

Mesenteric Ischemia: Results Of Surgical Treatment And A Review Of Literature

M Mozaffar, P Kharazm, M Far, K Firoozi

Citation

M Mozaffar, P Kharazm, M Far, K Firoozi. *Mesenteric Ischemia: Results Of Surgical Treatment And A Review Of Literature*. The Internet Journal of Surgery. 2006 Volume 9 Number 2.

Abstract

Background: Acute Mesenteric Ischemia (AMI) is one of the causes of acute abdomen which occurs because of significant decrement in bowel perfusion. Mortality rates of 60 to 100 percent have been reported in different studies in relation to this fatal disease (1, 5, 11, 16,18,28). In this study, we review clinical features, laboratory findings, abdominal x rays, ECGs, intraoperative findings and results of treatment in 32 patients who were admitted in Shohada-E-Tajrish hospital with final diagnosis of AMI from March 1996 to March 2002.

Methods: 32 patients with final diagnosis of AMI who were admitted in Shohada-E-Tajrish hospital were included in this retrospective study by means of review of their files and medical records.

Findings: The disease was more common in men than women, with a 2:1 male: female ratio. The mean age of patients was 60 years. Abdominal pain was the most common symptom of patients followed by nausea, vomiting, obstipation, hematemesis, and melena. On physical exam tachycardia was prevalent. Oliguria was seen in approximately 70% of patients and it was related to mortality. 10% of patients were in shock status related to mortality. 30% of patients had peritoneal signs, but it was not related to mortality. In laboratory tests, leukocytosis was present in 95% of patients, and in 50% of cases it was more than 20000/mm³. Acidosis was seen in 80% of patients and overall mortality rate was 75%.

Conclusion: The final advice of the study is to pay intensive attention to resuscitation of the patients, correction of metabolic and homodynamic derangements, and performing laparotomy as soon as these derangements were corrected. In some patients it is necessary to perform second look operation to evaluation of the viability of the intestine.

INTRODUCTION

Acute mesenteric ischemia is one of the most fatal diseases with a mortality rate of 60% to 100% (1,2,4,5,11,16,18,28). The severity of injury depends on etiology of ischemia, systemic blood pressure, collateral circulation flow, response of mesenteric vessels to autonomic stimulators, amounts of circulatory autonomic stimulators, regional hormonal factors, presence of cellular metabolites after reperfusion of the ischemic bowel, and duration of ischemia (2,7,11,12,17,23,24,25,26). Four pathologic factors have been described as the cause of acute mesenteric ischemia including: superior or inferior mesenteric artery emboli, thrombosis of these vessels, venous thrombosis, and non occlusive mesenteric ischemia (5,9,12,21). Emboli is the most common cause of AMI (1,14,15,25). Appropriate diagnosis of this disease depends on a high clinical suspicion particularly in elderly patients who has history of cardiovascular disease

(4,7,21,22). Early diagnosis and early intervention to ameliorate vascular obstruction are critical patient's salvage (1,4,9,20,22,27). Appropriate resuscitation of the patient and diagnostic studies and early surgical or non surgical intervention is the most effective approach to save the patient (1,3,9,28). Non surgical interventions are still investigatory (3,15). However, recent studies have shown that angiography and vasodilator or thrombolytic agent injection before appearance of peritoneal signs or hemodynamic derangements, has had suitable results and may replace surgical intervention in a large number of this patients (3,13,15,16,21). At this time, appropriate surgical intervention, embolectomy, thrombectomy, vascular bypass, and resection of frankly gangrene bowel and second look is the standard treatment of this fatal disease (1,6,10,22,27). In this study we decide to review cases of mesenteric ischemia during 6 years in Shohada-E-Tajrish hospital and analyze their clinical findings, results of

paraclinical studies, and results of treatment in these patients.

PATIENTS AND METHODS

32 patients with final diagnosis of acute mesenteric ischemia who were admitted in Shohada-E-Tajrish hospital from March 1996 to March 2002 were included in this study. 2 patients died before operation in which the diagnosis was based on clinical finding and intraabdominal fluid aspiration analysis. Others were operated. Intraoperative diagnosis in all cases was mesenteric ischemia. Identification data, clinical findings, laboratory and paraclinical findings, operative procedure, intraoperative findings, etiology of the disease based on operative findings, and postoperative progression were recorded and classified and evaluated in relation to mortality.

Intra operative diagnosis of etiology was based on presence of pulse at the origin of mesenteric arteries, location of injured bowel, and mesenteric veins evaluation. Presence of pulse at the origin of mesenteric arteries make the diagnosis was emboli and absence of it result in the diagnosis of thrombosis, segmental intestinal involvement and presence of underlying disease suggests non occlusive disease and at last, thrombosis of main veins means venous thrombosis.

RESULTS

32 patients consist of 21 men (%65.6) and 11 women (%34.4) were included in this study. The mean age of patients was 60.8 ± 16.9 years.

All of 32 patients (%100) had abdominal pain which had sudden onset in 12 patients (%37.5) and sustain onset in other 20 patients (%62.5). 31 patients (%96.9) had nausea, 28 patients (%87.5) vomiting 19 patients (%59.3) obstipation, 5 patients (%15.6) hematemesis, and 5 patients (%15.6) had hematochesia.

13 patients (%40.6) had cardiac under lying disease, 4 patients (%12.5) Atherosclerosis, 5 patients (%15.6) vasculitis, 1 patient (%3.1) peritonitis, and 1 patient (%3.1) had Abdominal Aortic aneurysm.

- systemic diseases encountered in patients consisted of diabetes mellitus in 5 patients (%15.6), hypertension in 5 patients (%15.6), M.R in 2 patients (%6.2), Cardiomyopathy in 2 patients (%6.2) and scleroderma in 1 patient (%3.1). 17 patients (%53.1) had no systemic disease.

On physical examination 17 patients (%53.1) were conscious, 11 patients (%34.4) lethargic, and 4 patients

(%12.5) were agitated.

Oral temperature was normal in 26 patients (%81.2) and in 6 patients (%18.7) was further than 37.8°C . 10 patients (%31.2) were in shock condition and 16 patients (%50) had symptoms of peritonitis.

Mean systolic blood pressure on admission time and mean diastolic blood pressure were 113.8 ± 26.1 and 67.3 ± 15.2 mm Hg. Mean pulse rate was 106.8 ± 19 per minute and prosperity rate was 25.6 ± 6.1 per minute.

In head and neck exam, dehydration of mucus surfaces was present in 30 patients (%93.7). In abdominal exam, 32 patients (%100) had tender ness, 18 patients (%56.2) had guarding, and 10 patients (%31.2) had rebound tender ness. 31 patients (%96.9) had abdominal distention. Bowel sounds was decreased in 28 patients (%87.5), normal in 2 patients (%6.3) and increased in 2 patients (%6.3).

Comparison of severity of pain and severity of tenderness, guarding and rebound tenderness showed discordance in 27 patients (%84.3) and coordination in some (%15.6). Central venous catheters were inserted for all of patients and CVP was normal in 20 patients (%62.5), increased in 9 patients (%28.1) and decreased in 3 patients (%9.4).

Urinary output was less than 30cc per hour in 23 patients (%71.9) and further than 30cc per hour in 9 patients (%28.1).

Electrocardiography showed AF rhythm in 12 patients (%37.7), sinus tachycardia in 11 patients (%34.4) normal sinus rhythm in 8 patients (%25) and myocardial Infarction in 1 patient (%3.1).

White blood cell count was further than 20000/mm³ in 16 patients (%50), 10000 to 20000 in 13 patients (%40.6) and less than 10000 in 3 patients (%9.4).

Blood sugar was high in 20 patients (%62.5) and normal in other 12 patients (%37.5).

Hemoglobin was high in 12 patients (%37.5), normal in 10 patients (%31.2) and low in 10 patients (%31.2).

Blood Urea Nitrogen was high in 11 patients (%34.4), normal in 14 patients (%43.7) and low in 7 patients (%21.9).

Creatinin was high in 21 patients (65.6%) and normal in 11 patients (34.4%).

PaO₂ was low in 22 patients (%68.8) and normal in 10

patients (%31.2).

PH showed acidosis in 25 patients (%78.1) and normal in 7 patients (%21.9).

Bicarbonate level was low in 25 patients (%78.1), normal in 5 patients (%15.6) and high in 2 patients (%6.3).

Potassium was high in 7 patients (%21.9) , normal in 17 patients (%53.1) and low in 8 patients (%25).

Sodium was high in 4 patients (%12.5) , normal in 14 patients (%43.7) and low in 14 patients (%43.7).

On plain abdominal x-rays, there was distended loop in 1 patient (%3.1) , diffuse haziness in one patient , diffuse haziness and air-fluid level in 7 patients , diffuse haziness and distended loop and air-fluid level in 3 patients (%9.4) , and x-rays didn't perform in 20 patients (%62.5).

The interval between onset of pain and operation was further than 10 hours in 25 patients (%78.1) and lower than it 10 hours in 25 patients (%15.6).

2 patients died before operation. Intra abdominal fluid (based on intra operative findings or aspiration in deceased patients) was dark in 28 patients (87.5%) and bright in 4 patients (12.5%).

Intra operative findings consisted of:

Jejunum was gangrene in 13 patients (43.3%), normal in 12 patients (40%) and suspicious in 5 patients (16.7%).

Ileum was gangrene in 24 patients (80%) and normal in 6 patients (20%).

Cecum was gangrene in 13 patients (43.3%), normal in 15 patients (50%) and suspicious in 2 patients (6.7%).

Ascending colon was gangrene in 17 patients (56.7%), normal in 11 patients (36.7%) and suspicious in 2 patients (6.7%).

Transverse colon was gangrene in 15 patients (50%), normal in 12 patients (40%) and suspicious in 3 patients (10%).

Descending colon was gangrene in 7 patients (23.3%), normal in 22 patients (73.3%) and suspicious in 1 patients (3.3%).

Intra operative diagnosis of patients was emboli in 19 patients (63.3%), thrombosis in 9 patients (30%), non occlusive in 1 patient (3.3%), and venous thrombosis in 1

patient (3.3%).

The mucosa of the transected bowel had appropriate perfusion in 16 patient (53.3%), poor perfusion in 12 patients (40%) and suspicious in 2 patients (6.7%) .

DISCUSSION

As mentioned above mean age of patients was 60.8 ± 19.6 years which in approximately 10 years younger comparing to similar studies (_{2,7,11,19}). Tachycardia is common in patients and most of them had leukocytosis with mean leukocyte count of further than 20000 per mm³ Bun and Cr analysis shows that prerenal azothemia is a common complication of disease and ascertains importance of adequate resuscitation. Most of patients had abnormal pt notifying heparin prescription should be started with caution. The mean PH level shown acidosis and noticeable bicarbonate deficit was present in most cases.

In our study 67% of patients were male showing significant predominance in men which is opposite to what reported in other studies in which the disease was more common in women (_{11,19}).

Cardiac disease was the most common cause of the disease and atrial fibrillation was the most common cardiac disease in our patients.

After cardiac disease, atherosclerosis, vasculitis, peritonitis and scleroderma were the leading causes of the disease in reported studies.

Abdominal pain was the most common sign followed by nausea, vomiting, obstipation, melena and hematemesis. Only 28% of patients had adequate urinary output (≥ 30 cc per hour) which has significant relation to mortality rate ($p=0.004$).

In fact, patients with normal urinary out put have more chance to survive comparing to those with less urinary out put volume. It emphasizes on importance of appropriate resuscitation before operation.

84% of patients had discordance between severity of signs and symptoms. 34% of patients were in shock status and it had significant relation to mortality.

Abdominal x rays which were performed in 13 patients had no specific finding.

50% of patients had signs of peritonitis which has not significant relation to mortality.

Laboratory test including CBC-BS – BUN- Cr –Na-K shows abnormalities which no significant relation to mortality.

There is not significant relation between final diagnosis and mortality rate however it seems that emboli has better prognosis than thrombosis (_{17,21}).

Second look operation was performed in 7 cases which 5 patients survived with significant relation to survival.

It shows when the surgeon decides to do second operation; it may have significant benefit for the patient.

SMA embolectomy was performed on two patients, one which died on operation table and the other one was discharged after 1 week. Over all mortality rate was 75%.

CONCLUSION

This study reviews prevalence of causes of AMI, signs, symptoms, hemodynamic, biochemical and metabolic derangements, and results of operation on AMI patients. As a result of this study comprehensive history taking and physical examination, complete evaluation of the patient and paying attention to past history are the most beneficial way for surgeon to appropriate diagnosis and to help the patient.

Resuscitation should be started as soon as the diagnosis is suspicious (₁₅). Urgent laparotomy, embolectomy or vascular bypass should be performed as soon as the resuscitative trial is done (_{11,16,20,27}). Suspicious bowel- if has significant length- should be preserved and reevaluated in a second operation after 18 to 36 hours (_{10,22,27}). Gangrenous bowel should be resected however; extensive bowel resection has no survival benefit (_{2,3,24,27}).

Accurate postoperative monitoring of the patient is critical and oral feeding should be started with delay. In this situation TPN may be helpful in managing the patient. If short bowel syndrome or other complications of bowel resection occur, continuing the TPN until bowel adaptation is recommended.

References

1. Safioleas MC, Moulakakis KG, Papavassilion VG, Kontzoglou K, etc. Acute mesenteric ischaemia, a highly lethal disease with a devastating outcome. *Vasa*. 2006 May; 35(2): 106-11.
2. Acosta-Merida MA, Marchena-Gomez J, Hemmersbach-Miller M. Identification of risk factors of perioperative mortality in acute mesenteric ischemia. *World J Surg*. 2006 Aug; 30(8): 1579-85.
3. Falkensammer J, Oldenburg WA. Surgical and medical management of mesenteric ischemia. *Curr Treat Options Cardiovasc Med*. 2006 Apr; 8(2): 137-43.
4. Nonthasoot B, Tullavardhana T, Sirichindakul B, Suphapal J, etc. Acute mesenteric ischemia: still high mortality rate in the era of 24-hour availability of angiography. *J Med Assoc Thai*. 2005 Sep; 88 Suppl 4: S46-50.
5. Svab J, Rathous I, Klofanda J, Vyborny J, etc. Intestinal ischemia-consequence of intestinal malrotation. *Rozhl Chir*. 2005 Dec; 84(12): 626-30.
6. Ujiki M, Kibbe MR. Mesenteric ischemia. *Perspect Vasc Surg Endovasc Ther*. 2005 Dec; 17(4): 309-18.
7. Huang HH, Chang YC, Yen DH, Kao WF, et al. Clinical factors and outcomes in patients with acute mesenteric ischemia in the emergency department. *J Chin Med Assoc*. 2005 Jul; 68(7): 299-306.
8. Rosow DE, Sahani D, Strobel O, Kalva S, et al. Imaging of acute mesenteric ischemia using multidetector CT and CT angiography in a porcine model. *J Gastrointest Surg*. 2005 Dec; 9(9): 1262-74; discussion 1274-5.
9. Menon NJ, Amin AM, Mohammed A, Hamilton G. Acute mesenteric ischemia. *Acta Chir Belg*. 2005 Aug; 105(4): 344-54.
10. Kaminsky O, Yampolski I, Aranovich D, Gaessin E, et al. Does a second-look operation improve survival in patients with peritonitis due to acute mesenteric ischemia? A five year retrospective experience. *World J Surg*. 2005 May; 29(5): 645-8.
11. Svab J, Rathous I, Klofanda J, Vyborny J, etc. Intestinal ischemia-consequence of intestinal malrotation. *Rozhl Chir*. 2005 Dec; 84(12): 626-30.
12. Ritz JP, Gremer CT, Buhr HJ. Prognostic factors for mesenteric infarction: multivariate analysis of 187 patients with regard to patient age. *Ann Vasc Surg*. 2005 May; 19(3): 328-34.
13. Yasuhara H. Acute mesenteric ischemia: the challenge of gastroenterology. *Surg Today*. 2005 May; 35(3): 185-95.
14. Schoots IG, Levi MM, Reekers JA, Lameris JS, et al. Thrombolytic therapy for acute superior mesenteric artery occlusion. *J Vasc Interv Radiol*. 2005 Mar; 16(3): 317-29.
15. Acosta S, Ogren M, Sternby NH, Bergqvist D, et al. Clinical implications for the management of acute thromboembolic occlusion of the superior mesenteric artery: autopsy findings in 213 patients. *Ann Surg*. 2005 Mar; 241(3): 516-22.
16. Kotuch PL, Brandt LJ. Review article: diagnosis and management of mesenteric ischemia with an emphasis on pharmacotherapy. *Aliment Pharmacol Ther*. 2005 Feb; 21(3): 201-15.
17. Freeman AJ, Graham JC. Damage control surgery and angiography in cases of acute mesenteric ischemia. *ANZ J Surg*. 2005 May; 75(5): 308-14.
18. Schoots IG, Koffeman GJ. Systematic review of survival after acute mesenteric ischemia according to disease aetiology. *Br J Surg*. 2004 Jan; 91(1): 17-27.
19. Acosta S, Ogren M, Sternby NH, Bergqvist D, et al. Incidence of acute thrombo-embolic occlusion of the superior mesenteric artery - a population-based study. *Eur J Vasc Endovasc Surg*. 2004 Feb; 27(2): 145-50.
20. Baeshko AA, Klumuk SA, Lushkevich VA. Acute disorders of mesenteric circulations: the etiology, risk factors and incidence of lesions. *Angiol Sogud Khir*. 2004 May; 10(4): 99-113.
21. Martinez JP, Hogan GJ. Mesenteric ischemia. *Emerg Med Chin North Am*. 2004 Nov; 22(4): 909-28.
22. Burns BJ, Brandt LJ. Intestinal ischemia. *Gastroenterol Clin North Am*. 2003 Dec; 32(4): 1127-43.
23. Pasupathy S, Sebastian MG, Chia KH. Acute embolic occlusion of the superior mesenteric artery: a case report and discussion of management. *Ann Acad Med Singapore*. 2003 Nov; 32(6): 840-2.

24. Segatto E, Mortelet KJ, Ji H, Weisener W, et al: Acute small bowel ischemia: CT imaging findings. *Semin Ultrasound CT MR*. 2003 Oct;24(5):364-76.
25. Kramer SC, Gorich J, Oertel F, Scheld H, et al: Non-occlusive mesenteric ischemia. *Rofo*. 2003 Sep;175(9):1177-83.
26. Acosta S, Bjorck M: Acute thrombo-embolic occlusion of the superior mesenteric artery: a prospective study in a well defined population. *Eur J Vasc Endovasc Surg*. 2003 Aug;26(2):179-83.
27. Foley WD: Mesenteric ischemia. *Ultrasound Q*. 2001 Jun;17(2):103-11.
28. Karwowski J, Arko F: Surgical management of mesenteric ischemia. *Tech Vasc Interv Radiol*. 2004 Sep;7(3):151-4.
29. Corke C, Glenister K: Monitoring intestinal ischemia. *Crit Care Resusc*. 2001 Sep;3(3):176-80.

Author Information

Mohammad Mozaffar

Associate professor, Department of general and vascular surgery, Shohada-E-Tajrish medical center

Pezhman Kharazm

Resident, Department of general and vascular surgery, Shohada-E-Tajrish medical center

Mohsen Talebian Far

Resident, Department of general and vascular surgery, Shohada-E-Tajrish medical center

Kamel Firoozi

General surgeon