

## Superior Mesenteric Artery Thrombosis Risk and Treatment (SMART): Review of Literature

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Superior mesenteric artery thrombosis is a serious illness with potentially catastrophic implications. Diagnosis and treatment require an efficient, collaborative approach involving physicians, nursing, as well as laboratory and radiology personnel. The severity of the injury directly relates to the amount of small bowel affected and time to make correct diagnosis. Here we review the SMA thrombosis in detail and emphasize on Superior Mesenteric Artery Risk assessment and Treatment (SMART) and report a case of 64-year-old male with acute SMA thrombosis with successful surgical management.

**Keywords:** SMA Thrombosis; Acute Abdomen; Mesenteric Artery Thrombosis**Introduction**

Acute thromboembolic occlusion of the superior mesenteric artery (SMA) is a condition with a serious prognosis [1]. Acute mesenteric ischemia (AMI) is an uncommon occurrence and represents 0.1% of hospital admissions [2]. The occlusion may occur due to *in-situ* thrombosis of the vessel, most commonly due to underlying atherosclerotic disease, or embolic occlusion from a distant source, as may occur in patients with atrial fibrillation. Despite considerable advances in medical diagnosis and treatments, mesenteric vascular occlusion still has a poor prognosis, with an in-hospital mortality rate of 59 to 93%. A prompt recognition and treatment are of utmost importance [3]. For patients with acute symptoms, a rapid diagnosis is imperative since the clinical consequences can be catastrophic, including sepsis, bowel infarction, and death. Here we review the SMA thrombosis in detail and emphasize on Superior Mesenteric Artery Risk assessment and Treatment (SMART) and report a case of 64-year-old male with acute SMA thrombosis with successful surgical management.

**Pathophysiology**

Mesenteric artery thrombosis (MAT) is a condition involving occlusion of the arterial vascular supply of the intestinal system. It is a severe and potentially fatal illness typically of the SMA, which provides the primary arterial supply to the small intestine and ascending colon. Intestinal ischemia, which can affect the small or large intestine, can be caused by any process that reduces intestinal blood flow, such as arterial occlusion, venous occlusion, or vaso-

constriction. Intestinal ischemia can be classified according to the time course of onset and quality of symptoms (acute or chronic), the degree to which blood flow is compromised, and the segment of bowel that is affected. Ischemia affecting the small intestine is generally referred to as mesenteric ischemia, while ischemia affecting the large intestine is referred to as colonic ischemia. The severity of the injury directly relates to the amount of small bowel affected. In general, the more proximal the occlusion, the more severe the injury. Other factors, including the duration of ischemia, hypotension, and the presence (or absence) of collateral circulation may have a direct impact on the severity of the insult [4].

**Aetiology**

The two main causes of acute superior mesenteric artery thrombosis are:

- Embolic occlusion
- Atherosclerotic occlusion

In series done by Acosta., *et al.* the embolus/thrombus ratio was 1.4 to 1. Other rare causes, including vasculitis and aortic dissection, may be predisposing factors [5].

**Risk factors [6]**

- Atherosclerosis
- Arrhythmias (specifically atrial fibrillation)
- Advanced age
- Intra-abdominal malignancy

- Cardiac disease including CHF, recent MI, and valvular disease
- Inflammatory bowel disease (IBD) has also been implicated in the pathogenesis of acute mesenteric thrombosis.
- Hypovolemia

**Improving health care team outcomes**

SMA thrombosis is a serious illness with potentially catastrophic implications. Diagnosis and treatment require an efficient, collaborative approach involving physicians, nursing, as well as laboratory and radiology personnel. Because there is no specific test to make the diagnosis of SMA thrombosis, the general surgeon should be consulted early in the care of the patient. Although, the overall outlook for most patients is poor but patients can be salvaged with resuscitation and treatment. A similar case of SMA thrombosis was successfully managed at our center. A 64-year-old man came to the Emergency department with the acute onset of Generalized pain in abdomen along with nausea, vomiting and abdominal distension for 2 days. There was no history of fever, bleeding per rectum or hematemesis. Patient was known hypertensive and was on regular treatment. He was chronic smoker with occasional consumption of alcohol. No other significant past medical or surgical history of note. On physical examination, there was abdominal distension with tenderness, along with the presence of guarded abdomen. The bowel sounds were reduced on auscultation. On admission, white blood cell (WBC) counts were raised-12,000/mm<sup>3</sup>, serum creatinine was 1.67 mg/dl and serum amylase were: 481.80 U/L. Serum electrolytes were in normal range. CT Abdomen and Pelvis was performed, it showed intramural air and air in the mesenteric vessels, with suspicion of bowel ischemia (Figure 1).



**Figure 1**

CT angiography was performed with showed proximal and distal transition points in SMA.

Based on clinical scenario and Radiological suspicion, patient was immediately planned for emergency laparotomy. Intra-oper-

ative findings showed gangrenous extending distally from 20 cms distal to Duodeno-jejunal junction upto to mid transverse colon (Figure 2). All gangrenous bowel was excised and end to end jejunocolic anastomosis was done. Nasojejunal (NJ) tube kept distal to anastomosis. Thorough intra-peritoneal lavage was done. One drain in pelvis was inserted and abdomen was closed in layers. Postoperatively, Patient was shifted to intensive care unit for post-operative management for 3 days with intravenous parental nutrition and albumin. NJ feeding was started on 2nd post-operative day kept nil by mouth for next 2 days. Consequently, the patient was gradually shifted to oral liquid diet then soft diet. Pelvis drain output was reported initially high and was clear in colour. Gradually, the drain output reduced in amount to less than 50 cc per day. Pelvis drain was removed on 6th post-operative day. The patient recovered well and was discharged on the 10th post-operative day.

**Figure 2**

**Discussion**

Ischemia affecting the small intestine is generally referred to as mesenteric ischemia, while ischemia affecting the large intestine is referred to as colonic ischemia. Acute mesenteric ischemia is a rare abdominal emergency that usually requires wide intestinal resection and carries a high mortality rate with the adverse effects of short-bowel syndrome in the surviving patients. A critical point that influences the survival rate is prompt diagnosis in patients with AMI. The poor signs, symptoms, and nonspecific laboratory tests are among the causes of the delay in the diagnosis. Distention and severe tenderness with rebound guarding appear as a consequence of the bowel infarction. Pain associated with arterial embolism to the proximal superior mesenteric artery is typically sudden, severe, periumbilical, and often accompanied by nausea and vomiting. Patients with underlying peripheral artery disease who have a thrombotic mesenteric arterial occlusion may report worsened postprandial pain or have symptoms indistinguishable from mesenteric arterial embolism. Patients with mesenteric venous thrombosis are more likely to present with a more insidious

onset of abdominal pain that can wax and wane for a period of time before a diagnosis is established [1,2] Elevated serum amylase levels have been observed in approximately one-half of patients with intestinal ischemia [7]. In a systematic review, the pooled sensitivity for D-dimer for acute mesenteric ischemia was 96% with a pooled specificity of 40% [3]. Investigations can be helpful in the diagnostic process are DSA angiography, computed tomography angiography (CTA), and magnetic resonance angiography (MRA). Treatment of this condition is focused on early diagnosis, surgical or intravascular restoration of blood flow to the ischemic intestine, surgical resection of the necrotic bowel, and supportive intensive care. When no clinical evidence is found for an immediate surgical intervention, such as peritonitis or gastrointestinal patients with suspected AMI, because this investigation allows us to distinguish between non- thrombotic and thrombotic causes. Moreover, angiography allows us to treat the occlusion with a restoration of the blood flow by using an endovascular approach, such as percutaneous transluminal angioplasty and thrombolysis. However, in patient presenting late, emergency laparotomy with resection of gangrenous bowel with end arterectomy is the treatment of choice.

#### Problems post-surgery [8]

- Short bowel syndrome
- Peritonitis
- Multiorgan failure
- Colostomy
- Occlusion of vein graft
- Death

#### Conclusion

The possibility of vascular problem should be considered in abdominal pain. These cases should be investigated with CT-angiography or, if feasible, with arteriography to exclude an acute mesenteric infarction. Early recognition of small bowel ischemia correlates with better outcomes. Pain out of proportion to the clinical examination should raise suspicion of mesenteric ischemia. Diagnosis and treatment require an efficient, collaborative approach involving physicians, nursing, as well as laboratory and radiology personnel. Hence, it should be certainly considered in differential diagnosis of patients presenting to the emergency department with acute abdomen.

#### Authors Contributions

The authors contributed in study concept and design; data acquisition of the manuscript; critical revision of the manuscript for important intellectual content, material support and study supervision.

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