

Ischemic colitis

Summary: Twenty cases of ischemic colitis are reviewed; 19 were obtained from autopsy files and the diagnosis in one was made from a surgical specimen. The majority of the patients were elderly with generalized arteriosclerosis. In approximately two-thirds of the patients the ischemic colitis was precipitated by preceding trauma, operation or congestive heart failure. Clinically, ischemic colitis is characterized by abdominal pain, distension and bleeding per rectum. Perforation of large bowel may occur. The lesions tend to be localized around the splenic flexure and junction of the descending and sigmoid colon, and in cases following aortic graft surgery the rectum is involved. Microscopically, there is necrosis, hemorrhage and ulceration. In less severe cases the mucosa only is affected. Cases with perforation show necrosis of all layers. It is considered that ischemic colitis is comparatively frequent and should be distinguished from other inflammatory conditions of the colon.

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Inflammatory lesions of the large bowel not caused by known pathogenic organisms have usually been considered as ulcerative colitis or regional colitis. However, a considerable number of such inflammatory lesions do not fit into either of these disease entities. There are numerous reports that ischemia may be responsible for these atypical forms of colitis.²⁻⁶

Presentation of cases

We have collected 20 cases of ischemic colitis; 19 are from our autopsy files and the diagnosis in one was made from a surgical specimen. All the cases were seen during the last eight years. According to the clinical histories and the pathological findings they may be divided into three groups (Table I).

Group I (Cases 1-7)

These patients developed the condition after a major operation or severe trauma. The first three patients were submitted to a major operation. Cases 4 and 5 underwent resection of abdominal aortic aneurysm and devel-

oped lesions in the left portion of the colon and the rectum (Figs. 1 and 2). The other two patients were previously healthy individuals who had been involved in accidents. Case 6, a 52-year-old man, had multiple fractures of the pelvis and mandible due to an industrial accident; he developed signs of ileus several days afterwards and passed blood per rectum a few hours before death. Case 7 was a young girl who tried to hang herself and was admitted in a state of severe shock, pulseless and with fixed dilated pupils. She was kept alive for about 30 hours by assisted ventilation but she did not regain consciousness.

On gross examination the large bowels from the Group I cases showed similar changes. The mucosa was hemorrhagic with multiple, sometimes longitudinal, ulcerations. Microscopical examination showed necrosis, ulceration and hemorrhages. These changes were confined to the mucosa or, in the more severe cases, extended to the submucosa and muscularis, and this was grossly evident by marked friability of the bowel. In three cases transmural necrosis was associated with fibrinous peritonitis. In four cases there was evidence of thrombosis of the small mucosal and submucosal vessels.

The following is the clinical history and findings of a typical case in the first group.

CASE 2

A 61-year-old man was admitted to hospital on December 22, 1963, because of severe pain and swelling of the right lower extremity. For the past few years he had been having intermittent claudication affecting the right leg on walking the distance of one city block.

On physical examination there was blotchy, purplish discoloration of the skin of the leg and absent popliteal and dorsalis pedis pulsations. On December 24 a right mid-thigh amputation was performed. During the operation the patient was in shock for about one hour. Two days after the operation he complained of crampy abdominal pain and showed signs of ileus. He died on the third postoperative day.

Pathological examination of the resected limb showed peripheral arteriosclerosis and acute cellulitis. At post-mortem examination there was marked arteriosclerosis of the aorta, iliac and coronary arteries. The left colon and the sigmoid were covered by fibrinous exudate. The mucosa of the colon was hemorrhagic and showed multiple ulcers (Fig. 3). The process was more severe in the sigmoid. Some ulcers were also seen in the right colon and ileum and some small ones in the mucosa of the urinary bladder. The mesenteric vessels were widely patent. Microscopically, lesions from the colon showed hemorrhage and focal necrosis of the mucosa. The inflammatory exudate was scanty. There was thrombosis of the small mucosal vessels in many places and in some areas the necrosis extended through all layers (Fig. 4).

Group II (Cases 8-15)

This group comprises eight patients, seven of whom were 70 years of age

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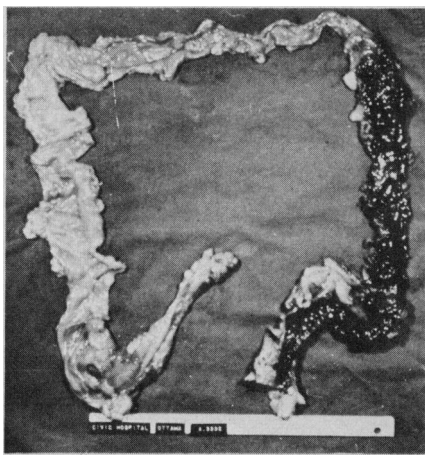


FIG. 1—Case 5. Hemorrhage of the left colon and rectum in a patient who underwent resection of abdominal aortic aneurysm 48 hours before death.



FIG. 2—Case 5. Same case as Fig. 1; microscopical examination of colon shows vascular congestion, edema of the submucosa and hemorrhage of the mucosa and submucosa. The mucosa is completely necrotic. (40x, hematoxylin-phloxine-saffron.)

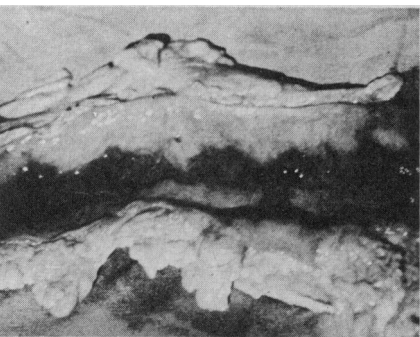


FIG. 3—Case 2. Portion of descending colon showing edema of the wall and deep longitudinal ulcerations with hemorrhagic and necrotic base.

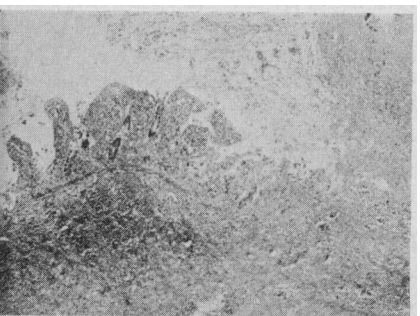


FIG. 4—Case 2. Section of colon. Hemorrhage and necrosis involves all the layers of the wall. Surface is covered by a layer of fibropurulent exudate. (40x, Masson's trichrome.)

TABLE I
Particulars of cases of ischemic colitis

Case No.	Sex	Age	Primary disease	Precipitating factor	Gastro-intestinal symptoms	Distribution	Ischemic colitis—main cause of death
Group I							
1	M	84	Adenocarcinoma of rectum	Abdominoperineal resection	Postoperative ileus; peritonitis	Entire colon	Yes
2	M	61	Arteriosclerosis; gangrene of leg	Amputation of leg	Postoperative ileus	Patchy in ileum and colon (mainly sigmoid)	Yes
3	M	55	Acute and chronic pancreatitis	Drainage of pancreatic cyst	Perforation of transverse colon; peritonitis	Transverse and descending colon	Yes
4	F	75	Aneurysm of abdominal aorta	Resection of aneurysm	Bloody diarrhea	Left colon and rectum	No
5	F	68	Aneurysm of abdominal aorta	Resection of aneurysm	Bowel distension; ileus	Left colon and rectum	No
6	M	52	Industrial accident with multiple fractures	Severe shock	Paralytic ileus; rectal bleeding	Patchy in colon	No
7	F	12	Hanging (suicide)	Severe shock	None	Patchy in colon	No
Group II							
8	F	75	Arteriosclerotic heart disease; cerebrovascular accident; diabetes	—	Diarrhea; rectal bleeding	Entire colon	Yes
9	F	78	Arteriosclerotic heart disease; ulcer of foot	—	Paralytic ileus	Transverse and descending colon	Yes
10	F	75	Mitral insufficiency; old diabetes	Congestive heart failure	Diarrhea; perforation; peritonitis	Patchy in ileum and colon	Yes
11	F	79	Arteriosclerotic heart disease; mitral and aortic stenosis; myelogenous leukemia	Congestive heart failure	Paralytic ileus	Patchy in colon	Yes
12	F	85	Aortic stenosis	Congestive heart failure	Abdominal distension	Entire colon	No
13	M	58	Pulmonary emphysema; carcinoma of pancreas	Congestive heart failure	Bloody diarrhea	Left colon	No
14	F	72	Arteriosclerotic heart disease; bleeding	Myocardial infarction	Abdominal distension	Splenic flexure and rectum	No
15	F	70	Arteriosclerotic heart disease; broncho-pneumonia	Myocardial infarction	Abdominal distension	Entire colon	No
Group III							
16	F	62	Ischemic colitis	—	Abdominal distension; perforation; peritonitis	Splenic flexure	Yes
17	F	58	Ischemic colitis	—	Perforation; peritonitis	Sigmoid colon	Yes
18	M	61	Ischemic colitis	—	Perforation; retroperitoneal abscess	Splenic flexure	Yes
19	M	68	Ischemic colitis	—	Rectal bleeding	Splenic flexure	Re-covered
20	F	55	Ischemic colitis	—	Perforation; peritonitis	Entire colon	Yes

or older. All had serious cardiovascular disease and the intestinal episode was precipitated by an acute myocardial infarct, severe congestive heart failure or shock. In four of these cases ischemic colitis was considered the main cause of death although only one patient developed a diffuse acute peritonitis.

Histologically the colon showed fibrous thickening of submucosa and muscularis or atrophy and thinning of the mucosa or a combination of

both (Figs. 5 and 7). In three cases there was evidence of fresh hemorrhage. Macrophages containing hemosiderin were observed in five instances.

CASE 14

A 79-year-old woman was admitted to hospital because of vomiting a large amount of blood during the previous few hours. There was a history of a myocardial infarct four years before; she was being treated for arteriosclerotic heart disease with digitalis and diuretics.

At the time of admission her hemoglobin was 7.5 g. per 100 ml. and three units of blood were given. The patient developed increasing dyspnea and a rising temperature, and died a short time later.

At autopsy a bleeding duodenal ulcer was found, as well as generalized arteriosclerosis and an old myocardial infarct. Necrotic lesions were seen in the rectum and splenic flexure of the colon (Fig. 6). Microscopically, in the area of the splenic flexure there was necrosis of the mucosa and fibrous scarring of the underlying tissue (Fig. 7).

Group III (Cases 16-20)

In the third group there were five patients. In these the ischemic colitis was the presenting disease and was not preceded by conditions which are known to compromise circulation. In four of the five it caused perforation of the large bowel and death; in three cases the perforation led to generalized peritonitis and in one to a localized abscess. One patient underwent segmental resection of the colon and recovered (Case 19). This patient had

a history of recurrent episodes of diarrhea in the previous six months and presented with massive rectal bleeding and abdominal pain for one day before operation. Examination of the roentgenograms showed a filling defect in the area of the splenic flexure. The resected segment of colon showed marked reduction of the lumen because of thickening and scarring of the wall. The mucosa was ulcerated and irregular over an area about 10 cm. in length (Fig. 8). The other cases of this group also showed localized lesions with chronic changes characterized by fibrosis. The following is a representative case history.

CASE 16

A 62-year-old woman was first admitted in January 1965 because of rectal bleeding, tenesmus and pain on defecation. She was found to have a mass in the anterior rectal wall, and a rectovaginal fistula was demonstrated. This was closed and the patient was discharged in good condition.

Her next admission was in September 1966 with complaints of anorexia, weakness and nausea. Her hemoglobin was 11.3 g. per 100 ml. The stools were positive for blood on two occasions. Two barium enemas as well as other investigations failed to demonstrate definite disease.

The patient was discharged but was seen again two weeks later with crampy abdominal pain. She was nauseated and claimed that she had not passed stool for one week or flatus for 48 hours. The patient was in shock with a rapid thready pulse and the blood pressure could not be registered. The abdomen was rigid with generalized tenderness and absent bowel sounds. Resuscitative measures were carried out and shortly afterwards a laparotomy was performed. She was found to have generalized peritonitis due to perforation of the colon at the splenic flexure. A proximal colostomy was performed and the area was drained. The condition of the patient continued to deteriorate and she died about 36 hours after the operation.

Postmortem examination showed an area of marked narrowing and fibrosis of the colon for a length of about 5 cm. just proximal to the splenic flexure. Microscopically there was ulceration of the mucosa, infiltration with chronic inflammatory cells and fibrosis of the submucosa (Fig. 9).

Discussion

Marston *et al.*¹ reported 16 cases of ischemic colitis. They classified their cases into three groups, the gangrenous forms, those showing localized strictures and the transient, self-healing forms. McGovern and Goulston² collected 33 cases of ischemic colitis over a period of 14 years.

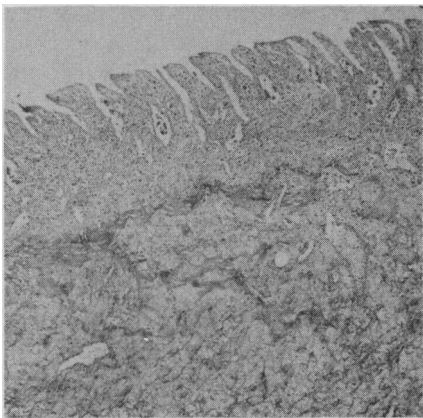


FIG. 5—Case 9. Section of descending colon. Edema, fibrin deposition and fibroblastic proliferation involve the submucosa and muscularis. The mucosa is moderately infiltrated by chronic inflammatory cells and somewhat atrophic. (40x, phosphotungstic acid hematoxylin.)

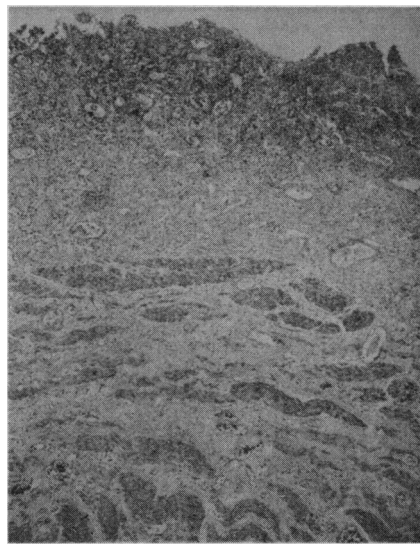


FIG. 7—Case 14. Section of colon shows necrosis and ulceration of the mucosa. There is extensive scarring of the submucosa and muscularis. (40x, hematoxylin-phloxine-saffron.)

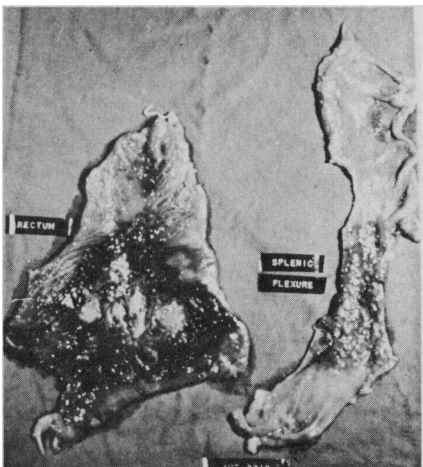


FIG. 6—Case 14. Focal hemorrhagic and necrotic lesions of colon and rectum.

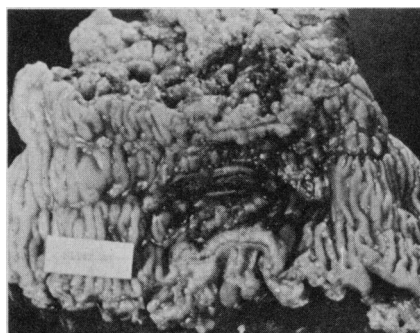


FIG. 8—Case 19. Specimen segmental colectomy. There is a localized area of narrowing due to fibrous thickening of the wall. The mucosa is focally hemorrhagic and ulcerated.

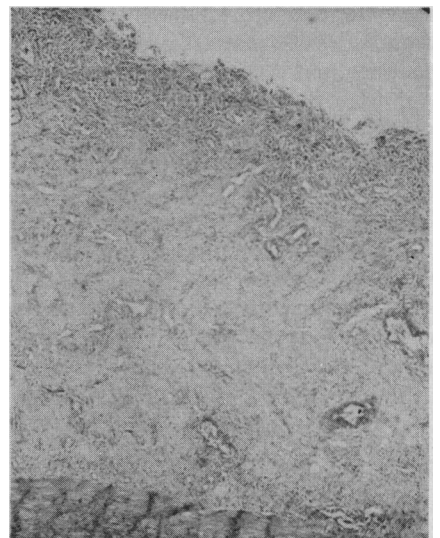


FIG. 9—Case 16. Section of colon. The mucosa is ulcerated and infiltrated by chronic inflammatory cells. The submucosa shows fibrosis. (40x, hematoxylin-phloxine-saffron.)

Recently Kilpatrick *et al.*³ have reported 10 cases of ischemic colitis of the large bowel.

Our experience with ischemic colitis is generally in agreement with that reported in previous publications and we have relied on the diagnostic criteria previously described by various authors. These criteria can be grouped in four main categories:

1. *The Clinical Picture.* The onset of symptoms is usually rapid, with colicky abdominal pain and diarrhea, often with the passage of blood. Sometimes the onset is more insidious, with abdominal distension and signs of obstruction. Rarely is there a history of mesenteric angina. Severe cases show rapid deterioration with perforation of the bowel and peritonitis.

2. *Radiological Findings.* There are localized areas of tubular narrowing of the colonic lumen and ragged "saw-tooth" irregularity of the mucosa. In other instances localized dilatations (sacculations) or "thumb printing" are seen.

3. *Sigmoidoscopic Findings.* The mucosa is friable and edematous, with numerous discrete ulcers.

4. *Pathological Changes.* The distribution is characteristically confined to the splenic flexure and sigmoid colon, the areas considered to have a less adequate blood supply. In more serious cases the lesion may extend through the entire colon.

Involvement of the rectum is often found in cases following aortic graft operations which interrupt the inferior mesenteric artery.⁷ This is consistent with our experience (Cases 4 and 5). Shippey and Acker¹⁰ in 1965 pointed out that the belief previously held, that the inferior mesenteric artery can be dispensed with because of its ample anastomotic bed, is not always true. In Case 14 the rectum was affected in the absence of a preceding aortic operation. According to Kilpatrick *et al.*,³ the rectum may be involved quite frequently, but this is contrary to our experience and that of other authors.¹

It has been demonstrated that after vascular occlusion the clinical and pathological manifestations will vary greatly, depending on individual variations in the number and size of the anastomoses of the mesenteric vessels.¹¹ Similar variability will be seen also after episodes of impaired circulation due to postoperative shock, congestive heart failure, etc.

The microscopical changes are those of ischemia, i.e. necrosis and hemorrhage, with the expected variations in severity according to the extent and age of the lesion.⁹ In less severe acute cases, necrosis and hemorrhage are confined to the mucosa. In more severe cases the lesion extends through all layers, and perforation of the bowel may result. Less serious cases may heal completely (Marston's⁸ transient, self-healing cases) or heal with resulting fibrosis and stricture.

Fifteen of our cases had associated pathological conditions known to impair circulation, viz. cardiovascular disease, postoperative shock, trauma or aortic graft surgery. The remaining cases were associated with generalized arteriosclerosis and old age. The great majority of patients were over 50 years of age when vascular deficiencies are common. It is obvious that this age group is prone to develop circulatory deficiency of the colon, particularly after added circulatory disturbances such as shock, blood loss or cardiac failure. The distinction between Groups I and II is probably somewhat artificial and there is distinct overlapping. The differences are mainly in the clinical circumstances when the lesion develops. Likewise there is overlap between the group of patients with a precipitating cause of colonic ischemia and the group in which the colonic disease was the presenting condition. (For instance, Case 19 came to autopsy several years later because of arteriosclerotic heart disease.)

Detailed vascular studies of vessels supplying the colon were not carried out in any of our cases. We consider that the clinical history, radiographic findings and pathological changes, taken together, are sufficiently characteristic to establish the diagnosis.

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Résumé

La colite ischémique

Il s'agit d'une revue de 20 cas de colite ischémique. Dans 19 cas, les données ont été puisées dans le protocole d'autopsie et dans l'autre cas, le diagnostic avait été posé d'après un spécimen chirurgical. La majorité de ces malades étaient âgés et souffraient d'artériosclérose généralisée. Chez près des deux-tiers des malades, la colite ischémique avait été précipitée par un traumatisme préalable, par une opération ou par une insuffisance cardiaque. Le tableau clinique de cette pathologie comprend particulièrement des douleurs et de la distension abdominales, outre une hémorragie par voie rectale. Le côlon peut se perforer. Les lésions ont tendance à se localiser autour de l'anse splénique du côlon et à la jonction du côlon descendant et du sigmoïde. Dans les cas consécutifs à une greffe aortique, le rectum est affecté également. Au point de vue microscopique, il existe de la nécrose, des hémorragies et de l'ulcération. Dans les cas les moins sévères, seule la muqueuse est affectée. Par contre, dans les cas compliqués de perforation, il y a nécrose des diverses couches de l'intestin. On considère que la colite ischémique est relativement fréquente et devrait être distinguée des autres états inflammatoires du côlon.

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