Middle East Journal of Digestive Diseases

Original Article

Acute Mesenteric Ischemia: Causes and Mortality Rate in Shiraz, Southern Iran

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Abstract

Background: Acute mesenteric ischemia (AMI) is a catastrophic disorder of gastrointestinal tract with high mortality. Due to recognition in advanced stages and late treatment of patients, the disease is still a highly fatal one. This study was conducted to determine the characteristics of the disease in the region.

Methods: In a retrospective study, all patients' records of public and private hospitals in Shiraz, southern Iran, with the impression of acute abdomen, bowel gangrene or abdominal pain, and patients with risk factors for the disease, who were admitted from March 1989 to March 2005, were reviewed and those with AMI were enrolled in the study.

Results: Among 10,000 patients' records, 105 patients with AMI were identified. Mean age of patients was 57 years. The most common symptom was abdominal pain (98.09%). Heart disease was seen in 44.7% of cases. The mortality rate was lower in patients undergoing mesenteric angiography (*P*=0.014). When the site of lesion was exactly defined, venous thrombosis was found to be the most common type (41.9%).

Conclusion: AMI was a common cause of acute abdomen in our area especially in the elderly with venous thrombosis as the most common type. Early diagnosis especially with early use of mesenteric angiography and treatment may decrease the mortality from AMI.

Keywords: Acute Mesenteric Ischemia; Cause; Mortality Rate; Southern Iran

Introduction

Acute Mesenteric Ischemia (AMI) is more common than the chronic form. It has different etiologies and its clinical presentation is wide and variable. Due to different factors such as increased diagnosis of the disease, aging of the population (higher life expectancy and larger percentages of old people), cardiovascular (especially in the elderly) and other systemic diseases with an increased risk in the past 25 years, the prevalence of AMI has had an increasing trend.[1, 2]

The disease is one of the most ominous causes of acute abdomen and though a fast diagnosis and prompt intervention lowers the mortality, in the past 25 years, no improvement was seen in the outcome of acute mesenteric ischemia.[1,2] The lack of a clinical picture, the low sensitivity and specificity of

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Received: February 16, 2008 Accepted: August 13, 2008

diagnostic tests and the co-morbidities associated with the disease, all resulted in a problem in diagnosis and treatment of AMI. In many cases, the diagnosis is just based on clinical suspicion that is substantiated only through surgery and pathological studies.[3]

This retrospective study was carried out in patients who were admitted to private and public hospitals in Shiraz, southern Iran to determine the causes and the mortality rate of AMI.

Materials and Methods

In a retrospective study, all hospital records of patients admitted to public and private hospitals in Shiraz, southern Iran, during 1989-2005 were collected and compared with the results of the same study in years 1988-1989 in Shiraz and other reported studies elsewhere.

The wide range of etiologies and predisposing factors of AMI necessitated the manual search and evaluation of all the hospital records of 10,000 patients admitted with abdominal pain, bowel gangrene or acute abdomen and the suspected patients with at least one known predisposing factor like atrial fibrillation, myocardial infarction or ischemia, diabetes mellitus, SLE etc. Out of these, 105 cases had a final diagnosis of AMI based on their post-operative and pathology reports. In the limited number of cases where surgery had not been performed, the diagnosis was based on para-clinical work ups like angiography.

After selection, each patient with AMI was assigned a code number and a uniform questionnaire was completed for each patient. The collected data were analyzed using SPSS software (version 11.5, Chicago, IL, USA) and a *P* value of less than 0.05 using Chi-Square and rapid fissure tests was considered significant.

Results

One-hundred and five patients were diagnosed with AMI, majority of them referred after 2001, 16% during 2001-2003 and 14.3% during 2003-2004. The mean age of the patients was 57±20 years, with a range of 7-96 years. For patients over 40 years, the mean was 65±12.7 years. There was a significant difference in mortality between patients less than 40 years (28.6%) and older (56%; *P*=0.025; Figure 1). Sixty one patients were male and 44 were female (M/F ratio=1.38).

The clinical impressions (before work-up) were AMI, bowel gangrene, bowel obstruction or perforation in 35.2%, 30.4%, and 16.19% of cases, respectively. In 5.7% of cases, it was a non-related one. Some patients had more than one clinical impression.

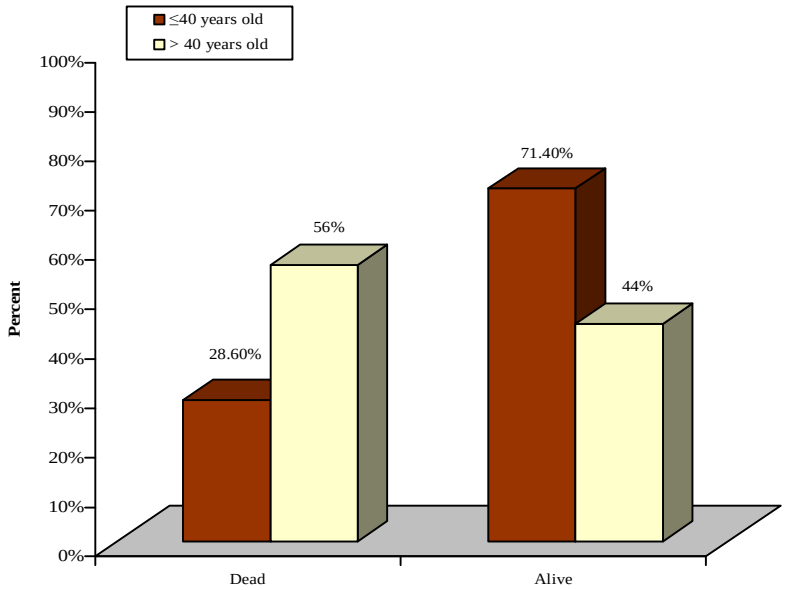

Figure 1: The relation between ages older than 40 years and increase in AMI mortality Rate in years (1989-2005), (*P* value: 0.025).

The most common complaints in these patients were abdominal pain, vomiting, and constipation observed in 98.1%, 68.5%, and 36.1% of cases, respectively (Figure 2). Predisposing factors in these patients were heart disease, hypertension and smoking demonstrated in 44%, 35%, and 30.4% of cases, respectively. Eight percent of cases had a history of undergoing a previous laparatomy. Heart disease as an important risk factor for AMI was found in 44.7% of cases including 30.4% of ischemic heart disease and 17.1% of atrial fibrillation.

The most common abnormal physical finding was increased blood pressure, while the blood pressure, body temperature, and pulse rate were normal in the majority of patients (54.2%, 60% and 54.2% of cases, respectively). Abnormal signs in abdominal examination (80%) were abdominal tenderness, abdominal distension, and decreased or absent bowel sounds noticed in 80%, 61% and 45.8% of cases, respectively (Figure 3).

Creatine phosphokokinase (CPK) and lactate

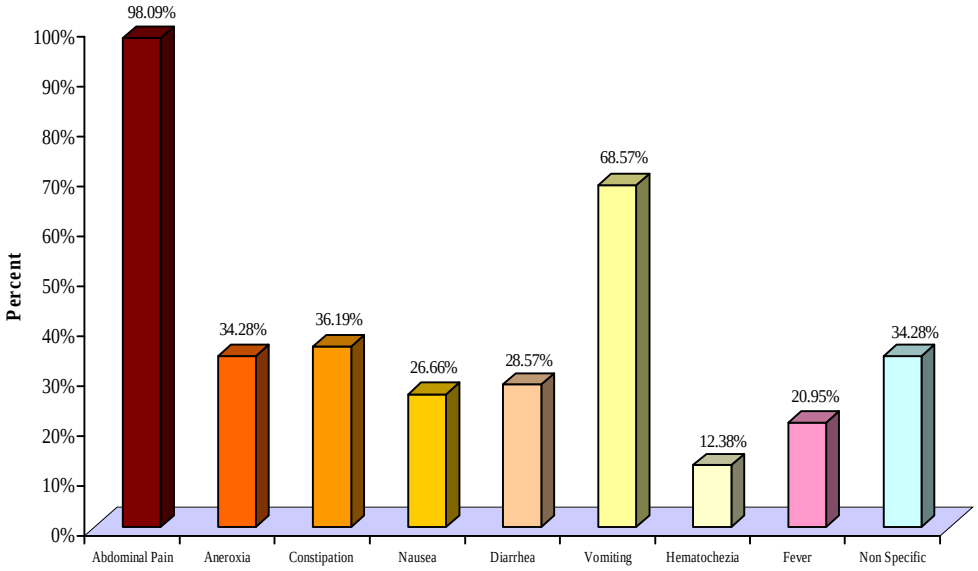

Figure 2: The frequency of symptoms in patients with AMI in Years (1989-2005).

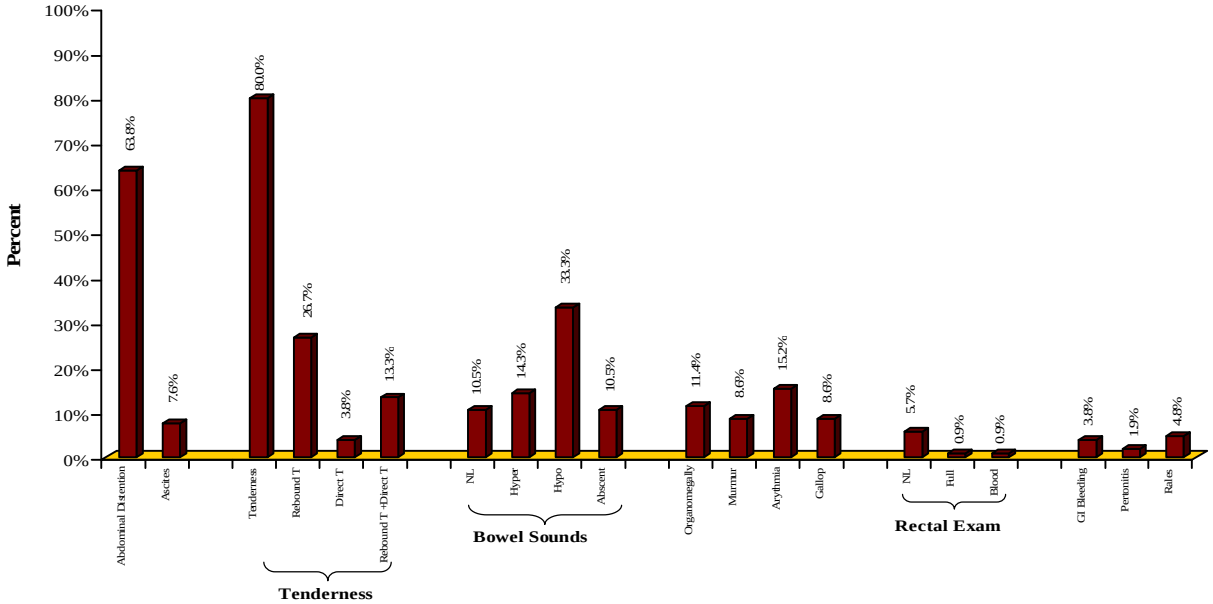

Figure 3: Frequency of clinical signs in patients with AMI in years (1989-2005).

dehydrogenase (LDH) were checked only in 11 suspected patients and alkaline phosphatase in 16 cases. All the tests showed increased values. WBC count showed leukocytosis, leukopenia, and normal counts in 67.5%, 5% and 27.5% of cases respectively. PT and PTT were prolonged in 72% of cases and was normal in 25% of patients. In patients with BUN of more than 25 mg/dL, the mortality increased in comparison to the normal BUN level indicating the negative effect on the survival (*P*=0.025; Figure 4). Heart disease did not only cause AMI but also effectively increased the mortality rate in these patients (*P*=0.038; Figure 5). The mortality in patients with acidosis was significantly higher than the other cases (*P*=0.0008; Figure 6).

Among the other paraclinical work-ups, abdominal x-ray was the most commonly performed one (94.28% of cases), abdominal ultrasonography was the second which was normal in the majority of patients except for those with ascites.

The least commonly performed procedure was

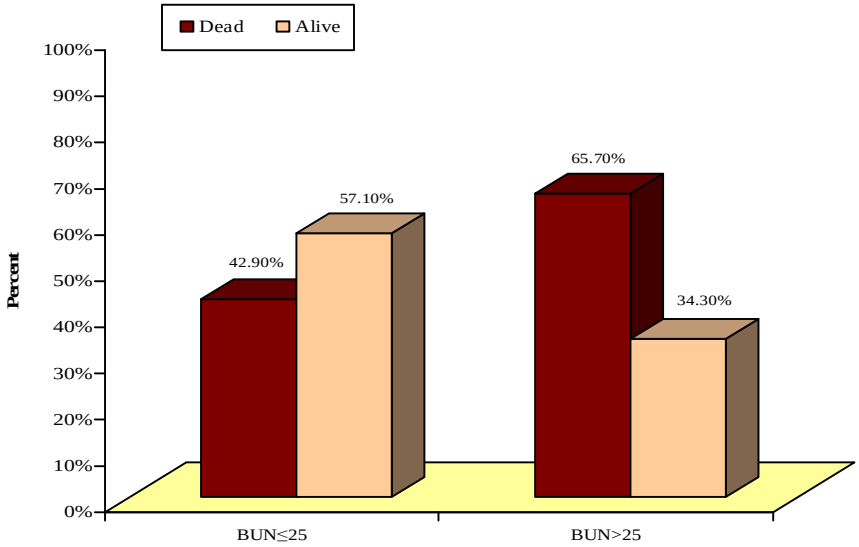

Figure 4: The relationship between BUN >25 with increase in AMI mortality rate in years (1989-2005), (*P* value: 0.027).

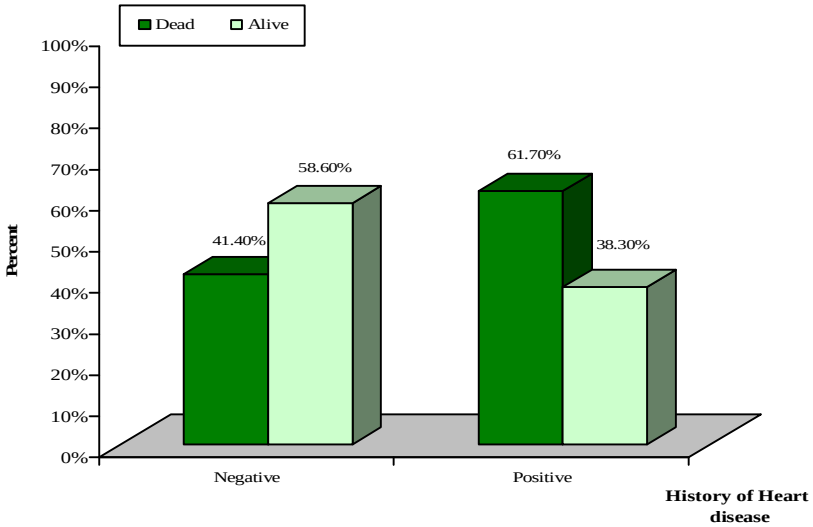

Figure 5: The relationship between History of Heart disease and increase in mortality Rate in patients with AMI in years (1989-2005), (*P* value = 0.038).

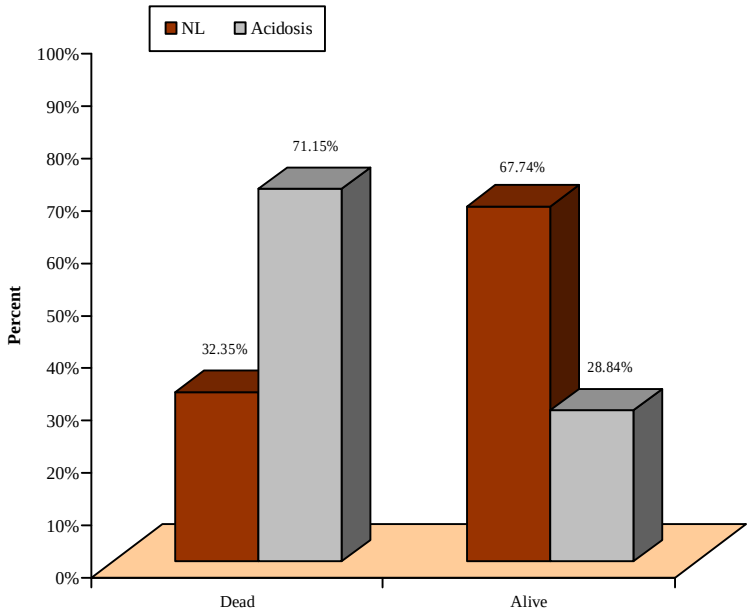

Figure 6: The relationship between acidosis and increase in AMI mortality Rate in years (1989-2005), (*P* value = 0.0008).

angiography performed in 9 patients (8.57%) associated with a significant lower mortality rate (*P*=0.014; Figure 7). During the hospital course, the most common complications following surgery were sepsis (49%) and gastrointestinal bleeding (20%) which were influential factors in increasing the mortality rate. Among medications, the most common ones were antibiotics (92.9%), anticoagulants (19.6%) and antacids (18.2%).

The mean time between the beginning of symptoms and hospital admission was 4.1±3.5 days. The time interval between arrival and surgery was 1.3±1.7 days. 86.2% of patients underwent laparatomy, 55% survived and 45% died after the operation. Eight

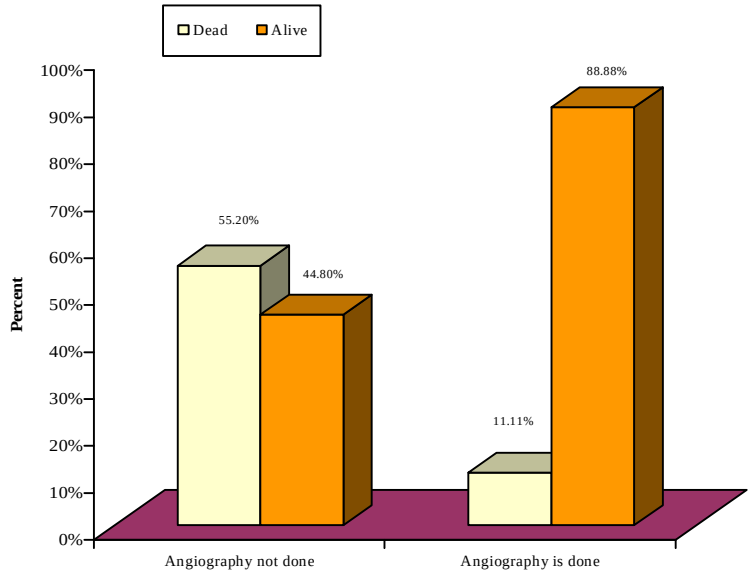

Figure 7: The relationship between diagnostic angiography and decrease in AMI mortality rate in years (1989-2005), (*P* value: 0.014).

patients died before entering the operation room. 23.6% of the patients who underwent surgery were eventually reoperated, but the second operation was mostly just an open–and–close surgery due to extensive bowel gangrene. The mean time between surgery and death was 1.9±2.6 days. The mean duration of hospitalization was 6.7±5.7days.

The type of mesenteric ischemia was venous thrombosis (41.9%) while 40% compromised the superior mesenteric vein, 6% the inferior mesenteric vein and 4.7% both veins. Arterial emboli and thrombosis affected 25.7% and 19% of patients. Simultaneous thrombosis of both the mesenteric artery and vein was seen in 3 cases. Among the arteries, superior mesenteric artery was the most affected one. There was a statistically significant relationship between arterial emboli and a history of atrial fibrillation (P=0.016).

Discussion

Sudden occlusion of gastrointestinal arteries comprises 2 % of acute abdomens and 8% of all sudden vascular occlusions.[4] Acute mesenteric ischemia constitutes 1-2 % of all gastrointestinal diseases, and due to generalized atherosclerosis in the elderly, is a cause of increased mortality in this group.[5] The key to the diagnosis is strongly based on clinical and judicial interpretation of the findings.[2,6] For accurate diagnosis**,** factors such as an accurate history based on quality of symptoms**,** appropriate physical examination and appropriate work up can rule out non-vascular causes. Clinical suspicion of vascular causes in unexplained abdominal pains in patients at risk is mandatory.[7]

In the present study, the mean age of the patients with AMI was 66±13.6 years. The difference in mortality rate between patients under 40 years (28.6%) and the older ones (56%) confirms the fact that the age over 40 years is a risk factor for a higher mortality in AMI (P=0.025; scale 7). The increase in the number of risk factors increases the mortality from AMI such as heart disease and atherosclerosis. So age is an independent risk factor for the increased mortality from the disease.

Despite the advances in understanding of the pathophysiology, the mortality of the disease in the last 25 years did not change much. In some reports, it has been 40-95%.[8] In our study, it was 50%. The primary prompt diagnosis of AMI in majority of patients (35.2%) decreased the duration between beginning of symptoms and seeking for medical attention and surgery and improved the use of diagnostic and therapeutic methods like angiography.[9] Patients who underwent angiography from 1989 to 2005 when compared with 1984 to 1988, show a decrease of mortality. In one study, 91% of patients with abdominal pain did not have any accompanying symptom.[8] In our study, abdominal pain (98.09%) and vomiting (68.5%) were the most common complaints, mostly accompanied by a clinical sign on abdominal physical exam (80%) including tenderness in 80% and abdominal distension in 60 % of cases. In more than 50% of cases, vital signs were within normal limits. Hypotension, which was reported in 40% of cases[8] was seen in 7.6% of our cases while 20% of them had elevated blood pressure.

A non-obstructive ischemia in digitalized patients may exhibit an abnormal response of a sudden increase in portal pressure accompanied by heart failure.[9] In our study, 12.5% of cases were on long term digitalis therapy, 75% led to death. It may be appropriate to consider digoxin as a risk factor of AMI in patients who have a co-morbidity of heart disease. Heart disease is one of the predisposing factors for AMI reported in 83.8% of cases.[8,11] In this study, heart disease was present in 44% of cases**,** followed by hypertension in 35.2% of subjects. The decrease in mortality due to heart disease in view of modern treatment modalities in the area led to an increased survival in heart disease patients, and increased incidence of co-morbidities.

In this study, BUN of more than 25 mg/dL (P=0.027), acidosis (P=0.0008), heart disease (P=0.038), and age over 40 years (P=0.025) were among the risk factors for increased mortality in patients with AMI.

In other studies, patients with peritoneal signs showed an 82.3% mortality rate while its absence lowered the mortality to 33.3%; moreover, peritonitis and bowel necrosis increased the mortality.[8] In our study, presence of peritoneal signs was accompanied by 100% mortality. Patients with gastrointestinal bleeding and sepsis had also a high mortality rate. Several studies reported superior mesenteric artery emboli as the most common form of AMI, followed by superior mesenteric artery and venous thrombosis and then other non-obstructive forms.[12,13] In our study, venous thrombosis (44 cases) was more prevalent than the arterial emboli (27 cases). Atrial fibrillation due to embolization had a significant association with superior mesenteric artery embolization (P=0.016).

Abdominal ultrasonography, the second most popular paraclinical procedure in our patients was normal in the majority of patients except in those with ascites showing that ultrasonography is not a reliable or useful method for diagnosis of AMI. The best method of diagnosis, despite its invasiveness, is still angiography.[3,5,7,12-14] Therefore, emergency angiography before surgery is vital. During the years 1984 to 1988, no angiography was done while 9 cases reported angiography from 1989 to 2005. In patients undergoing angiography, the mortality rate was significantly lower than in other cases (P=0.04). The low number of cases makes it difficult to clarify the exact mechanism by which angiography resulted in lower mortality rates.

In several studies, patients with a shorter interval between beginning of symptoms and presentation stand a better chance of survival.[8,16,17] In the present study, the interval between beginning of symptoms and referral of the patient to the hospital (with a mean of 4.1 days) and the time between surgery and death (with a mean of 1.3 days) were compared to the years 1984 to 1988 (with a mean of 4.5 days of beginning of symptoms to presentation, and 2 days time of presentation to surgery). It showed a relative improvement, and when compared to the years 1989 to 2005, it indicates a more precision and quality of diagnosis and treatment of the disease in recent years.

To improve the prognosis, there should be a stronger suspicion for the disease in all patients with predisposing factors for AMI, in older patients with unexplained abdominal pain, etc. Immediate mesenteric angiography or abdominal CT scan depending on individual patient's condition will probably be effective in decreasing the mortality of these patients. Moreover, immediate and invasive treatments like surgery is much more successful than just conservative management in these patients.[17,18]

In this study, BUN of more than 25 mg/dL (P=0.027), acidosis (P=0.0008), heart disease (P=0.038), and age over 40 years (P=0.025) were among the risk factors for the increased mortality in patients with AMI. The delay in referral of the patients to hospital may point to the importance of educational programs for primary care providers. Therefore, wasting time on performing exhaustive paraclinical work-ups should be avoided in any patient suspected of mesenteric ischemia.

Acknowledgement

The authors would like to thank the Center for Development of Clinical Studies of Nemazee Hospital for editorial assistance.

Conflict of interest: None declared.

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