DIVERTICULOSIS OF THE COLON

Review of 726 Consecutive Cases

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DIVERTICULA are not infrequently found in the various portions of the gastrointestinal tract. They occur more frequently in the colon, especially in the sigmoid colon, than elsewhere in the gastrointestinal tract. Collins[1] has reported an incidence of diverticula of the colon in 7 per cent of 3000 consecutive barium enema examinations.

Etiology

Diverticula of the colon are blind sacs or pouches branching from the lumen of the colon. While the exact cause is unknown, several theories have been suggested.

The embryologic theory[2] postulates that the bowel develops from a diverticulum. Since the liver, pancreas, cecum and appendix arise as diverticula from the bowel, sporadic secondary diverticula should not be unexpected. Diverticula are found in close relationship to the vessels entering the bowel from the mesentery. At these points of entry into the bowel wall there may be weak spots which herniate with the formation of diverticula.[3] There are also inherent weak areas in the bowel wall which cannot withstand the intraluminal pressure to which they are subjected.[4]

Location

Diverticula occur most frequently in the sigmoid colon but rarely in the rectum. They appear with decreasing frequency from the sigmoid colon proximally to the cecum.

This report is based on a study of 726 consecutive cases of diverticulosis of the colon observed at the Cleveland Clinic. Each patient has had a complete gastrointestinal survey. Cases in which diverticula were merely suspected either clinically or radiologically were excluded. The series includes cases in which diverticulosis of the colon was the only organic abnormality as well as those which manifested other abnormalities of the gastrointestinal tract. In many cases the diverticula had multiple locations (Table 1).

TABLE 1

Location of the Diverticula

	No.	Per Cent
Sigmoid colon	654	90
Descending colon	348	47.9
Transverse colon	121	16.5
Ascending colon	55	7.6
Cecum	10	1.3

Table 2 gives the distribution of the diverticula according to arbitrary divisions of the colon. Diverticula were approximately thirty-five times as common in the left colon as in the right; diverticula of the left colon were fifteen times as frequent as the generalized form.

TABLE 2*

Frequency

	No.	Per Cent
Left colon	662	92
Right colon	19	2
Generalized	45	6

Sex Distribution

The incidence of diverticula of the colon is about equal in the two sexes. Kocour[5] studied diverticula of the colon in 7000 consecutive autopsies and reported the incidence to be 35 per cent higher in women than in men. There is little difference shown in this series, Table 3.

TABLE 3

	No.	Per Cent
Men	398	54.83
Women	328	45.17

Age Distribution

According to most reports diverticula of the colon are rarely observed in persons under the age of 20 and the incidence increases until the age of 60. In this series 55 per cent were between 40 and 60 years old. It is noteworthy that 75 per cent of the total series were 50 years of age or older. There were only 5 patients under 30. The youngest patient was 25 years old (figure).

**For the purposes of this report the right colon includes the cecum and ascending colon, the left colon the transverse, descending and sigmoid portions.*

The Factor of Obesity

It is generally believed that obesity favors the formation of diverticula of the colon. In this series of cases approximately 65 per cent were overweight, 7 per cent were underweight and 28 per cent were within normal limits using standard weight and height charts as a base line.

In 121 of these cases some organic disease of the gastrointestinal tract other than the presence of diverticula of the colon was also found, but this did not alter the percentages significantly.

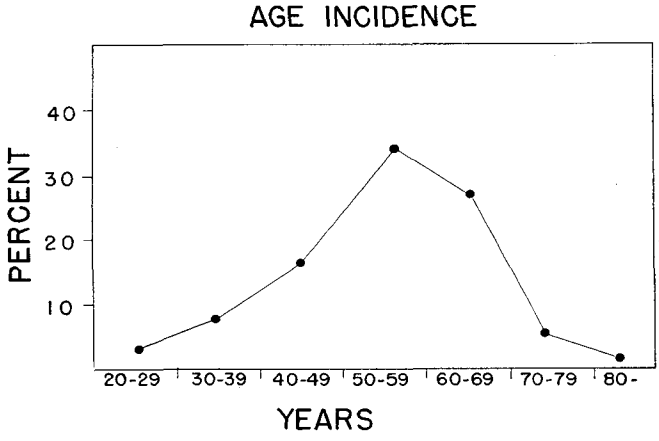
Symptoms

In a series of cases of diverticula of the colon reported by Willard and Bockus[6], only about 50 per cent had symptoms considered related to the presence of the colonic diverticula. Spriggs and Marxer, also cited by Bockus[6] did not find any complaints referable to the presence of diverticula in the colon in 29 of their 100 cases.

It appears logical that symptoms resulting from diverticula of the colon would reflect some alteration in the function or behavior of the colon. The symptoms of which the patients complained followed a remarkably consistent pattern. Predominating in the series were flatulence, constipation, and pain, or abdominal discomfort. They probably indicate an alteration of the large bowel function. When diverticula are found in a patient having complaints referable to the gastrointestinal system however, it cannot be assumed that the symptoms are due to the presence of the diverticula alone.

Bockus[6] states that a history of diarrhea or alternating diarrhea and constipation are common complaints and in his series reported that such a history was present in 25 per cent of their cases. In this series only about 9 per cent gave a history of diarrhea.

The history of constipation or diarrhea is at times difficult to evaluate as the average patient has only a vague idea as to the nature or meaning of these



terms. In our series constipation was diagnosed only in those patients who gave a history of hard, infrequent dry stools or in those who found it necessary to take frequent laxatives in order to obtain any bowel movement. Diarrhea was considered present in those patients who gave a history of repeated or continuous episodes or three or more loose watery stools a day.

The abdominal pain or discomfort of which the patient with diverticulosis complained was often vague and could be poorly localized. It might involve any portion of the abdomen but was usually in the lower abdomen and the left lower quadrant. The pain was not constant and tended to recur. Often there was a history of relief by the passage of flatus or by a bowel movement. The type of pain could be roughly described as sharply stabbing, cramp-like or aching. The location varied and was not necessarily consistent with the anatomical location of the diverticula. A numerical analysis of the type and location in the 404 patients who gave pain as a symptom is shown in table 4.

TABLE 4

Type of Pain

Type	No.
Ache	207
Cramp	137
Sharp	60

Location of Pain

Lower abdomen	122
Left lower quadrant	95
Right upper quadrant	53
Epigastrium	49
Right lower quadrant	35
Left upper quadrant	34
Generalized	26

Whether blood occurs in the stool in uncomplicated diverticulosis has been a matter of dispute. It certainly does not occur frequently. In this series, 36 patients gave a history of passage of gross blood by rectum. On examination some cause other than the diverticula was found in 11; in 25 no other cause was found. Therefore, in only 3½ per cent of the cases in this series could rectal bleeding be attributed to the presence of colonic diverticula.

Other symptoms such as anorexia, nausea, vomiting, weight loss and the passage of mucus in the stools were even less frequent.

Many patients had had one or more abdominal operations. The sigmoid and the descending colon frequently could be palpated as a spastic rope-like cord. Tenderness was common but was usually mild and not accompanied by muscle spasm.

In general the symptoms and physical findings of the patients in this series were like those observed by Collins and Van Ordstrand[7] in their report of 1000 consecutive cases of irritable colon seen at the Cleveland Clinic. In this series the relative duration of the symptoms (eight years) is about the same as in this series (six years); the age and sex incidence were approximately the same, and the complaints almost identical, namely, "gas," abdominal distress or pain, constipation and to a lesser extent nausea and vomiting. We believe that the similarity of the symptoms and the response to treatment are more than coincidental. Doubtless the presence of the diverticula may aggravate the symptoms and may lead to later complications. It seems more logical to suppose that the diverticula are the result of the irritable colon or that they have become larger as a result of the altered function of the large bowel due to the irritable colon.

Table 5 presents the symptoms of the entire series and table 6 the symptoms in those cases in which colonic diverticulosis was the only gastrointestinal abnormality found.

TABLE 5

Symptoms of All Patients (726)

	No.	Per Cent
"Gas"	543	74.8
Constipation	498	68.6
Pain or abdominal discomfort	404	55.6
Abdominal fullness	188	25.3
Nausea	79	11
Diarrhea	68	9.3
Mucus in the stools	41	5.6
Melena	36	4.9
Anorexia	29	4
Average duration of symptoms		5.9 years

TABLE 6

Symptoms in Patients with Colonic Diverticula Alone (605 cases)

	No.	Per Cent
"Gas"	472	78
Constipation	404	66.7
Pain or abdominal discomfort	336	55.5
Abdominal fullness	150	24.8
Nausea	67	11
Diarrhea	53	8.7
Mucus in the stool	31	4.9
Melena	25	4.7
Anorexia	28	4.8

Associated Organic Gastrointestinal Disease

In this series there were 121 patients or 16½ per cent in which organic gastrointestinal disease was found. Gallbladder disease and duodenal ulcer were the conditions most commonly encountered. Although cancer of the gastrointestinal tract is considered rare in association with diverticula of the colon 24 cases were found in this series. In 2 others the diagnosis of cancer of the colon was made clinically and by x-ray but since the patients refused operation the diagnosis was not confirmed. The incidence of the associated gastrointestinal lesions is shown in table 7, and table 8 shows the location of the associated lesions.

TABLE 7

Associated Gastrointestinal Disease

Cholelithiasis	45
Duodenal ulcer	26
Carcinoma	24
Cholecystitis	18
Gastric ulcer	3
Amebiasis	3
Ulcerative colitis	1
Polyp of the sigmoid	1

TABLE 8

Location of Neoplasms

Sigmoid	13
Rectum	4
Hepatic flexure colon	2
Stomach	2
Splenic flexure colon	1
Ileum	1
Jejunum	1

Diagnosis

The diagnosis of diverticulosis should be suspected in any patient over the age of 40 who is overweight, and has a history of long-standing flatulence, constipation and abdominal discomfort or poorly localized pain which tends to be relieved by a bowel movement or by the passage of flatus. The diagnosis is made by exclusion of other possibilities and can be substantiated only by x-ray examination.

Treatment

The treatment of diverticulosis of the colon is aimed first at the determination of the underlying cause of the symptoms and second at the prevention of future complications.

Undue emotional upsets and either nervous or physical exhaustion should be avoided as far as possible. In the obese person weight reduction is desirable. Small weekly or bi-weekly doses of barium sulfate by mouth is often advised, especially in the patients in whom a mild diverticulitis is suspected. The hope is that the barium will fill the diverticula and that this inert substance will prevent further irritation. Barium sulfate should not be given when symptoms indicate partial obstruction or impending obstruction. The diet suggested is of a low residue type with absolute avoidance of seeds, skins and coarse fibers. The treatment of constipation depends upon the adherence of the patient to the principles of bowel management. This includes ample sleep and rest, adequate fluid intake, habit time and the use of one of the bland bulk producing mucilaginous or Karaya gum preparations until the rectum is re-trained to a habit time. When the stool is unduly hard the use of a three ounce oil retention enema before retiring will usually result in a soft stool the next morning. At the beginning of treatment it may be necessary to initiate bowel movement at the habit time by the insertion of a glycerine suppository. Harsh or irritative laxatives and enemas should be avoided. At the beginning of treatment antispasmodics such as belladonna or some related compound and the use of phenobarbital in small doses will aid in the reduction of the spasm of the colon as well as relax the patient. Mild exercise taken out of doors is often beneficial. As improvement takes place in the symptomatology, especially in the constipation, a normal diet may be resumed and the use of drugs discontinued.

The nature of the patient's illness should be discussed with him. Care must be taken, however, not to emphasize the presence of the diverticula because many of these patients have a nervous temperament and are already concerned with their intestinal complaints. The nature of the diverticula, their relative innocuousness, and the simplicity and success of the treatment should be explained carefully so that the patient may have a clear understanding of the problem. The three "Rs" of Kantor are most important: "Reassurance, rest and relaxation." During the first and the most discouraging part of the treatment, the patient should be observed at frequent intervals so he may discuss the problems of treatment and gain encouragement to continue. Even though the condition is not serious it is important, and comfort can be improved and a life of semi-invalidism avoided by patient care. The low incidence of the complications of diverticulosis in those patients who follow proper management should be explained. Brown and Marcley[8] report that in 192 cases of uncomplicated diverticulosis of the colon given medical management above only 1 developed diverticulitis.

Summary

An analysis of the history of 726 cases of uncomplicated diverticulosis of the colon reveals that the symptomatology is essentially the same as that of irritable colon.

Diverticulosis of the colon is an abnormality most commonly observed in middle age. Seventy-five per cent of the cases in this series were over 50 years old. It is

most prevalent in the overweight or obese persons. Sixty-six per cent of this series were in this group.

Cancer of the gastrointestinal tract was found in 3½ per cent of these cases. It was located in the colon or rectum in the majority.

The diagnosis of diverticulosis of the colon is made only by the exclusion of any other lesion of the gastrointestinal tract and by x-ray examination.

The treatment of diverticulosis of the colon is based on the prevention of future complications and on eliminating as far as possible the underlying causes. We believe that the symptoms are due to irritable colon and not to the presence of the diverticula.

The prognosis of patients with uncomplicated diverticulosis of the colon who follow proper management is excellent.

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