

Arch Clin Exp Surg 2018;7:59-64 doi:10.5455/aces.20170816073935



Ischemic colitis problems of diagnosis and treatment

Cristian Mesina¹, Theodor Viorel Dumitrescu¹, Cosmin Vasile Obleaga¹, Daniela Ciobanu²

ABSTRACT

Objective: The aim of this study was to evaluate the characteristics of colonic ischemia and to highlight predictive factors for ischemic colitis gangrenous type

Methods: We performed a retrospective study of 20 patients with ischemic colitis, whose diagnosis was confirmed in the anatomo-pathological examination during 2010-2015. Patients with ischemic colitis were divided into two groups: severe ischemic colitis with transmural colonic ischemia and/or multi-organ failure (irreversible type – gangrenous colitis) and moderate ischemic colitis without multi-organ failure (reversible type).

Results: Irreversible ischemic colitis (gangrenous ischemic type) was found in five patients. All patients with ischemic colitis gangrenous type underwent colectomy with primary anastomosis in two cases and total colectomy with ileostomy in three cases. Two patients died postoperatively (these were patients with pancolitis) because of multi-organ failure.

Conclusion: The analysis of this cases indicated four factors predictive of severe ischemic colitis (gangrenous type): abdominal tenderness, absence of hematochezia, absence of diarrhea, and hypoalbuminemia. Total colectomy with ileostomy was the prefered surgical option.

Key words: Ischemic colitis, gangrenous colitis, pancolitis

Introduction

The classification of intestinal ischemia is: acute mesenteric ischemia, chronic mesenteric ischemia (intestinal angina), and colonic ischemia (ischemic colitis).

Ischemic colitis is a condition that brings together acute or chronic colon and/or rectum wall lesions secondary to anoxia, due to venous or arterial circulation disorder. It is a fairly common digestive stroke (50-60% of all vascular disorders of the digestive tract) and occasionally lower digestive bleeding (3-10%) [1-5]. It affects mainly older and diabetic patients in 15-20% of cases [2] and patients over 50 years old, with organic colitis are less than half of cases. This disease is characterzed by a great clinical polymorphism and the incidence is underestimated due to nonspecific clinical signs and symptoms [6].

The exact causes of colon tissue hypoxia remain unknown. Non-obstructive mechanisms are distinguished by simple reduction of blood flow without any obstructive vascular lesions; cases with a real vascular obstruction (thrombosis or stenosis) may occur rarely [7].

Author affiliations : ¹Department of Surgery, ²Department of Gastroentrology, University of Medicine and Pharmacy of Craiova, Emergency Hospital of Craiova, Craiova, Dolj, Romania
 Correspondence : Cristian Mesina, MD, Department of Surgery, University of Medicine and Pharmacy of Craiova, Emergency Hospital of Craiova, Craiova, Dolj, Romania.
 Correspondence : Cristian Mesina, MD, Department of Surgery, University of Medicine and Pharmacy of Craiova, Emergency Hospital of Craiova, Craiova, Dolj, Romania.

Received / Accepted : June 18, 2017 / August 14, 2017

Material and Methods

There were analyzed 53 cases of acute intestinal ischemia admitted to our department, out of 818 cases of acute non-traumatic surgical abdomen, between January 2010 to December 2015. Out of 53 cases of acute intestinal ischaemia, eight cases were caused by acute mesenteric venous thrombosis (venous occlusion), 20 cases by mesenteric arterial occlusion, one case was non-occlusive acute mesenteric ischemia, and 20 cases were acute ischemic colitis, the latter being the subject of this article.

Patients with ischemic colitis were divided into two groups: severe ischemic colitis with transmural colonic ischemia and /or multi-organ failure (irreversible type gangrenous colitis) and moderate ischemic colitis without multi-organ failure (reversible type). In this study 15 patients had moderate ischemic colitis and the other five patients suffered from severe ischemic colitis (gangrenous type), the latter ones requiring surgery (25%).

We retrospectively reviewed five patients who underwent abdominal surgery for severe ischemic colitis (gangrenous type – being estabilished by postoperatory histological (Figure 1) examination). This study did not include patients in the following departments: cardiovascular surgery, nephrology, gastroenterology, geriatrics, and intensive care unit.

The following patients were excluded from this study: those requiring surgery for segmental ischemic colitis secondary to traumas (traumatic abdomen), strangulated hernias, volvulus, infectious colitis, colonic inflammatory disease, Crohn's disease, ulcerohemoragic rectocolitis, membranous pseudocolitis, complicated colon diverticulosis, infections with parasites or viruses such as cytomegalovirus or colon adenocarcinoma.We analysed the following patients characteristics: age, gender, the presence of comorbidities (coronary heart disease, diabetes mellitus, hypertension), preoperative laboratory data (leukocytosis, serum ureea, serum creatinine, hypoalbuminemia), preoperative SIRS (systemic inflammatory response syndrome)/ sepsis, preoperative hypotension, topography of colonic ischemia (right colon, left colon, sigmoid colon, pancolitis), and type of operation (right hemicolectomy, segmental colonic resection, subtotal/total colectomy and ileostomy). Sepsis was assessed in patients who



Figure 1. Colon wall necrosis in ischemic colitis, HE staining , x4.

presented two or more of the following conditions: (a) temperature > 38°C or < 36°C; (b) heart rate > 90 beats per minute; (c) respiratory rate > 20 breaths per minute or paCO2 < 32 mmHg; and (d) white blood cell count >12000/mm³, or <4000/mm³ or >10% immature bands [8].

Results

Ischemic colitis was classified as severe ischemic colitis (gangrenous ischemic type) in five patients.

The mean age of the patients with ischemic colitis was 72 years (range 52-84 years) and three of these were women.

All patients had cramping abdominal pains. Physical examination of patients with severe ischemic colitis revealed distenssion and abnormal tenderness, absence of hematochezia, absence of diarrhea, tachycardia and fever (Table 1). The most frequent sign of SIRS was leukocytosis (13400 – 27800/mm³).

Comorbidities were: coronary heart disease, diabetes, hypertension and in 1 case patient reported use without medical advice of NSAIDs (Nonsteroidal Antiinflammatory Drugs).

Preoperatively, we registered: anemia, hyperglicemia, elevated serum creatinine, and urea, hypoalbuminemia (Table 1).

Testing for Clostridium difficile infection was performed in all patients (those patients with the positive test were excluded from the study).

Colonoscopy was performed in all patients (15 out of 20 patients, having moderate ischemic colitis) a few hours after admission and revealed colonic mucosal ischemic lesions (hypermia, congestion, edema,

61

 Table 1. Clinical characteristics of patients with ischemic colitis gangrenous type.

Age (yr)	Sex (M/F)	White Cell Count	Albumin	Urea	Haemoglobine	Glycaemia	Absence of diarrhea	Absence of hematochezia	Physical examination	Fever tachycardia	Topography of lesions
52	Μ	13.8 x10 ⁹ /L	2.8 g/dl	67 mg/dl	8.9 g/dl	136 mg/dl	+	+	Abnormal Tenderness Abdominal distension	+	Right colon
72	F	16.7 x10 ⁹ /L	2.6 g/dl	87 mg/dl	9.3 g/dl	143 mg/dl	+	+	Abnormal Tenderness	-	Pancolitis
66	Μ	27.8x10 ⁹ /L	2.5 g/dl	89 mg/dl	10.2 g/dl	145 mg/dl	+	+	Abnormal Tenderness	+	Left colon
84	F	19.2x10º/L	1.9 g/dl	94 mg/dl	8.6 g/dl	139 mg/dl	+	+	Abnormal Tenderness Abdominal distension	-	Pancolitis
67	F	21.3x10 ⁹ /L	2.1 g/dl	82 mg/dl	9.2 g/dl	152 mg/dl	+	+	Abnormal Tenderness	+	Sigmoid



Figure 2. Colon mucosa necrosis in ischemic colitis, HE staining, x4.

bleeding upon contact with the colonoscope), and the anatomo-pathological examination performed on the biopsies taken during the colonoscopic examination indicated ischemic changes (Figure 2).

Medical management of moderate ischemic colitis without multi-organ failure (reversible type) was based on general reanimation, hemodynamic stabilization, perfusion with intravenous fluid, 3rd generation cephalosporin and metronidazole, local steroid enema, decompresed with a rectal tube of the distended colon. Anticoagulation agents must be used in patients carrying hipercoagulable conditions.

All operated patients had plain abdominal x-rays showing air-fluid levels. CT (Computed tomography) in 2 cases showed colon distension and thickening of colon wall.



Figure 3. Macroscopic aspect of the surgical specimen (total colectomy for ischemic colitis – gangrenous type).

Preoperative diagnosis in operated cases showed perforated colon cancer and appendicitis in 2 cases.

Distribution of the severe ischemic colitis was the right colon in 1 case, pancolitis in 2 cases, sigmoid in 1 case and the left colon in 1 case. All patients underwent colectomy: primary anastomosis in 2 cases and total colectomy with creation of stoma in three cases (ileostomies). Patient with ischemic colitis gangrenous type of the right colon underwent right hemicolectomy and ileotransversoanastomosis; patient with ischemic colitis gangrenous type of sigmoid colon underwent segmental colonic resection and colorectoanastomosis; patients with pancolitis (Figure 3) and severe ischemic colitis of left colon underwent total colectomy and ileostomy. Two patients died postoperatively (patients with pancolitis) because of multi-organ failure .

Discussion

Intestinal ischemia can be divided into two main types: occlusive intestinal ischemia and non-occlusive intestinal ischemia. Occlusive intestinal ischemia is divided in relation to obstructive mechanism in three types: (A) acute mesenteric ischemia: (a) – major arterial occlusion; (b) – minor arterial occlusion; (c) – embolus major; (d) – mesenteric vein thrombosis; (e) – splahnic vaso-constriction (non-occlusive mesenteric ischemia); (B) chronic mesenteric ischemia which is ischemia of the small bowel without loss of tissue viability; (C) and colonic ischemia which is ischemia involving only the colon. Of these, colonic ischemia is the most frequent in our experience [1].

Several terminologies for ischemic colitis have been attributed over the time. In 1966, Marston et al. [9] used the term ischemic colitis in a group of 16 patients, one of whom had gangrenous ischemic colitis, 12 patients with ischemic colonic strictures, and 3 patients with reversible ischemic colitis.

The term ischemic colitis is a general physiopathological term used to describe a wide variety of clinical conditions related thereto. These clinical conditions are divided into reversible and irreversible and then classified as: (a) reversible ischemic colopathy (submucosal or intramural hemorrhage), (b) reversible or transient ischemic colitis, (c) chronic ulcerative ischemic colitis, (d) ischemic colonic stricture, (e) colonic gangrene, or (fulminant universal colitis).

The incidence of ischemic colitis is difficult to assess, and many cases of transient ischemic colitis are unreported or undiagnosed.

Anamnesis plays a central role in determining the type of colon ischemia because in elderly patients, colon ischemia occurs in a certain pathological context, while young patients appear in various circumstances (cocaine, oral contraceptives and coagulations disorders) [2,10-12].

The exact causes of colonic ischemia remain unknown. Non-obstructive mechanisms characterized by a simple reduction in blood flow without obstructive lesions [13] are the most common when obstructive vascular lesions (thrombosis and stenosis) are uncommon [7]. The pathological manifestations related to colon ischemia range from edema and submucosal haemorrhage to colon perforation and peritonitis. The clinical consequences of colon ischemia depend on a variety of factors: the duration and depth of ischaemia, the cause of ischemia (reduction of flow or obstruction), the level of obstruction, rapid onset of ischemic process, adequate collateral circulation, the presence of associated conditions such as colonic distension, and virulence of microbial germs in the intestinal lumen [13].

Clinical manifestations are variable. Colonic ischemia presents with insidious onset through abdominal periombilical colic pain, located in the left iliac fossa. Pains are accompanied by accelerated intestinal transit and changes in the appearance of faeces that present either red or black blood mixed with faeces. Bleeding is usually minimal.

The clinical examination reveals abdominal tenderness located on the projection area of the ischemic colon segment, even showing signs of localized peritonitis in patients with reversible lesions, but signs of transient peritonitis lasting more than 2-3 hours may be suggestive of irreversible colonic ischemic lesions. Fever and leukocytosis may be present. No specific serum markers for ischemic colitis are described. However, elevated serum levels of lactate dehydrogenase, creatinekinase or amylase may indicate a colonic tissue injury. The combination of metabolic acidosis, increased leucocyte counts over $20x10^9/1$ and abdominal pain may be suggestive of intestinal ischaemia [14].

In the study of Kwak et al., 19 patients were analyzed with ischemic colitis gangrenous type. The most commonly observed clinical form was pancolitis, and the colon segment affected was the sigmoid colon. From the analysis of the cases, the same conclusion was reached with us that there were 4 predictive factors for gangrene ischemic colitis: abdominal tenderness, absence of hematochezia, absence of diarrhea and decrease of serum albumin level. Cases of unfavorable evolution were associated with 4 factors: arterial pH, metabolic acidosis, albumin (<3g/dl) and arterial oxygenation [15].

For intestinal ischemic colitis, fatty acid binding protein, alpha-glutathione S transferase and D-dimer are considered suspected markers and metabolic acido-

www.acesjournal.org

sis, lactate and significant basal deficiency occur in late stages (ischemic colitis gangrenous type).

The late diagnosis of colonic ischemia is explained by the low degree of suspicion despite new imagistic methods [16]. Ultrasound is considered a valid method of diagnosis of colonic ischemia in the absence of colonoscopy [16]. Angiography and nuclear medicine (In-111 label leukocyte scans) were rarely helpful in diagnosis of ischemic colitis. Patients with ischemic colitis are often under-diagnosed and gold standard is considered to be colonoscopy [17].

Colonoscopy, unlike barium enema, is considered the best imaging investigation in ischemic colitis because it detects the color changes of the colonic mucosa in the early stages and offers the possibility of obtaining biopsy fragments. More recently, colonoscopy using carbon dioxide as an insufflating agent, which is rapidly absorbed, reduces the risk of reduced intestinal perfusion with perforation [18]. During colonoscopy, a lower air insufflating will be preferred.

Beppu and colaboratores showed that endoscopic classifications were accurate indicators of severity of ischemic colitis [19].

In ischemic colitis, finding a thickening of the colon wall in CT with contrast is considered nonspecific.

Medical management of ischemic colitis is based on general reanimation, hemodynamic stabilization, perfusion with intravenous fluid. Will be avoided drugs that cause mesenteric vasoconstriction (vasopressors and digitalis). Cardiac output is maximized and urine output is monitored to ensure adequate systemic perfusion [20].

A broad – spectrum antibiotic (3rd generation cephalosporin and metronidazole) is generally used [14].

Antiplatet agents are generally not used. Anticoagulation agents must be used in patients carrying hipercoagulable conditions [21].

Blood derivatives will be administered only in severe anemia and the fluid and electrolyte status must be carefully monitored with special attention to potassium and magnesium levels, as they are adversely affected by diarrhea and tissue necrosis. Laxatives and solutions used to colonoscopy (fortrans, moviprep) will be avoided due to the possible triggering of a colonic perforation or acute toxic dilation of the colon [3]. Parenteral administration of steroids is contraindicated, but their use in the form of an enema can help to decrease edema and obtain a mucosal healing of the affected colon. In case of colon distension it is useful to introduce a rectal tube for decompression.

The indications for the surgical treatment of colonic ischemia were: increased of abdominal tenderness, elevated temperature over 38°C, and paralytic ileus occurring during the patient's surveillance period. Surgical treatment was segmental, subtotal/total colectomy depending on the viability of the affected colon [22].

Surgical treatment in colon ischemia is dependent on the topography of ischemic lesions in the colon: in the case of ischemic lesions located on the left colon, Hartmann segmental colectomy is preferred and colostomy is closed after 4-6 months, and for right colonic ischemic lesions, right hemicolectomy is indicated with ileostomy. Total/subtotal colectomy with ileostomy is indicated in cases of pancolitis. There are still controversies about laparoscopic second-look. Some authors perform second-look in the first 24 hours. Yanar and collaborators perform second-look in the first 72 hours [22]. In most studies, postoperative mortality varies between 10 and 65% [23].

Conclusions

In severe ischemic colitis, the most common clinical form was pancolitis. The analysis of this cases indicated four factors predictive of severe ischemic colitis (gangrenous type): abdominal tenderness, absence of hematochezia, absence of diarrhea and hypoalbuminemia.

Total colectomy with ileostomy was the prefered surgical option.

Conflict of interest statement

The authors have no conflicts of interest to declare. **Acknowledgments**

The authors would like to thank their reviewers for their helpful comments and acknowledge the support of the Research Grant No. 26/2014, code PN-II-PT-PCCA-2013-4-1153, entitled IMEDIATREAT – Intelligent Medical Information System for the Diagnosis and Monitoring of the Treatment of Patients with Colorectal Neoplasm – financed by the Romanian Ministry of National Education (MEN) – Research and the Executive Agency for Higher Education Research Development and Innovation Funding (UEFISCDI).

Archives of Clinical and Experimental Surgery

References

- Meşină C, Vasile I, Paşalega M, Calotã F, Vîlcea D. [Acute mesenteric ischemia][Article in Romanian]. Chirurgia (Bucur) 2008;103:385-94.
- 2. Brandt LJ, Boley SJ. Colonic ischemia. Surg Clin North Am 1992;72:203-29.
- Gandhi SK, Hanson MM, Vernava AM, Kaminski DL, Longo WE. Ischemic colitis. Dis Colon Rectum 1996;39:88-100.
- Petit A, Guédon C, Duhamel C, Lerebours E, Colin R. ["Ambulatory" ischemic colitis. Clinical course and etiologic features in 88 cases] [Article in French]. Gastroenterol Clin Biol 1990;14:739-43.
- Zukerman GR, Prakash C. Acute lower intestinal bleeding. Part II: etiology, therapy, and outcomes. Gastrointest Endosc 1999;49:228-38.
- 6. Robert JH, Mentha G, Rohner A. Ischaemic colitis: two distinct patterns of severity. Gut 1993;34:4-6.
- Toursarkissian B, Thompson RW. Ischemic colitis. Surg Clin North Am 1997;77:461-70.
- Bone RC, Balk RA, Cerra FB, Dellinger RP, Fein AM, Knaus WA, et al. Definitions for sepsis and organ failure and guidlines for the use of innovative therapies in sepsis. The ACCP/SCCM Consensus Conference Committe. Am Coll Chest Phys Soc Crit Care Med Chest 1992;101:1644 – 55.
- 9. Marston A, Pheils MT, Thomas ML, Morson BC. Ischaemic colitis. Gut 1966;7:1-15.
- Meşină C, Vasile I, Paşalega M, Calotă F, Vâlcea ID, Meşină-Botoran MI, et al. Mesenteric inflammatory veno-occlusive disease as a rare cause of acute abdomen. Rom J Morphol Embryol 2007;48:83-6.
- 11. Barcewicz PA, Welch JP. Ischemic colitis in young adult patients. Dis Colon Rectum 1980;23:109-14.
- 12. Biaggi AM, Potet F. [La colite ischémique du sujet jeune][Article in French]. Ann Pathol 1995;15:46-9.
- 13. Vasile I, Meşinã C, Paşalega M, Calotã F, Vâlcea ID. [Nonocclusive acute mesenteric ischemia][Article

in Romanian]. Chirurgia (Bucur) 2008;103:337-43.

- 14. Elder K, Lashner BA, al Solaiman F. Clinical approach to colonic ischemia. Cleve Clin J Med 2009;76:401-9.
- Kwak HD, Kang H, Ju JK. Fulminant gangrenous ischemic colitis: is it the solely severe type of ischemic colitis? Int J Colorectal Dis 2017;32:147-50.
- López E, Ripolles T, Martinez MJ, Bartumeus P, Blay J, López A. Positive Predictive Value of Abdominal Sonography in the Diagnosis of Ischemic Colitis. Ultrasound Int Open 2015;1:E41-E45.
- Doulberis M, Panagopoulos P, Scherz S, Dellaporta E, Kouklakis G. Update on ischemic colitis: from etiopathology to treatment including patients of intensive care unit. Scand J Gastroenterol 2016;51:893-902.
- Scowcroft CW, Sanowski RA, Kozarek RA. Colonoscopy in ischemic colitis. Gastrointest Endosc 1981;27:156-61.
- 19. Beppu K, Osada T, Nagahara A. Relationship between endoscopic findings and clinical severity in ischemic colitis. Intern Med 2011;50:2263-7.
- 20. Heyn J, Buhmann S, Ladurner R. Recurrent ischemic colitis in patient with Leiden factor V mutation and systemic lupus erytematous with antiphospholipid syndrome. Eur J Med Res 2008;13:182-4.
- 21. Brandt LJ, Boley SJ. ACA technical review on intestinal ischemia. American Gastrointestinal Association. Gastroenterol 2000;18:954–68.
- Yanar H, Taviloglu K, Ertekin C. Planned second – look laparoscopy in the management of acute mesenteric ischemia. World J Gastroenterol 2007;13:3350-3.
- 23. Beck DE, de Aguilar-Nascinento JE. Surgical management and outcome in acute ischemic colitis. Oschsner J 2011;11:282-5.

© eJManager. This is an open access article licensed under the terms of the Creative Commons Attribution Non-Commercial License (http://creativecommons. org/licenses/by-nc/3.0/) which permits unrestricted, noncommercial use, distribution and reproduction in any medium, provided the work is properly cited.