

Diverticulitis

A Comprehensive Follow-Up

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PURPOSE: This study was undertaken to examine the long-term results of medical and surgical management for diverticulitis. **METHODS:** A retrospective review of all patients admitted to Naval Medical Center Portsmouth, Virginia, between January 1991 and February 1994, was conducted. Of 78 patients included in the study, 65 were able to be contacted for follow-up. **RESULTS:** The surgically treated group consisted of 33 patients, and medically treated group had 32 patients. Of the medically treated group, 62.5 percent were found to have continuing symptoms. Medically treated patients with a long history and infrequent flares tended to be less symptomatic after hospitalization. Conversely, those medical patients with a short intense history were more likely to have symptoms. The frequency of symptoms in the surgical group was surprising, because 27.2 percent of this group reported continuing symptoms. **CONCLUSIONS:** Close follow-up of medically treated patients for objective evidence of diverticulitis is indicated. When surgical therapy is undertaken, patients should be counseled that symptoms may be largely unchanged following operation. [Key words: Diverticulitis; Surgery; Symptoms; Recurrence]

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Diverticulitis and associated complications are commonly encountered by colorectal and general surgeons. Criteria for medical *vs.* operative management are well established. Medical therapy is indicated for the first episode of diverticulitis, except in the young or when complications arise. Operation with resection is advised after first episode in the young, complicated episodes, and second events in older patients.¹⁻³ For those medically treated, it is accepted that approximately 30 to 40 percent will continue to have symptoms, and one-half of these will eventually undergo surgery.^{3,4} Those operatively treated are generally felt to be cured and free of disease, with a need for further surgery in approximately 2 to 7 percent.^{1,5} Purpose of this study is to evaluate symptoms patients experience following medical *vs.* operative management.

MATERIALS AND METHODS

A retrospective review was conducted for all patients discharged from the Naval Medical Center in Portsmouth, Virginia, with diagnosis of diverticulitis for the period from January 1991 until February 1994. All charts were reviewed for correctness of diagnosis, demographics, and therapy rendered. Following this review, attempts were made to contact these patients by telephone in September 1994. Questions regarding continuing symptoms, dietary changes, and bowel functions were asked. Results of chart review and interview were analyzed by the medical statistics department at Portsmouth Naval Hospital using Fisher's exact test and the two-tailed *t*-test to determine significance of data collected.

RESULTS

During the three-year period, 78 patients with discharge diagnosis of diverticulitis were admitted a total of 106 times. Chart review and telephone interview were attempted for all patients. Four patients were excluded: two had cecal diverticulitis and one had no diverticulosis on subsequent barium enema, and one had appendicitis. Of the remaining 74 patients, 9 were not able to be contacted. This left a total of 65 patients in the study, with an 87.8 percent follow-up rate.

These 65 patients consisted of 32 who were medically treated and 33 who were surgically treated. Medical and surgical patients were further divided into four groups based on their interviews. Groups 1 (20 patients) and 2 (12 patients) consisted of medically treated patients with and without continuing symptoms, respectively. Groups 3 (9 patients) and 4 (24 patients) consisted of surgically treated patients with and without continuing symptoms, respectively.

Diagnosis of diverticulitis was established in medical groups by a minimum of appropriate history, lower abdominal tenderness on examination, leukocytosis, and at least one confirmatory study of sigmoidoscopy, computed tomography scan, barium

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enema, or laparoscopy. Surgical group had histologically proven diverticulitis in all but three patients who had a microscopic diagnosis of diverticulosis.

Table 1 displays demographics and pertinent history for the entire population and four subsets. There were four statistically significant differences among the groups: 1) symptomatic surgical group included eight females and one male ($P < 0.0017$); 2) symptomatic surgical group had more previous episodes of diverticulitis than symptomatic medical group ($P < 0.001$); 3) symptomatic surgical group had more admissions than symptomatic medical group ($P < 0.001$); 4) symptomatic medical group had more admissions and episodes of diverticulitis but a shorter duration of symptoms compared with asymptomatic medical group.

Table 2 displays ongoing symptoms of both medical and surgical groups. A total of 62.5 percent of medically treated patients continued to have symptoms. Location and character of their pain was not changed from that that caused them to be hospitalized. Thirty percent had frequent pain, and 70 percent had occasional pain. Two patients with frequent and two with occasional pain described severity as moderate; all others had slight pain. Surprisingly, 27.2 percent of operatively treated patients continued to have symptoms. All of these symptomatic, resected patients stated that location of pain was the same as before surgery. Character of pain was unchanged in two-thirds; however, one-third stated that pain was completely different from that that had hospitalized them. Eight patients (88.9 percent) admitted to occasional pain. Two patients (22.2 percent) described their pain as severe. Reoperation for diverticulitis was required in two patients, accounting for 22.2 percent

of the symptomatic group and 6.1 percent of all patients who underwent surgery.

No standardized dietary recommendations had been prescribed because this was a retrospective study. However, everyone was asked about changes that they had made because of diverticulitis. Table 3 summarizes these findings. The only group that showed a statistically significant change in dietary habits was the symptomatic medical group. These patients frequently used a fiber supplement of variable type, with avoidance of seeds and nuts because of associated pain. Asymptomatic patients were not questioned regarding seeds and nuts because they experienced no pain.

Bowel function is also summarized in Table 3. Only the symptomatic surgical group experienced significant change, although this difference did not reach statistical significance. The most disturbing patient developed incontinence to gas and liquid stools after surgery, even though digital rectal examination was the only anal instrumentation performed.

All surgical procedures were performed by a chief or senior resident, with an attending physician at the table. Attending physicians for symptomatic patients consisted of general surgeons in six of nine cases (66.7 percent) and colon and rectal surgeons in the remaining three cases (33.3 percent). Asymptomatic patients underwent surgery by general surgeons in 17 of 23 cases (73.9 percent) and colon and rectal surgeons in the remaining 6 cases (26.1 percent). At our institution, distal resection is placed in the rectum and proximal resection is placed in supple, normal appearing bowel above the sigmoid colon.⁶

Groups that underwent surgery were compared by type of anastomosis. Symptomatic patients had five

Table 1.
Demographics and Prior Episodes of Diverticulitis for Study Population

	All Patients (n = 65)	Medical with Symptoms (n = 20)	Medical Number of Symptoms (n = 12)	Surgical with Symptoms (n = 9)	Surgical number with Symptoms (n = 24)
Average age (yr)	55	60	56	49	53
Male	33	9	8	1	15
Female	32	11	4	8	9
Race					
Caucasian	57	16	10	8	23
Black	4	0	2	1	1
Other	4	4	0	0	0
Previous flares	1.26	0.75	0.50	1.56	1.96
Previous admissions	0.62	0.25	0.08	1.11	1.00
Length of symptoms (mo)	14.86	4.27	27.24	13.70	17.56
Follow-up (yr)	1.9	2.3	1.8	1.7	1.8

Table 2.
Current Symptoms in Medically and Surgically
Treated Patients

	Medical with Symptoms (n = 20)	Surgical with Symptoms (n = 9)
Character of pain		
Same	20	6
Different	—	3
Severity		
Severe	—	2
Moderate	6	1
Light	14	6
Frequency		
Occasional	14	8
Frequent	6	1
Location		
Left lower quadrant	15	8
Right lower quadrant	4	—
Middle lower quadrant	1	—
Back	—	1

handsewn and four stapled anastomoses. Asymptomatic patients had 16 handsewn, four stapled, and two undetermined anastomoses. These differences were not statistically significant.

Pathology reports and slides were reviewed by the authors and pathologists. Diagnosis was found to be correct in all patients who underwent surgery. All of the symptomatic surgical group had diverticulitis, five of whom (55.5 percent) had perforations. Asymptomatic surgical group had diverticulitis in 21 of 24 pathology specimens (87.5 percent). Perforation was present in 8 of these 24 patients (33.3 percent). Diverticulosis without inflammation was present in the other three specimens.

Measurements of the formalin-fixed colon as recorded on pathology reports were used to determine length of bowel resected. When more than one resection was performed on a patient, lengths were added to obtain the total. Symptomatic group had an average resection of 17.6 cm. Average resection for asymptomatic group was 19.3 cm. Difference between these two groups was statistically significant ($P = 0.002$ by the two-tailed t -test).

Slides were viewed in an effort to determine thickness of bowel wall at both ends of resection, presence of diverticulosis or inflammation at the proximal end, and configuration of muscle layers at rectal end. These determinations were hindered because gross specimens had been disposed, and slides had not always been taken from both ends of bowel. When slides were available, no proximal margin was thick-

ened, and no diverticula were present. Only one patient had inflammatory cells at the proximal margin of resection. No *Taenia coli* were seen at the distal line of resection in any case, indicating a rectal anastomoses. None of these findings could be evaluated statistically. Hospital course, operative complications, type of surgical procedures, and intraoperative findings had no bearing on long-term results.

DISCUSSION

High incidence of diverticulosis in western culture ensures a constant supply of diverticulitis to all general and colon and rectal surgeons. Annually, there are 131,000 hospital admissions for diverticulitis in the United States.⁷ A large percentage of these patients continue with symptoms following treatment.

Our data indicate that fully two-thirds of medically treated patients continue with symptoms after discharge. These people generally experience the same type and location of pain that caused them to be hospitalized. The only clue as to who is at risk is found in number of previous admissions, flares, and length of symptoms. Medical patients with long histories and infrequent flares tend to be less symptomatic after hospitalization. Conversely, individuals who have a short, intense history of diverticulitis are likely to have more frequent symptoms. Should more of these people be offered resection? Without objective data for recurrent diverticulitis, such as fever, leukocytosis, or confirmatory studies, the answer is no. As Breen *et al.*⁸ found, patients were more likely to have continued symptoms if there was no histologic evidence of inflammation in resected portion of colon. Certainly it is prudent to follow this symptomatic group closely for objective findings of diverticulitis.

It was enlightening to find that 27.2 percent of resected patients in our study continued to have abdominal pain. Incidence of recurrent diverticulitis that required surgery is generally quoted to be approximately 6 percent when distal anastomosis is in the rectum and 13 percent when resection ends in the sigmoid colon.¹ There is little information about the symptoms patients experience following surgery. Parks and Connell⁹ are the only physicians that have reported on this problem. Some 24 years ago, they found that 6 of 25 patients (24 percent) treated with a three-stage procedure continued to have mild symptoms. Source of these symptoms is not well defined.

All symptomatic patients in our study had pathologically proven diverticulitis. There were no signifi-

Table 3.
Change in Eating Habits

	Medical with Symptoms (n = 20)	Medical, No Symptoms (n = 12)	Surgical with Symptoms (n = 9)	Surgical, no Symptoms (n = 24)
Changed eating habits				
Yes	16	3	3	1
No	4	9	6	23
Use fiber				
Yes	13	2	1	2
No	7	10	8	22
Eat seeds				
Yes	5	—	7	—
No	15	—	2	—
Pain from seed				
Yes	7	—	2	—
No	13	—	7	—
Bowel function				
Normal	18	12	6	22
Diarrhea	1	—	1	—
Constipation	1	—	1	2
Incontinent	—	—	1	—

cant differences between symptomatic and asymptomatic surgical groups when comparing number of previous episodes, admissions, or duration of symptoms. There were statistically more women in the symptomatic group, but this was the only demographic difference. None of these measurable factors were predictive.

Statistically, length of resected bowel was significantly greater in the asymptomatic group. The actual measured difference was, however, very small, being an average of 1.7 cm shorter in the symptomatic group. Given that bowel fixed in formalin shrinks, difference in length for the fresh specimen would be approximately 3 cm. This small difference in length can be interpreted in several ways. 1) It could very well have no clinical significance. 2) To avoid taking down the splenic flexure, proximal resection could have been shortened, leaving a mildly hypertrophied bowel wall behind. Unfortunately, fate of the splenic flexure was not described in all operation reports. Microscopic slide review did not support a foreshortened resection, nor does the common practice at this institution. 3) Because majority of symptomatic patients were females, length difference could result from a shorter average stature. Whatever the cause, a slightly shorter resection accompanied the symptomatic group.

Modifications in lifestyle as evidenced by changes in diet and fiber supplementation occurred most frequently in the symptomatic medical group. Neither of

the asymptomatic groups had a significant alteration in their eating habits. Although no standardized teaching was given to any group, it would seem safe to say that absence of ongoing symptoms will result in no dietary or lifestyle changes.

CONCLUSIONS

Following successful treatment of diverticulitis, there remains a large group of people who have continued, intermittent pain in the lower abdomen. The reason for these symptoms is poorly understood and may simply represent presence of irritable bowel disease. Surgical and medical patients need to be made aware of this likelihood. Preoperative teaching and informed consent should certainly reflect the possibility of continued postoperative symptoms. When surgery is indicated, all diseased bowel must be removed. Medically treated patients need to be followed closely for objective findings of diverticulitis. Finally, it is unlikely that asymptomatic patients will make significant alterations in diet or fiber consumption.

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