Mortality from Ischemic Colitis

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Thirty-nine hospital-based cases of ischemic colitis were reviewed. There were 18 males and 21 females. Average age was 68.7 years (range, 18 to 92 years). Associated diseases among 13 patients younger than 65 included renal failure in seven patients and hematologic, vasculitic, or collagen vascular diseases in four. In 26 patients 65 or older, congestive heart failure was seen in 13, vascular disease in eight, and previous aortic surgery in four. Nineteen patients were treated nonsurgically and 8 died (42 percent mortality). Twenty patients (51 percent) underwent surgery: 18 had resection with colostomy or ileostomy and two had resection with reanastomosis; one patient underwent laparotomy followed by second-look exploration without resection. Thirteen of the 20 surgical patients died (65 percent mortality). Both patients who underwent reanastomosis died of sepsis. The data show a close association between ischemic colitis and a number of serious systemic diseases including renal failure, arteriosclerotic heart and vascular disease, and hematologic, vasculitic, and connective-tissue disease. A predilection for the right colon and sigmoid colon and splenic flexure was seen. A formidable mortality rate (53 percent) was found among patients treated both surgically and nonsurgically. [Key words: Anastomosis; Ischemic colitis]

ISCHEMIC INJURY TO THE colon is associated with a diverse spectrum of clinical and pathologic syndromes. Mild ischemic injuries present as a reversible process that ends with complete resolution of symptoms and mucosal abnormalities. More severe ischemia results in a longer course that may be complicated by stricture formation and subsequent obstruction. The most severe vascular insults may result in full-thickness gangrenous necrosis with a fulminant septic course. In earlier series, the percentage of patients with full-thickness necrosis varied widely from 6 to 77 percent.[1-5] Despite the variability in the reported incidence of full-thickness necrosis, this group is especially significant in that it represents most of the deaths attributed to ischemic colitis. In order to evaluate and define the disease in a hospitalized population, the following study was done.

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Materials and Methods

Thirty-nine consecutive cases of ischemic colitis at Hennepin County Medical Center were retrospectively reviewed from January 1983 to June 1987. All patients with segmental colonic ischemia or necrosis diagnosed by endoscopy, surgery, or at autopsy during that 4½-year period were included. Patients with total intestinal ischemia or infarction, presumptive diagnosis of intestinal ischemia without confirmation, or a history of a clinical course suggestive of inflammatory bowel disease were omitted from evaluation. The clinical characteristics, treatment, and outcome of these 39 patients were reviewed.

Patient Population

Age and Sex: The patient population included 21

TABLE 1. *Ischemic Colitis: Underlying Medical Problems in Patients Under 65*

Patients under age 65 (N = 13)	Number of patients
Chronic renal failure	7
Congestive heart failure	6
Vascular disease	5
Aortic surgery	1
Hematologic, vasculitic and collagen vascular disease	4
Sickle cell	1
Cryoglobulinemia	1
Amyloid	1
Myelodysplastic syndrome	1

females and 18 males ranging in age from 18 to 92 years (mean, 68.7 years).

Associated Disease: Thirteen of the 39 patients were under 65 years of age and five of these were under age 50. The most common medical problem in this younger age group was chronic renal failure seen in seven of 13 patients (54 percent). Six patients had congestive heart failure and five had vascular disease defined as either coronary artery, peripheral vascular, cerebrovascular, or aortic disease. One of these five had previous aortic surgery. Four of the 13 patients had a variety of hematologic and immunologic connective-tissue diseases (Table 1).

Twenty-six of the 39 patients were 65 years of age or older. The most prevalent associated medical problem was congestive heart failure in 11 of 26 patients (42 percent) followed by vascular disease in eight of 26 patients (31 percent). Four of the eight patients with vascular disease had previous aortic surgery. Six of the 26 patients were found to have dementia. Two patients had chronic renal failure and one patient each had hematologic or collagen vascular disease (Table 2).

Nineteen of the 39 patients were taking a digitalis preparation before developing evidence of ischemic colitis. Digitalis levels were available on 16 of these patients with levels ranging from 0.8 to 4.9. Four of these levels were clearly in the toxic range.

TABLE 2. *Ischemic Colitis: Underlying Medical Problems in Patients 65 or Older*

Patients age 65 or over (N = 26)	Number of Patients
Congestive heart failure	11
Vascular disease	8
Aortic surgery	4
Dementia	6
Chronic obstructive pulmonary disease	6
Diabetes	6
Hematologic plus collagen vascular disease	2
Rheumatoid arthritis	1
Myelodysplastic syndrome	1
Chronic renal failure	2

TABLE 3. *Presenting Signs and Symptoms of Ischemic Colitis* (N = 39)

	Number of Patients	(Percent)
Abdominal pain	26	67
Diarrhea, bloody	21	54
Shock	13	33
Nausea/vomiting	7	18
Distention	7	18
Altered sensorium	4	10
Anorexia	2	5

Signs and Symptoms: The most common presenting symptoms were abdominal pain in 26 of 39 patients (67 percent) and bloody diarrhea in 21 of 39 patients (54 percent). Four patients in the older-aged group presented with altered levels of consciousness and did not complain of abdominal pain. The diagnosis was suspected in these patients because of distention, ileus, or bloody diarrhea. Thirteen patients presented in shock defined as systolic blood pressure less than 90 (Table 3).

Precipitating Events: In 28 patients (72 percent), symptoms occurred spontaneously, without a prior hemodynamic event. Clear predisposing events were identified in the remaining 11 patients. Five patients developed intestinal ischemia following episodes of shock, two following myocardial infarction, two following a hypotensive episode while on hemodialysis, and one secondary to severe dehydration.

Five patients developed signs of bowel ischemia following aortic surgery and all five underwent ligation of the inferior mesenteric artery at the time of surgery. Four of the five patients had surgery on an emergency basis and the fifth case was done electively. The time of onset for ischemic symptoms varied from immediately postoperative to 6 weeks after surgery.

An additional patient developed acute renal failure secondary to acute thrombosis of her aorta distal to the superior mesenteric artery. Symptoms of ischemic colitis developed approximately four to five days later (Table 4).

Diagnosis: The diagnosis was made at surgery in 16 of 39 patients (41 percent). Endoscopy was diagnostic in 14 of 39 patients (36 percent) using either the 170 cm colonoscope (nine patients) or the flexible sigmoidoscope (five patients). One perforation occurred as a complication of colonoscopy.

Two patients had diagnostic radiographic studies including plain films in one and Gastrografin® enema in the other. The radiographic diagnosis was confirmed later by operative findings in these two patients. Diagno-

TABLE 4. *Ischemic Colitis: Predisposing Event* (N = 39)

	Number of Patients	(Percent)
Spontaneous	28	(72)
Aortic surgery	5	(13)
Emergent AAA	4	
Elective AAA	1	
Shock	5	(13)
Myocardial infarction	2	
Hemodialysis	2	
Severe dehydration	1	
Acute aortic thrombosis	1	(3)

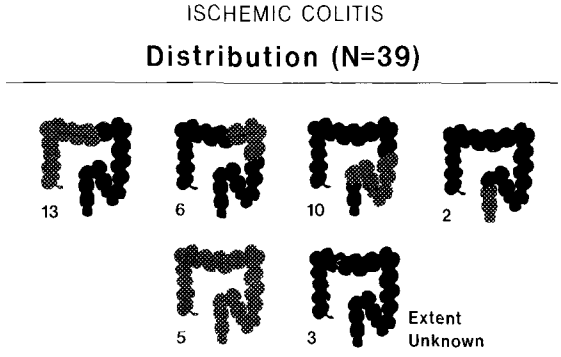

FIG. 1.

sis was made in the remaining seven patients at autopsy (Table 5).

Disease Distribution: The distribution of colonic ischemia included: right colon in 13 patients, splenic flexure in six patients, sigmoid in ten patients, rectum in two patients, and total abdominal colon in five patients. The extent was unknown in three patients in whom endoscopy was terminated after the diagnosis was established in order to avoid trauma (Fig. 1).

Results

Of the patients treated nonsurgically, 11 of 19 had mild reversible disease and survived. The remaining eight patients died for a mortality of 42 percent. Surgery was recommended to five of these patients, but was refused. Two patients were moribund, one had a massive cerebrovascular accident and the second had profound cardiogenic shock and acute renal failure. An additional patient died suddenly and was found to have a previously undiagnosed infarcted splenic flexure at autopsy (Table 6).

Follow-up data from 2 months to 3 years were available on ten of the patients managed medically. Three died of other underlying medical problems and one developed a mild recurrence associated with an asymptomatic stricture.

Twenty patients (51 percent) underwent surgery; 13 of the 20 patients died, for an operative mortality of 65 percent. Seventeen patients underwent resection without anastomosis. Two patients had resection with anastomosis and both died. One of these had a known anastomotic leak and the second died of sepsis. The remaining patient underwent exploratory laparotomy and second-look surgery without resection (Table 7).

Of the seven surgical patients who survived, three were lost to follow-up, two patients are alive 12 and 14 months after surgery, and two late deaths unrelated to the ischemic colitis occurred 6 weeks and 16 months after surgery.

TABLE 5. *Diagnosis* (N = 39)

	Number of Patients	
Surgery	16	
Endoscopy	14	
Flexible sigmoidoscopy		5
Colonoscopy		9
Radiographic	2	
Plain film		1
Contrast enema		1
Autopsy	7	

Discussion

Numerous factors determine the adequacy of colonic circulation. Arterial occlusion alone is seldom the precipitating event for an episode of ischemic colitis, largely because of the extensive collateral circulation of the colon. Complete or partial occlusion secondary to underlying arteriosclerotic vascular disease may, however, predispose to hypoperfusion during periods of decreased cardiac output.

In many patients, ischemic colitis is described as spontaneous since no recognizable hemodynamic event preceded its onset. These patients frequently are over age 50[2] and have multiple medical problems which place them at risk for colonic ischemia.[4,6,7] Subtle changes in blood volume and cardiac output in elderly patients on digitalis may result in perfusion that is inadequate to meet the metabolic demands of the colon.

Prompt recognition and aggressive management are

TABLE 6. *Ischemic Colitis: Nonoperatively Managed Patients* (N = 19)

	Number of Patients
Resolved	11
Died after refusing surgery	5
Moribund	2
Sudden death	1

TABLE 7. *Ischemic Colitis: Results of Surgery* (N = 20)

	Number of Cases	Deaths	
Resection without anastomosis	17	11	
Resection with anastomosis	2	2	
Laparotomy and second look	1	0	
TOTAL	20	13	(65%)

necessary if the high mortality associated with ischemic colitis is to be decreased. Intravenous hydration, nasogastric suction, and intravenous antibiotics constitute the initial management. Milder forms of ischemic injury will generally resolve under this treatment. In this series, patients who had partial-thickness ischemic injury responded quickly to conservative management with resolution of symptoms over a 4-to-7-day period and a benign hospital course.

Early surgical resection is essential for those patients having full thickness necrosis. Mortality rates for gangrenous colitis have remained high partly because of the difficulty in differentiating full-thickness injury from partial-thickness injury. Laboratory studies remain nonspecific and insensitive. Barium enema, previously the gold standard, has been replaced by endoscopy as the more sensitive means of early definitive diagnosis.[5] More than one third of the patients reported here were diagnosed endoscopically. Despite the accuracy of endoscopy for diagnosis, no diagnostic test is able to determine the extent of injury or to predict early or impending infarction. Therefore, the decision for surgical intervention must still be based on clinical grounds.

Digitalis has been implicated as a predisposing factor for development of ischemic colitis due to its powerful effect as a splanchnic vasoconstrictor.[8-10] Animal studies have demonstrated a decrease in mesenteric blood flow and increase in mesenteric vascular resistance with digitalis administration.[9,10] Furthermore, Treat and Ulano[10] reported that changes in mesenteric flow in dogs were greatest at higher concentrations. At the time of diagnosis, one fourth of the patients in this study had digitalis levels within the toxic range. This supports a cautious approach to the use of digitalis in patients considered to be at risk for ischemic bowel.

The overall mortality for surgical and nonsurgical patients was 21 of 39 (54 percent). Several high-risk factors were identified. Four of the five patients with abdominal aortic aneurysms who developed ischemic colitis died. The sole survivor was the one patient who underwent elective aortic surgery. The significant risk for ischemic colitis in those patients undergoing emergent resection for ruptured abdominal aortic aneurysms has previously been shown by Hagihara and Ernst[11] to be at least 60 percent as compared with a risk of 6 percent following elective resection.

An additional high-risk group included those patients who presented in shock. Twelve of 13 patients who presented in shock died, for a mortality of 92 percent. All of these patients either presented late or had a delayed diagnosis, emphasizing the need for early diagnosis and treatment. Septic complications developed in both patients having resection and primary anastomosis and we would not recommend this approach for patients having ischemic disease.

Age did not represent a risk factor for ischemic colitis. The mortality rate for the group of patients under 65 was slightly higher (62 percent) than that for patients over 65 years of age (50 percent). This probably represents the serious underlying medical problems found in the younger patient.

Summary

Review of 39 hospitalized patients with ischemic colitis reveals that the disease was associated with a mortality rate in excess of 50 percent. Ischemic colitis was found to be associated with a number of systemic diseases including renal failure, arteriosclerotic heart and vascular disease, and hematologic, vasculitic, and collagen vascular disease. The ischemic colitis was found to involve the right colon as well as sigmoid and splenic flexure. Primary anastomosis at the time of resection for ischemic colitis may be especially hazardous and should not be attempted.

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