Complications of Ulcerative Colitis *

DAVID BRUCE, M.D., WARREN H. COLE, M.D.

*From the Department of Surgery, University of Illinois,
College of Medicine, Chicago, Illinois*

As IN MANY other diseases, complications are extremely serious in ulcerative colitis and account for most of the deaths. Since our hospital admits only charity patients, one would expect certain of these complications (e.g., malnutrition) to be more common and more severe than in private hospitals. The high incidence of complications may be related to this serious decrement, but in the series reported herein steroid therapy appears to be a more significant cause of some of these complications (e.g., perforation and hemorrhage).

Clinical Material

We have reviewed the charts of all patients admitted to the wards of the University of Illinois Research and Educational Hospitals, Chicago, between January 1, 1946 and August 1, 1961, for in-patient treatment of ulcerative colitis. During this period 118 patients were admitted. Fifty-seven (48.3%) were treated on the surgical service, 30 of these being direct admissions to surgery and 27 being transferred from medicine. Of this group 48 had colectomy; the other nine had had colectomy elsewhere and were admitted because of some complication. In the total group of 57 patients, the average age was 35.8 years and the average duration of the disease was 5.1 years (Table 1).

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Complications

The complications encountered in ulcerative colitis are about as varied and serious as would be encountered in any surgical disease. However, we will devote most of our discussion to the four or five more frequent and serious (e.g., malnutrition, perforation, hemorrhage, and carcinoma).

Malnutrition. The loss of intestinal content from the persistent diarrhea and the decreased intake resulting from the anorexia produce malnutrition in almost every case. The average weight loss of 28.8 pounds exemplifies the intensity of the malnutrition. In our opinion, this decrement (if uncorrected), will markedly increase the operative mortality rate. Accordingly, we make it a rule to obtain a weight gain in all patients preceding operation unless serious complications require emergency operation, or efforts fail because of uncontrolled diarrhea and infection. Hypoproteinemia is perhaps the most important phase of the malnutrition. In general, the albumin should be above 2.5 Gm.% and the total protein above 6.0 Gm.% before operation may be considered safe. In repletion of the patient, transfusions (if indicated, and usually they are) are vital. Since the appetite is often poor, and diarrhea usually increased sharply by an attempt to force oral intake, intravenous therapy will usually be necessary to correct a serious malnutrition. In addition to glucose and amino acids, we have found intravenous fat (Lipomul) very helpful in

correcting the malnutrition. All of our patients were anemic, except those transfused elsewhere before they arrived. The average hemoglobin value was 9.6 Gm. (Table 1).

Acute Perforation. Perforation of the colon and ileum in patients with acute ulcerative colitis is a well known and serious complication. Of the 57 patients on the surgical service, 10 had acute bowel perforations. These 10 patients constitute the total number who perforated in the entire hospital series of 118 cases, since all perforations were sent to the surgical service.

In Table 2 are itemized several details of each of these 10 cases. To our surprise, six had symptoms of less than one year's duration; the remaining four had symptoms of at least five years. As might be expected three of the four deaths encountered in the "perforation series" occurred in the group having ulcerative colitis for five or more years. The age range is from 17 to 65 years; six of the ten were females. All had a significant weight loss since the inception of their disease. Two of the ten had previously had total colectomies, but later had exacerbation of the disease in their terminal ileum with an ileal perforation. All had received medical therapy prior to their admission to the surgical service, and those who had steroid therapy are indicated; this factor is discussed later.

Hemorrhage. Only patients with massive hemorrhage are included in this category. All bled so massively that shock developed, and after transfusions emergency operation was considered essential. The amount of blood given preoperatively (over a 24-hour period) varied between 2,000 and 12,500 cc. (Table 3).

Table 3 gives details of the five patients (in the group of 118) having massive hemorrhage. As with the patients having perforations, all were referred to the surgical service for treatment (Table 4, 5). Each of the five patients had an emergency colectomy and ileostomy; one of them died postoperatively. As may be seen in Table 3, all of them were young with acute disease. Only one of them had symptoms of more than one year's duration. She developed a deep vein thrombosis in her thigh, which was treated with heparin. During this heparinization she began bleeding massively per rectum. She was transferred to the surgical service and was submitted to emergency colectomy. At that time she had been on systemic corticosteroid therapy for 14 weeks. This case illustrates the hazard associated with anticoagulation therapy in a patient with active ulcerative colitis. This hazard is so great that anticoagulants should not be given for thrombophlebitis in ulcerative colitis.

Development of Cancer in the Involved Colon. Three of the 57 treated on the surgical service had cancer in the colon. The lesion in Cases 1 and 2 was detected by barium studies after admission. The three

TABLE 1. *Manifestations in 57 Patients Treated Surgically. (Average for the Series)*

Age	35.8 years
Duration of Colitis	5.1 years
Weight loss	28.8 pounds
Stools per day*	10.2
Anemia—36 of 47 pts.**	
Hemoglobin 10.1 to 12.5 Gm.	21.3% of patients (on admission)
Hemoglobin 8.0 to 10.0 Gm.	40.4% of patients (on admission)
Hemoglobin under 8.0 Gm.	17.0% of patients (on admission)

* Based on 45 patients with no prior surgery.
** Remaining 10 patients of the 47 had been transfused to normal before admission.

TABLE 2. *Details of 10 Patients Having Operation for Acute Perforation*

Case	Age, Sex, Race	Duration Yrs.	Mos.	Wt. Loss (lbs.)	Prior Therapy	Perforation	Surgery	Result
1	29 F W	5	0	60	No steroids	T. Colon	Subtotal Colect.	Died
2	25 M W	10	0	20	Total colectomy No steroids	Ileium	Ileal Resect.	Died
3	30 F W	0	4	20	ACTH 3 wks.	Cecum	Ileost.	Good
4	26 M W	6	0	20	Total colectomy ACTH 3 wks.	Ileum	Ileost.	Good
5	53 M W	0	10	60	No steroids	T. Colon	Subtotal Colect.	Died
6	46 F W	0	9	20	No steroids	T. Colon	Subtotal Colect.	Good
7	32 F W	10	0	30	ACTH 12 wks.	Sigmoid Spl. Flex.	Ileost.	Died
8	17 F W	0	2	40	ACTH 4 wks.	T. Colon	Subtotal Colect.	Good
9	38 F W	0	2	22	Prednisone 3 wks.	Sigmoid	Subtotal Colect.	Good
10	65 M W	0	2	35	Prednisone 4 wks.	Sigmoid	Colostomy	Good

cases constitute an incidence of 5.3 per cent.

A brief description of each case follows:

Case Reports

Case 1. J. G. (No. 302669), was a white man, aged 62. He had been treated elsewhere by sulfonamide drugs and a bland diet for 12 years. He was admitted in 1956 with complaints of three loose stools per day and rectal bleeding. Proctoscopy revealed rectal polyposis, and biopsy of a polyp (pseudopolyp?) revealed adenocarcinoma. The patient refused abdominoperineal resection. The polyp was widely and extensively fulgurated under spinal anesthesia. Patient at last report was living and well, in September, 1960.

Case 2. J. H. (No. 260879), was a white woman, aged 51. She had had ulcerative colitis for 20 years, with ileostomy done elsewhere (without colectomy) eight years prior to admission in 1949, at which time she gave a history of a weight loss of 30 pounds, and rectal bleeding. Exploratory celiotomy during this admission (1957) revealed a large tumor mass in the ascending colon with hepatic meastases. An ascending and transverse subtotal colectomy was done; she expired one year later.

Case 3. D. N. (No. 312824), was a white woman, aged 32. She had had ulcerative colitis for 12 years prior to admission. She was hospitalized 10 times during the first seven years of her illness. Five years prior to admission she had an ileostomy, and four years prior to admis-

TABLE 3. *Details of Five Patients Having Emergency Colectomy for Massive Hemorrhage*

Case	Age, Sex, Race	Yrs.	Mos.	Wt. Loss (lbs.)	Prior Therapy	Result of Surgery
1	18 F W	0	1	15	Prednisone 6 das.—5,000 cc. blood given on day of surgery	Died
2	20 M W	0	3	30	ACTH 4 wks,—4,000 cc. blood given 1 day preop.	Good
2	14 F W	1	0	20	ACTH and cortisone 3 wks. 7,500 cc. blood given 1 day preop.	Good
4	15 F W	0	1	20	No steroids. Given 12,500 cc. blood 1 day preop.	Good
5	27 F W	3	0	68	Prednisone 14 wks. Heparin for vein thrombosis. 2,000 cc. blood preop.	Good

sion she had an ascending and transverse sub-total colectomy, a new ileostomy and a sigmoid colostomy. Upon admission here in 1950, she complained of "swelling" of the sigmoid colostomy. This was diagnosed as a closed loop obstruction. At operation, she was found to have adenocarinoma of the rectosigmoid, invading the rectovaginal septum. She had an abdominoperineal resection and wide excision of recurrent perineal carcinoma; ten months later she had excision of recurrent tumor in the anterior and lateral vaginal walls and a right radical groin dissection yielding one positive node. In 1952, exactly two years after her initial admission, she died.

All of these patients had ulcerative colitis over ten years when cancer developed; two of the three had had diversion operations long before the tumor developed in the "resting" bowel. These data are consistent with the now accepted principles that the risk of malignant change increases with the duration of ulcerative colitis and that diversion of the fecal stream confers no guarantee of protection of the defunctionalized bowel against cancer.

In 218 patients studied by Dennis and Karlson[10] the incidence of cancer was 7.4 per cent; all of their patients with cancer had had symptoms for at least 10 years.

In 60 of their patients with the colon and rectum *in situ* followed for a total of 218 patient years, the incidence of cancer development was 4.0 per cent per year. In 54 patients having only the rectum *in situ* followed for a total of 229 patient years, the incidence of development of cancer was only one per cent.

TABLE 4. *Incidence of Perforation and Hemorrhage in 118 Hospitalized Patients*

Treatment	Cases	Perforation		Hemorrhage		Sum. of P. and H.
		No.	%	No.	%	
Steroids	44	6	13.6	4	9.0	22.6
No steroids	74	4	5.5	1	1.4	6.8
Totals	118	10		5		

TABLE 5. *Incidence of Perforation and Massive Hemorrhage as an Indication for Operation in the 48 Patients Having Colectomy*

Complication	24 Patients Received Steroids		24 Patients Received no Steroids	
	No. Cases	Deaths	No. Cases	Deaths
Perforation	6	1	4	3
Hemorrhage	4	1	1	0
	10	2	5	3

TABLE 6. *Cancer Incidence Reported in Literature (By Authors Who Have Included Patients Observed for a Long Period)*

Author	Over-all Incidence	Incidence of Ca in Patients Having Colitis More than 5 Years			
		Over 5	Over 9	Over 10	Over 12
Bacon *et al.*	14.3%	29.2%			
Cattell	7.0%		33.3%		
King *et al.*	5.9%		16.7%		
Counsell and Kukes	11.1%			45.0%	
Dennis and Karlson	7.4%		12.2%		
Hickey and Tidrick	6.0%			14.5%	
Wheelock & Warren	8.8%		18.1%		
Lyons and Garlock	3.9%				39.0%
Slaney and Brooke	3.8%		17.0%		

Two recent reviews concerning the incidence of carcinoma are of interest. Goldgraber *et al.*[14] reviewed 35 prior papers and added their own large number of cases seen at the University of Chicago Clinics. In their review, the reported incidence of colorectal cancer ranged from 0.59 per cent reported by Renshaw and Brownell[27] to 14.2 per cent reported by Bacon *et al.*[1] In their own series, there were 22 cases of carcinoma in a group of 792 patients, an incidence of 2.8 per cent. Slaney and Brooke[33] reviewed 27 papers and added their own series. In a total of 9,469 patients with ulcerative colitis there were 358 cases of cancer, an incidence of 3.8 per cent.

Some individual reports in the literature which have included patients observed for an extended length of time are listed in Table 6. The variation is self-evident. It is noted that all these reports give an overall incidence greater than that of 3.8 per cent compiled by Slaney and Brooke[33] in their collective series. The reports of Bacon *et al.*[1], Cattell[6] Counsell and Dukes[9] and Lyons and Garlock[22] are based on "surgical" series. Although a definite percentage is difficult to arrive at, it is certainly obvious that a very real danger exists and it increases with the duration of the ulcerative colitis.

On the basis of 358 cases in the literature, Slaney and Brooke[33] found the average duration of ulcerative colitis prior to onset of carcinoma to be 13.9 years. However, in the same paper they examined a smaller number of patients in more detail and found that a third of them had colitis "less than 10 years." In patients having the disease over 10 years they place the incidence of cancer at 17 per cent. To investigate this matter more fully we have analyzed 135 cases of cancer described in detail in 14 papers[1, 2, 7, 9, 13, 15, 17, 18, 22, 23, 30, 33, 36, 41] and have summarized them in Figure 1.

Although, in general, the danger of development of cancer in ulcerative colitis increases from year to year during the course of the disease, there are, of course, many exceptions such as a carcinoma reported by Cattell and Boehme[7] in a women, aged 38, who had a cancer but had fulminating colitis for only three months.

Hickey and Tidrick[16] regard five years as the "safe" zone, beyond which carcinoma becomes a very real threat. Wheelock and Warren[37] suggest three years as the boundary. Dennis and Karlson[10] state, "Each patient leaving his colon in place runs about 1.6 per cent risk of developing cancer in that colon in each year over nine years in which he retains within his abdomen a colon involved with idiopathic

ulcerative colitis." It might be suggested that five years serve as the upper limit of safety of non-surgical management in the typical case of ulcerative colitis developing between ages 15 and 35, but that a smaller length of time be allowed to elapse in older patients before seriously considering surgery.

There has been considerable discussion as to whether or not there is a significant danger of development of cancer in a rectal stump left in place following colectomy. Many authors have described carcinomas developing in a residual nonfunctioning bowel years after a subtotal colectomy for ulcerative colitis. In our series, two of the three cases are of this type. Gleckler and Brown [13] report two cases of carcinoma arising 16 and 18 years, respectively, after ileostomy alone. In the review by Slaney and Brooke [33] there are 34 such cases. Accordingly, it is obvious that diversion alone does not protect against carcinoma. Mayo, Fly and Connelly [25] studied the fate of 45 patients who had a rectal segment left in after subtotal colectomy for ulcerative colitis. Three of these 45 patients developed carcinoma in the rectal stump, and only eight were asymptomatic from the standpoint of the remaining rectal segment; the chief manifestations were residual bleeding and frequent mucous "stools."
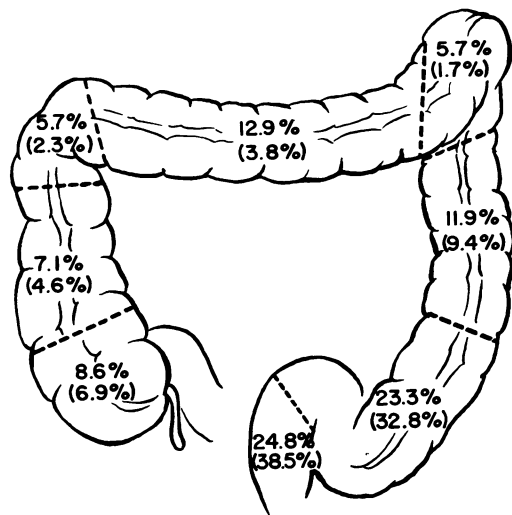

FIG. 2. Regional distribution of cancer in ulcerative colitis. The figures in parentheses represent the percentage distribution of the tumor in 487 patients with cancer of the colon and rectum (not associated with ulcerative colitis) reported by Buser et al.[5]

It is also well known that there is a relatively high incidence of multicentric primary carcinomas, and that they are difficult to detect clinically. Shands, Dockerty and Bargen [31] reported histologic multicentricity of tumor in 19 of 40 surgical specimens carefully examined. The present authors examined case reports in 16 papers [1, 2, 7, 9, 13, 14, 15, 17, 18, 22, 23, 30, 33, 34, 36, 37] regarding the question of multicentricity of primary carcinomas and found an incidence of 12.5 per cent of cases. This is certainly higher than in colorectal carcinoma in the absence of colitis. In Figure 2 is shown the distribution of 210 primary carcinomas reported within the 16 papers we reviewed, and for comparison, the distribution of 478 carcinomas reported by Buser, Kirsner and Palmer [5] in the colon and rectum not affected with ulcerative colitis. The more general distribution of the tumors in patients with ulcerative colitis is apparent.

The five-year survival of patients having resection of a cancer of the colon in the presence of ulcerative colitis is very low. In 304 cases collected from the literature
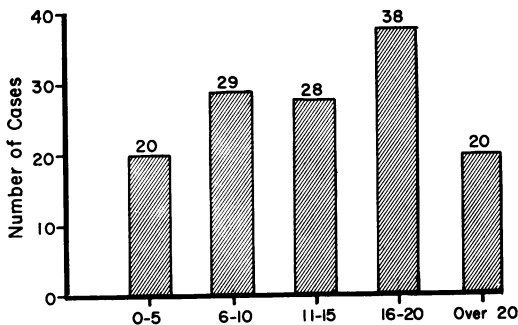

FIG. 1. Duration of colitis in years prior to development of colorectal cancer in 135 patients as summarized by the authors from 14 medical publications. (See text.)

Slaney and Brooke[33] found it to be only 18.6 per cent.

Miscellaneous Complications. Ulcerative colitis is a disease associated with innumerable complications. The most important ones have already been mentioned.

Perianal lesions including abscesses, fistula and suppurating fissures are common; when infection is severe, prolonged incontinence is not unusual. Any of these lesions can offer a serious complication to total colectomy. Whether the colectomy includes excision of the sphincter or is performed with preservation of a segment of rectum makes little difference because the danger of dissemination of the infection is considerable. If the infection extends very far beyond the anal margin it is usually safer to leave the sphincter and a segment of rectum; with defunctionalization of the sphincter and rectum the infection will usually subside, and allow excision later with safety.

Rheumatoid arthritis is fairly common as is also thrombophlebitis. Reference has already been made to the danger of hemorrhage under therapy with anticoagulants. Stenosis at the ileostomy site is also fairly common; it is due either to construction of an inadequate opening for the ileostomy, or to ulceration of the skin about the ileostomy bag. Ulceration about the stoma is usually due to inadequate care of the ileostomy or to a poorly fitting opening in the facing of the ileostomy bag. Occasionally, a revision will be necessary.

Intestinal obstruction is not a rare complication of ulcerative colitis. Wheelock and Warren[37] report 26 instances of small bowel obstruction in 18 patients in a follow up study in a group of 343 patients with ulcerative colitis. In 10 instances a twisting or volvulus of small bowel loops around the ileostomy arm produced the obstruction; in 11 patients the obstruction was caused by adhesions.

Prohaska and associates[26] have recently reported their surgical results in 81 pa-tients who had been under steroid therapy and had an operation. Their operative mortality rate was 7.7 per cent. They encountered wound disruption in 3.8 per cent of their series and concluded that steroid therapy caused a "definite retardation of wound healing," although the expected increase in postoperative infections did not occur.

Steroid Therapy

By steroid therapy is meant the systemic administration of ACTH and/or cortisone or one of the newer corticosteroids. Of the entire hospitalized group of 118 patients, 44 were treated with steroids and 74 were not. The relationship of steroid therapy to perforation and bleeding in the entire series of 118 hospitalized patients is indicated in Table 4, which reveals that 13.6 per cent of the 44 patients treated with steroids had acute perforation and 9.0 per cent had massive hemorrhage requiring emergency colectomy. This contrasts sharply with the incidence of 5.4 per cent having perforations and 1.4 per cent having massive hemorrhage in the 74 patients not receiving steroids. Combining these two emergency complications reveals the astounding fact that 22.6 per cent of the patients who had had steroid therapy developed one of these two serious emergency complications, compared to 6.8 per cent in the group not having steroid therapy. However, these comparative figures must not be taken too literally since, in general, the severely ill patients represent the groups most apt to be treated with steroids.

It is well known that steroids will produce marked improvement in a large percentage of patients who are very ill with ulcerative colitis; however, it is not fully appreciated by many of our medical friends that this period of benefit is temporary, usually lasting no longer than 10 to 20 days. One of the serious abuses of steroid therapy has been the prolongation

of nonbenefiting medical therapy. Often indeed, this ineffective therapy is prolonged so long that operability is extremely poor, and the golden opportunity to reap the benefits of steroid therapy has been lost.

The relationship of steroid therapy to perforations has been debated in the literature. Truelove and Witts,[35] in 1955 reported the results of a well-controlled study of this problem, done under the auspices of the British Medical Council. In this study, 101 patients without steroids had two perforations, while 109 patients with steroids had none. They concluded that steroids did not increase the incidence of perforations. Brooke[3] describes three patients having steroid therapy whose bowel wall was so friable that operative procedures in the peritoneal cavity were almost impossible.

Brooke states that if the patient has not responded to steroid therapy over a period of four to six weeks, the colon will become excessively friable. He suggests that steroid therapy be stopped in any patient showing no response after one or two weeks. Sklar, Kirsner and Palmer[32] compare two reported series from the University of Chicago. The first, reported by Kirsner et al.,[20] in 1948, had nine perforations in 100 cases. The second, reported by Kirsner, Sklar and Palmer,[21] in 1957, had one perforation in 180 steroid-treated patients.

In 1958, Resnak et al.[28] reported the results of a questionnaire regarding use of steroid hormones in ulcerative colitis sent to 324 members of the American Gastroenterological Association and 676 members of the American Proctologic Society. Of the 1000 questionnaires sent out, there were 226 replies giving "useful information." There were many areas of disagreement regarding the use of these drugs. Of the physicians contacted 32.5 per cent believed there was an increase in complications with steroid use, in the areas of hem-

orrhage, perforation and ulceration. The consensus was that these drugs should not be used routinely. In the same paper the authors present 60 of their own cases treated with steroids of which six perforated. They emphasize the necessity of careful observation for signs of perforation in patients on steroids, because the signs of peritoneal irritation are usually masked considerably, and, in fact, may be absent. For this reason, they give prophylactic penicillin and streptomycin to their steroid-patients.

Kiefer[19] states, "It is now apparent that ACTH and cortisone do not cure ulcerative colitis, but that their main effect is to modify the host's reactions to the disease." He proposes a pathogenetic concept of this disease as consisting of two phases: 1) Some sort of antigen-antibody reaction followed by, 2) Secondary bacterial invasion with local necrosis of tissue. The response to steroids is good in the first phase, but in the second phase the disease may even be enhanced by the steroid property of suppression of host defenses to bacterial invasion. Based on this reasoning he concluded that, "ACTH and the steroid hormones are contraindicated in the septic, fulminating form of ulcerative colitis. The reasons for this are, first, the steroids apparently impair the normal resistance to spread of the infection, and second, the reactions to the infection may be so modified that the true clinical state of the disease may be obscured. This may permit the destructive process in the mucosa to progress to extensive sloughing, resulting in hemorrhage, perforation and peritonitis, without producing the usual warning clinical signs."

Indications for Colectomy

There is considerable disagreement concerning the indications for operation in ulcerative colitis; however, nearly all will agree that operation should not be considered under four months following onset

of symptoms unless the case is fulminating, perhaps with the loss of a lot of blood. All would agree that medical therapy with good dietary care, intestinal antisepsis, freedom from emotional stress, etc., should be instituted in most cases. If these measures are not successful steroid therapy may be tried, but in our opinion should not be extended more than two or three weeks, particularly if there is no evidence that the steroids are beneficial. Zetzel and Atin[39] state that a favorable response to steroids usually occurs within one week, and certainly will occur within two weeks, if it is going to. Rhoads[29] remarks that, "This cortisone therapy often extends the period of medical therapy too long and may be as treacherous as morphine in appendicitis." Maltby, Dickson, and O'Sullivan[24] state, with regard to acute, fulminating cases, "The colectomy should be performed without delay if prompt and dramatic response does not occur on medical therapy, including ACTH and cortisone."

Brown, Glecker and Jones[4] list as one criterion for surgery, "Severe intractability and lack of response to medical treatment, the colitis making the patient a chronic invalid unable to earn his own livelihood." Dukes and Lockhart—Mummery[12] similarly include in their criteria, "chronic invalidism with failure of response to medical management." Rhoads ventures a more specific description of intractability when he describes this as existing in any patient who does not heal by x-ray criteria, as well as by proctoscopic examination and absence of gross blood from the stools within two years. However, he also states that some patients with "marked symptoms" must be considered intractable before this. In our series, 49 per cent of the patients who were sufficiently ill to require hospitalization, were operated on. Wheelock and Warren[37] report that 60 per cent of their cases were operated on. Justification for their high per cent of cases treated sur-

gically is found in their statement that they found cancer in 8.8 per cent of their operated cases, but that cancer was found in 18.1 per cent of their patients not having their colon removed. In 387 patients in their series submitted to conservative therapy they found that 19.1 per cent died, 60 per cent eventually had an operation and 20.9 per cent survived without operation. Wheelock and Warren state further that, "In any patient with a definite diagnosis of established chronic ulcerative colitis at the end of three years of treatment, colectomy and ileostomy should be recommended." All these statements leave the final responsibility for this decision up to the physician managing the case, and properly so.

It must be remembered that on many occasions the patient's condition may deteriorate from day to day (especially while on steroid therapy), soon reaching the point when operation is associated with a very high mortality rate. The physician in charge must try to prevent this unfortunate circumstance by considering operative therapy early in the disease.

In the treatment of fulminating cases, especially while trying to convert inoperability, we wish to emphasize the value of intravenous therapy including glucose and amino acids, but particularly, intravenous fat (Lipomul). This therapy is strongly indicated because attempts to improve the malnutrition by forced oral feeding so often increases the diarrhea with increased loss of blood and plasma.

Operative Therapy

Of the 57 patients admitted to the surgical wards, 51 had an operation of some type. The remaining six did not. Two of the six refused an operation, two left with the understanding that they would later return for surgery but never returned, two died preoperatively, one of bronchopneumonia and one of an *E. coli* septicemia.

Of the 51 operated cases, two had cancer operations which already have been described. A third patient, although he had apparently had active ulcerative colitis, developed a small bowel obstruction for which he had a celiotomy. He died postoperatively of an *E. coli* septicemia. This leaves 48 patients who had a colectomy for their ulcerative colitis.

Table 5 indicates that two of the 10 steroid treated patients having one of the serious emergency complications (perforation or hemorrhage) died following operation, whereas three of the five patients in the group not receiving steroids having emergency operation for perforation or massive hemorrhage died following operation. Although this series is too small to submit to statistical analysis, the mortality rate is lower in the steroid group. The question arises as to whether the steroids might improve operability. In a previous report we [8] have presented evidence showing that in a small percentage of debilitated and seriously ill patients (particularly in the elderly group) ACTH did appear to improve operability. However, our series is so small that categoric statements cannot be made concerning the results.

The mortality rate in the elective colectomies was almost the same in the steroid and non-steroid group. Of 14 cases in the first group two died, and of 19 in the second group, two died. We are inclined to agree with most surgeons that one stage colectomy is preferable to a two stage procedure but our figures do not support this statement. In our series, 15 patients had a two-stage operation (four steroid, 11 nonsteroid); none of these died. The four deaths in our elective colectomies occurred in patients having a one stage colectomy (two of 10 steroid, and two of eight nonsteroid). Again the small series does not permit categorical statements, but the difference is considerable. Of the four

deaths in the 33 patients having elective colectomy, one was the patient previously described whose wound abscess perforated into the peritoneal cavity. A second was a death on the sixth postoperative day from retroperitoneal hemorrhage. The third deserves brief description. He was a 13-year-old boy who had ulcerative colitis diagnosed at six years of age. For the following seven years he was treated medically and psychiatrically, and received numerous courses of ACTH therapy. For the two years from ages 11 to 13, he was on large daily doses of prednisone. When he was admitted to the surgery service for colectomy he was markedly understature and undernourished, and despite intensive preoperative buildup and steroid coverage he died postoperatively of cardiovascular collapse. He received intravenous cortisone during the operation and the postoperative period prior to his death. At autopsy the adrenal glands showed extensive areas of necrosis and hemorrhage and thrombosis of the veins. In retrospect, his operability was too poor to justify operation at the time it was done; perhaps, he should have been taken off steroid therapy for a time. Certainly he should *not* have been given steroids for such a long period of time because complete atrophy or destruction of the adrenals would appear inevitable.

It should be emphasized that removal of large segments of mesocolon is not required in ulcerative colitis as it is in cancer of the colon. There are two additional reasons why resection of considerable perirectal tissue is not desirable. In the first place, less bleeding will be encountered if the dissection is carried out close to the rectum. Perhaps of more importance is the fact that excision of a minimal amount of perirectal tissue will minimize the possible production of impotence by the operative procedures.

Donovan and O'Hara [11] report that only one patient in their series was rendered

impotent following protectomy. One other noted temporary difficulty which subsequently cleared up entirely, whereas nine of the 21 noted definite improvement in sexual function. It is highly significant that the one case of permanent impotence occurred in a man who had resection of his rectum, including lymphatic drainage, for what was thought to be a neoplasm. If the dissection is carried out close to the rectum, pelvic nerve damage leading to impotence should not occur.

Summary

Malnutrition, perforation, massive hemorrhage and development of carcinoma are perhaps the most important of the numerous complications observed in ulcerative colitis. The incidence of perforation and massive hemorrhage was many times higher in our patients having steroid therapy than it was in those not having it. For example, in 48 patients having steroid therapy 22.7 per cent had either perforation or hemorrhage, compared to 6.8 per cent of our patients not having steroid therapy. Perforation was about twice as common as massive hemorrhage. Our series is too small to compare the mortality rate, but the relative postoperative death rate did not appear to be increased by steroid therapy. Our incidence of cancer in 57 patients treated on our surgical wards was 5.3 per cent which is about equal to the average of reported series. The duration of disease in all of our cases was longer than 10 years.

Our experience supports the impression held by many clinicians that the use of steroid therapy over a prolonged period of time is undesirable, and, in fact, is dangerous. The chief value of steroids lies in the temporary improvement so commonly observed following their administration; accordingly they can be very useful in improving operability. Steroids mask the symptoms of serious intra-abdominal complications such as perforation.

Bibliography

1. Bacon, H., L. Yang, P. Carroll, B. Cates, G. Villalba and R. McGregor: Non-Specific Ulcerative Colitis, with Reference to Mortality, Morbidity, Complications and Long-Term Survivals Following Colectomy. Am. J. Surg. 92:688, 1956.
2. Bargen, J. and C. Dixon: Chronic Ulcerative Colitis with Associated Carcinoma. Arch. Surg., 30:854, 1935.
3. Brooke, B.: Cortisone and Ulcerative Colitis. Lancet, 2:1175, 1956; The Outcome of Surgery for Ulcerative Colitis. Lancet, 2: 532, 1956.
4. Brown, C., W. Glecker and T. Jones: Surgical Treatment of Chronic Nonspecific Ulcerative Colitis. Gastroent., 14:465, 1950.
5. Buser, J., J. Kirsner and W. Palmer: Carcinoma of the Large Bowel. Cancer, 3:214, 1950.
6. Cattell, R.: The Surgical Treatment of Ulcerative Colitis. Gastroent., 10:63, 1948.
7. Cattell, R. and E. Boehme: The Importance of Malignant Degeneration as a Complication of Chronic Ulcerative Colitis. Gastroent., 8:695, 1947.
8. Cole, W. H., W. J. Grove and M. M. Montgomery: Use of ACTH and Cortisone in Surgery. Ann. Surg., 137:718, 1953.
9. Counsell, P. and C. Dukes: The Association of Chronic Ulcerative Colitis and Carcinoma of the Rectum and Colon. Brit. J. Surg., 39:485, 1951.
10. Dennis, C. and K. Karlson: Surgical Measures as Supplements to the Management of Idiopathic Ulcerative Colitis: Cancer, Cirrhosis and Arthritis as Frequent Complications. Surgery, 32:892, 1952; Cancer Risk in Ulcerative Colitis: Formidability per patient year of Late Disease. Surgery, 50:568, 1961.
11. Donovan, M. and E. O'Hara: Sexual Function Following Surgery for Ulcerative Colitis. New Engl. J. Med., 262:719, 1960.
12. Dukes, C. and H. Lockhart-Mummery: Practical Points in the Pathology and Surgical Treatment of Ulcerative Colitis. New Engl. J. Med., 262:719, 1960.
13. Glecker, W. and C. Brown: Carcinoma of the Colon Complicating Chronic Ulcerative Colitis. Gastroent., 14:455, 1950.
14. Goldgraber, M., E. Humphreys, J. Kirsner and W. Palmer: Carcinoma and Ulcerative Colitis, A Clinical-Pathological Study. I. Cancer Deaths. Gastroent., 34:809, 1958; Goldgraber, M., J. Kirsner and W. Palmer: The Role of ACTH and Adrenal Steroids in

Perforation of the Colon in Ulcerative Colitis. Gastroent., 33:434, 1957.

15. Hayes, M.: Chronic Ulcerative Colitis and Associated Carcinoma. Am. J. Surg., 77: 363, 1949.

17. Jackson, B., H. Olken and S. Sarris: Carcinoma in Chronic Ulcerative Colitis. Arch. Surg., 76:472, 1958.

18. Johnson, R. and F. Orr: Carcinoma of the Colon Secondary to Chronic Ulcerative Colitis. Am. J. Digest. Dis., 15:21, 1948.

19. Kiefer, E. D.: ACTH and the Corticosteroid Hormones in the Management of Chronic Ulcerative Colitis. Med. Clin. of N. A. 44: 567, 1960.

20. Kirsner, J., W. Palmer, S. Maiman and W. Ricketts: Clinical Course of Chronic Non-Specific Ulcerative Colitis. J. A. M. A., 137: 922, 1948.

21. Kirsner, J., M. Sklar and W. Palmer: Use of ACTH, Cortisone, Hydrocortisone and Related Compounds in Management of Ulcerative Colitis: Experience in 180 Patients. Am. J. Med., 22:264, 1957.

22. Lyons, A. and J. Garlock: The Relationship of Chronic Ulcerative Colitis to Carcinoma. Gastroent., 18:170, 1951.

23. MacDougall, I.: Ulcerative Colitis and Carcinoma of the Large Intestine. Brit. Med. J., 1:852, 1954.

24. Maltby, E., R. Dickson and P. O'Sullivan: The Use of ACTH and Cortisone in Idiopathic Ulcerative Colitis. Canad. Med. Assn. J., 74: 1956.

25. Mayo, C., O. Fly, Jr. and M. Connelly: Fate of the Remaining Rectal Segment after Subtotal Colectomy. Ann. Surg., 144:753, 1956.

26. Prohaska, J. V., L. R. Dragstedt and R. G. Thompson: Ulcerative Colitis: Surgical Problems in Corticosteroid Treated Patients. Ann. Surg., 154:408, 1961.

27. Renshaw, R. and T. Brownell: Carcinoma Complicating Ulcerative Colitis. Cleve. Clin. Quart., 12:123, 1945.

28. Resenak, B., R. Pickett, H. Van Factor, J. Hammond et al.: The Present Status of the Treatment of Chronic Ulcerative Colitis with Steroid Hormones. Gastroent., 34:879, 1958.

29. Rhoads, J.: Surgical Management of Ulcerative Colitis. Med. Clin. N. A. p. 1667, Nov. 1957.

30. Ricketts, W. and W. Palmer: Complications of Non-Specific Ulcerative Colitis. Gastroent., 7:55, 1946.

31. Shands, W., M. Dockerty and J. Bargen: Adenocarcinoma of Large Intestine Associated with Chronic Ulcerative Colitis. Surg. Gynec & Obst., 94:302, 1952.

32. Sklar, M., J. Kirsner and W. Palmer: Problems in the Management of Ulcerative Colitis, with Particular Reference to ACTH and the Adrenal Steroids. Ann. Int. Med., 46:1, 1957.

33. Slaney, G. and B. Brooke: Cancer in Ulcerative Colitis, Lancet, 2:694, 1959.

34. Svartz, N. and T. Gillnas: In Which Phase of Ulcerative Colitis does Colonic Cancer Occur? Am. J. Digest. Dis., 3:537, 1958.

35. Truelove, S. and C. Witts: Cortisone in Ulcerative Colitis. Brit. M. J., 2:4947, 1955.

36. Weckesser, E. and A. Chinn: Carcinoma of the Colon Complicating Chronic Ulcerative Colitis. J. A. M. A., 152:905, 1953.

37. Wheelock, F. and R. Warren: Ulcerative Colitis, Follow-Up Studies. New Eng. J. Med., 252:421, 1955.

38. Wilcox, H. Jr. and J. Beattie: Carcinoma Complicating Ulcerative Colitis During Childhood. Am. J. Clin. Path., 26:778, 1956.

39. Zetzel, L. and H. Atin: ACTH and the Adrenalcorticosteroids in the Treatment of Ulcerative Colitis. Am. J. Digest. Dis., 3: 916, 1958.

DISCUSSION

DR. J. WILLIAM HINTON (New York): It might be worthwhile mentioning eight patients with complications from ulcerative colitis. All of these patients were relatively young. Five were under 20, one was 20, one was 23 and one was 24.

The first patient had a massive hemorrhage in 1938, and she was 23 years old and the wife

of a doctor and after a transverse ileostomy, the hemorrhage stopped but she died following the colectomy.

The next patient was a boy 14 years of age, seen in Utica, New York in 1941. He was under the care of an experienced gastroenterologist, but had massive hemorrhages which could not be controlled with blood transfusions. I went to Utica and did an ileostomy on the patient but he died