Acute mesenteric ischemia (AMI) is a rare vascular disorder that carries a fatal prognosis. Common risk factors for superior mesenteric artery embolism include arrhythmia and myocardial infarction that was both associated in our patient. Early diagnosis and aggressive therapy can prevent bowel infarction and improve survival rates and thus outcomes since it carries a fatal prognosis. We report a case of AMI in a 79-year-old woman with a history of chronic atrial fibrillation and following recent myocardial infarction.

Keywords: Acute mesenteric ischemia, early diagnosis, embolectomy

INTRODUCTION
Acute mesenteric ischemia (AMI) is a rare vascular disorder that carries a fatal prognosis. The initiation of an early treatment before the onset of bowel infarction can reduce mortality. Reduction in mortality requires a high index of suspicion and prompt diagnosis. Therefore, although the entity is an uncommon cause of abdominal pain, diligence is always required because if untreated, mortality has consistently been reported in the range of 50%.[1]

We report a case of AMI in a 79-year-old woman with a history of chronic atrial fibrillation (AF) and following recent myocardial infarction. In this manuscript, we also discuss the epidemiological, physiopathologic, clinical, diagnostic, and therapeutic aspects of this fatal pathology.

CASE REPORT
A 79-year-old woman was referred to our hospital for management of an acute coronary syndrome with severe left ventricle dysfunction for which she presented with chest pain for more than 26 h. Her medical history was significant for AF for which she has been receiving anticoagulant therapy for 2 years. With poor therapeutic compliance, the recent international normalized ratio is at 1.2.

The physical examination revealed an irregular rhythm of approximately 85 bpm. Her arterial blood pressure was 110/69 mmHg.

Electrocardiographic at admission revealed ST-segment elevation in the anterior, septal, inferior, and low lateral leads. T-wave inversions were observed in the same leads. It also revealed AF with a ventricular frequency of 107 bpm and an incomplete right bundle branch block. Chest radiography demonstrated no cardiomegaly. Bedside echocardiography revealed a severe left ventricle dysfunction with reduced left ventricular systolic function = 30%, increased left atrial diameters and left ventricular contractility was diminished. There were no other echocardiographic abnormalities.

The patient received aspirin, an antiplatelet agent (clopidogrel charge dose), a statin, an angiotensin-converting enzyme inhibitor, and heparin 500 UI/kg/jr.

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At day 4 of hospitalization, the patient had a sudden onset of dull, continuous and severe abdominal pain. The pain was associated with nausea, vomiting, and diarrhea. The abdomen was soft and mildly tender to deep palpation, especially in the periumbilical region. Mesenteric ischemia is suspected in the presence of diarrhea and abdominal pain and recent cardiac event.

A contrast-enhanced computed tomography (CT) scan of the abdomen and pelvis showed occlusion of the proximal superior mesenteric artery (SMA) with normal enhancement of the intestinal wall [Figures 1, 2 and 3].

Laboratory data revealed raised neutrophils count (8.550 × 10^9/L) and lactate dehydrogenase (852 UL).

The patient was urgently taken to the operating room for SMA embolectomy [Figures 4 and 5]. A median laparotomy was performed, the AMS was without pulse, and an arteriotomy with embolectomy with the Fogarty probe (4F) was performed with recovery of a good in and outflow. No bowel resection was performed.

Postoperatively, she was transferred to the Surgical Intensive Care Unit, during 5 days under treatment with heparin with the self-pushing syringe 500 IU/kg/jr.

**DISCUSSION**

The incidence of the AMI is low, estimated at 0.09%–0.2% of all acute surgical admissions,[1] having a high mortality rate of 60%–90%. Declining survival rates are observed when the diagnosis is delayed, with 50% survival when diagnosed within 24 h of symptom onset, and 30% survival when diagnosed beyond this time frame.[2]

Its classical clinical presentation is a sudden onset of abdominal periumbilical pain with vomiting and diarrhea occurring most frequently in patients with a history of heart disease. However, the clinical presentation and severity of the disease varies a great deal depending on individual anatomy and location of the occlusion in the mesenteric arterial tree.[3]

Common risk factors for SMA embolism include arrhythmia, myocardial infarction which were both associated in our case, valvular disease, cardiomyopathy, and a history of embolic events.[4] A new threat of mesenteric artery embolism has emerged in relation to endovascular aortic repair technique extending above the infrarenal segment. Patel *et al.* reported an incidence rate of 5% for bowel ischemia was reported in a recent series of 99 patients undergoing fenestrated endovascular aortic aneurysm repair.[5]

Embolism of the SMA as in our patient is the most common cause of AMI. In approximately half of the cases, the acute occlusion is caused by embolism that is usually of cardiac origin.[6,7] These embolism cases are in most of the time secondary to AF.

The SMA has a normal anatomic narrowing proximal to its origin which is the most frequent site of emboli lodging, this results in a partial or complete occlusion of the arterial lumen causing mesenteric ischemia.[8,9] Most of the small intestine and
right hemicolon suffers from severe ischemia, and the patient cannot usually survive without revascularization, mortality has consistently been reported in the range of 50%.[1,10] The initiation of an early treatment before the onset of bowel infarction can reduce mortality.

Thrombi in AF are not always detected with transesophageal echocardiography (TEE) since they originate in most of the cases in the left atrial auricle.[11,12] The observation of thrombi in the left atrial auricle occurs with TEE in only 20%–40% of cases since they appear in an intermittent fashion even in patients with a chronic AF.[12] This means that a negative TEE for left atrial appendage does not exclude the left atrial origin of the AMI in a patient with chronic AF.[11-13]

Nonspecific laboratory findings include leukocytosis, elevated lactate, hemoconcentration, and metabolic acidosis.[4]

A prompt timely diagnosis of AMI is needed so that an early therapy could be initiated. Standard abdominal CT scan could not be a diagnostic test for AMI since it lacks sufficient sensitivity.[14] This technique is actually replaced by CT and magnetic resonance angiography[7,8] since both are fast and accurate investigation tools that provide direct visualization of the mesenteric vasculature, intestines, and mesentery.[14]

In our case, a CT angiography was performed. It has high spatial resolution and gives three-dimensional reconstructions, which helps visualization of the etiology of AMI and its insults on the intestines. Findings associated to mesenteric ischemia could also be captured.

The examination is fast and has the advantage of providing detailed information of the visceral organs, thereby enabling the radiologist to evaluate not only the mesenteric circulation but also the intestines and exclude any other intraabdominal pathologies. Kirkpatrick et al. demonstrated a sensitivity of 96% and a specificity of 94% for the diagnosis of AMI in 62 prospectively evaluated patients when using biphasic multi-detector-row CT angiography (CTA). These findings have since then been confirmed by other studies, reporting a sensitivity and specificity of 93% and 100% and 93% and 99%, respectively.[15,16]

L’angiography has been proposed as the “golden standard” for diagnosing mesenteric vascular occlusion (Boley). Imaging in the anterior and lateral view offers detailed information on the mesenteric vasculature regarding flow dynamics, extent of occlusive disease, and collateral circulation.

Furthermore, it is a mandatory adjunct to endovascular intervention which is increasing in the management of acute SMA occlusion. Still, many centers do not have access to angiography on a 24 h basis or do not have access to it at all. This limits the use of angiography as the primary diagnostic method in the emergency setting.[15,17]

An occlusion of the SMA is seen as a sharp, rounded filling defect in the contrast column.[15] This technique can also help in assessing the development of collateral vessels from the coeliac axis or the inferior mesenteric artery[15] that can be a sign of the chronicity of the occlusion although a rapid establishment of a collateral vessel preventing development of bowel necrosis can be observed[16,18] CTA can also probably diagnose other pathologies such as aneurysms, dissection, and uncommon pathologies though not particularly in this patient.

Surgical therapy for AMI is based on reestablishment of mesenteric blood flow through embolectomy and the resection of irreparably damaged bowel although cases of small emboli limited to SMA branches or the SMA distal to the ileocolic artery could be treated with anticoagulant agents and vasodilators.[9,15]

Ultimately, the assessment of bowel viability may not be conclusive during the primary procedure. In this case, a second-look operation is planned at a defined time interval. Many surgeons claim a second look to be mandatory, but there are no data comparing outcome after routine and on-demand relaparotomy. On second-look laparotomy, the intestine has more likely demarcated between viable and nonviable
segments and bowel resection, if necessary, can be made with better precision, sparing viable segments. In cases where there is still suspicion of borderline ischemic segments, definitive surgical treatment and reanastomosis of stapled bowel segments can be made during a third- or even a fourth-look operation.[16,18]

The decision to perform a second look or not should be based on the individual patient at hand considering the potential benefits and risks of another invasive procedure.[19]

We do not need a second-look procedure since the bowel looked well vascularized intraoperatively.

**CONCLUSION**

AMI is a relatively rare cause of abdominal pain. Common risk factors for SMA embolism include arrhythmia, myocardial infarction which were both associated in our case. Early diagnosis and aggressive therapy can prevent bowel infarction and improve survival rates and thus outcomes since it carries a fatal prognosis. Close cooperation between acute care surgeons, radiologists, anesthetists, and the vascular surgeons is essential to reduce the high mortality associated with this entity.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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