteric division occurring at a convenient distance from the bowel; wide mesenteric resection is not necessary. If a staged colectomy is to be performed, the colon is removed, and the rectum is left either as a Hartmann pouch or as a mucous fistula. In most cases, a Hartmann pouch can safely be created. In the construction of a Hartmann pouch, it is important that the stump be of the appropriate length. If the stump is too short, the proctectomy to be performed in the second stage may prove very difficult; if it is too long, there is an increased risk of complications related to persistent disease in the rectum (e.g., bleeding, discharge, and tenesmus). Ideally, the Hartmann pouch should be made at the level of the sacral promontory \[\text{see Figure 3}\]. During the colectomy, the sigmoid branches of the inferior mesenteric artery should be divided and the terminal branches of the inferior mesenteric artery preserved. This measure ensures a good blood supply to the remaining rectal stump and helps the Hartmann closure to heal. Preservation of the terminal branches of the inferior mesenteric artery and the superior rectal artery also simplifies the subsequent proctectomy by keeping the pelvic sympathetic nerves free of surrounding scar tissue and by providing a key anatomic landmark that will assist the surgeon in locating the appropriate presacral dissection plane for any future planned proctectomy.

To create the Hartmann pouch, the mesenteric and pericolonic fat are removed from the bowel wall for a distance of approximately 2 cm. A transverse anastomosis (TA) stapler loaded with 4.8 mm staples is placed on the prepared bowel and fired to close the pouch. The bowel is then divided proximal to the staple line. The staple line should be closely examined to confirm that the staples are closed properly into two rows of well-formed Bs and that individual staples are not cutting into the muscularis propria of the bowel. To provide additional protection against dehiscence, the staple line may be oversewn with interrupted Lembert sutures \[\text{see Figure 3}\]. If sutures are employed, they should be carefully placed so that the anterior and posterior serosal surfaces are approximated without undue tension. With a well-constructed Hartmann pouch, pelvic drains are unnecessary and may even be harmful, in that they can promote dehiscence if situated close to the suture line.

In some cases, the colon at the level of the sacral promontory is affected by deep ulcerations and severe inflammation, to the point where closure of the Hartmann pouch at this level poses an unac-
ceptably high risk of dehiscence [see Figure 4]. If the severity of disease precludes safe closure of the Hartmann pouch, creation of a mucous fistula should be considered. A mucous fistula requires a longer segment of bowel than a Hartmann pouch does and thus is associated with a higher risk of bleeding from the retained segment. In addition, a mucous fistula is unsightly and often generates a very foul odor. As a compromise approach, some surgeons advocate creating a Hartmann pouch of moderate length and placing the proximal end of the stump through the fascia at the lower edge of the midline incision; the end of the stump is then left buried in the subcutaneous tissue. The benefit of this approach is that if dehiscence of the staple line occurs, any ensuing infection is limited to the subcutaneous space and does not result in an intra-abdominal or pelvic abscess.

If attempts to fashion a secure Hartmann closure fail and the remaining rectal stump is too short to be brought out as a mucous fistula, the proximal rectum should be resected, and closure of the remaining rectal stump is too short to be brought out as a mucous pouch. Such a short Hartmann pouch, however, will be more difficult to locate during the subsequent restorative proctectomy and ileoanal anastomosis.

With a staged colectomy, an end ileostomy is created in the standard fashion [see 5:30 Intestinal Stomas], and the abdomen is closed. Placing a rectal tube to drain rectal secretions may be beneficial in reducing the risk of dehiscence of the Hartmann pouch.

**Laparoscopic Approaches**

Experience has demonstrated that laparoscopic-assisted approaches to abdominal colectomy can be safely employed in patients with ulcerative colitis. Mobilization of the colon and division of the mesentery can be accomplished laparoscopically [see Figure 5], with the specimen being removed through a small Pfannenstiel incision. An end ileostomy can also be fashioned with the aid of inspection through the Pfannenstiel incision. Alternatively, the Pfannenstiel incision can be made early in the procedure and used for placement of a hand port, and the colon can be removed by means of a hand-assisted laparoscopic approach.

Whether a laparoscopic-assisted approach to the management of fulminate ulcerative colitis possesses any significant clinical advantages remains to be determined. However, a growing body of experience with this approach indicates that in experienced hands, laparoscopic-assisted colectomy is a safe and reasonable alternative that may well result in shorter hospital stays and decreased postoperative pain. The laparoscopic-assisted approach may therefore be considered as an option for patients with fulminant ulcerative colitis. Patients with toxic megacolon, however, should be managed by means of an open surgical approach; the instruments used to grasp the bowel in a laparoscopic-assisted colectomy are likely to cause perforation of the severely thinned walls of the dilated megacolon.

**References**