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Case Report

Acute superior mesenteric arterial thromboembolic occlusion-catheter directed thrombolysis-be on time, still be cautious!

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ABSTRACT

Acute mesenteric ischemia (AMI) is one of the major life-threatening emergencies which require immediate attention and treatment. The most common cause of AMI is superior mesenteric artery (SMA) occlusion secondary to an embolic phenomenon. We present a 55-year-old gentleman with acute SMA thromboembolism, treated by catheter directed thrombolysis (CDT) that helped in avoiding a major surgery. A 55-year-old male, with known diabetes, hypertension and atrial fibrillation, presented with acute abdominal pain and found to have SMA thromboembolism on contrast computed tomography (CT) abdomen. As there were no evidences of bowel ischemia clinically and on the CT imaging, endovascular CDT was performed following which the patient improved and discharged after 10 days of hospital stay. Timely endovascular intervention in appropriate patient population with acute mesenteric arterial thromboembolic occlusion can help avoid major surgeries, reduce the extent of non-viable bowel and decrease the resultant significant morbidity.

Keywords: Mesenteric ischemia, Thromboembolism, CDT, Atrial fibrillation

INTRODUCTION

Acute mesenteric ischemia (AMI) is rare, constituting ~ 0.2% of the patients presenting with acute abdominal pain and results from sudden cessation or reduction in the blood flow to the intestines resulting in bowel necrosis. The prognosis is poor with a high mortality rate of 60-80%.[1,2] The main etiology is cardiac emboli constituting 50% of the causes followed by pre-existing arterial plaque rupture resulting in sudden occlusion.[3,4] The other causes include prothrombotic conditions, non-occlusive causes and venous thrombosis.[3-5] The most common artery to be affected in mesenteric ischemia is the SMA which is the primary blood supply to the small bowel.[5] The blood supply should reduce by more than 50% for the bowel to become ischemic.[6] We present a 55-year-old male presented with acute abdominal pain and diagnosed to have SMA thromboembolic occlusion managed by CDT.

CASE REPORT

A 55-year-old male presented to our emergency department with severe acute generalised abdominal pain for 2 hours. He was a diabetic and hypertensive on regular medications. The patient was on warfarin for atrial fibrillation, but skipped the dose for few days. His abdominal examination did not reveal any significant focal tenderness. His blood pressure was stable at 130/85 mmhg and heart rate showed irregularly irregular rhythm. There was no acute abnormality on Electrocardiography (ECG). Echocardiography showed dilated left atrium, however there was no evidence of atrial thrombus. Ultrasound abdomen, abdominal radiograph, urine analysis, serum amylase, serum electrolytes and C reactive protein were all within normal limits. There was elevation in white blood cell counts (13000 cells/ microlitre), otherwise the complete blood count was normal. The patient had a saturation of 98% on room air.

His INR was 0.9 and his lactate was normal on further evaluation. His liver functions and renal function tests were within normal limits. With the suspicion of mesenteric ischemia, CT abdomen with contrast was performed.

Contrast CT abdomen revealed SMA thromboembolism involving the mid and distal third of SMA resulting in occlusion of majority of the small bowel branches. There was no bowel wall thickening, no collateral vessels to suggest chronic occlusion, no pneumatosis or portal venous gas or intraperitoneal free air. We had a multidisciplinary emergency meeting including the diagnostic radiologist, gastrointestinal surgeon, interventional radiologist and gastroenterologist to decide upon further management. As there was no evidence of bowel necrosis both clinically and on CT scan, the consensus was to treat the patient with CDT with surgical back up as and when required.

Patient and the family members were explained about the disease and the prognosis with probable need for a major surgery after endovascular treatment. The chance of discontinuing endovascular treatment was also explained in case of any thrombolysis complications. Digital subtraction angiogram (DSA) revealed complete SMA thromboembolism from the mid segment with resultant occlusion of the distal intestinal branches (Figure 1). We negotiated the catheter beyond the occlusion and placed the multi-side holed catheter within the thromboembolism.

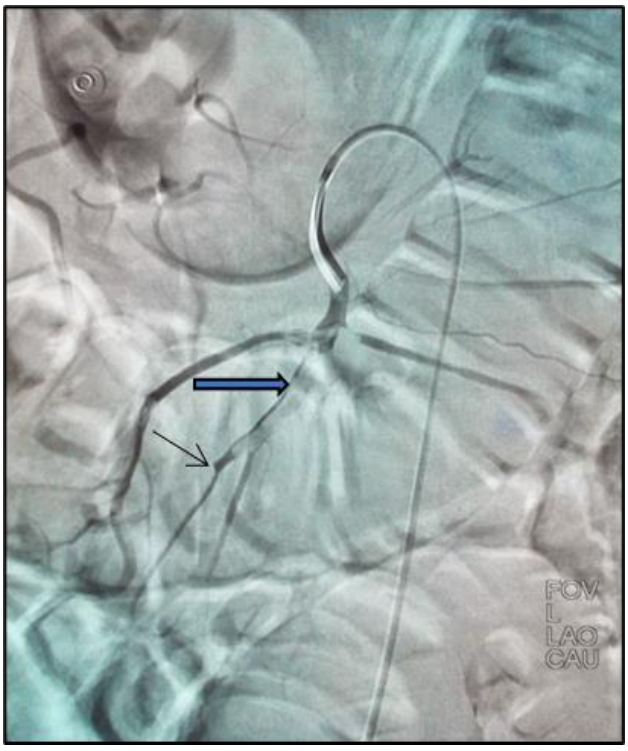

Figure 1: SMA DSA of near complete occlusion of mid/ distal SMA (bold arrow) and blocked distal intestinal branches (thin arrow).

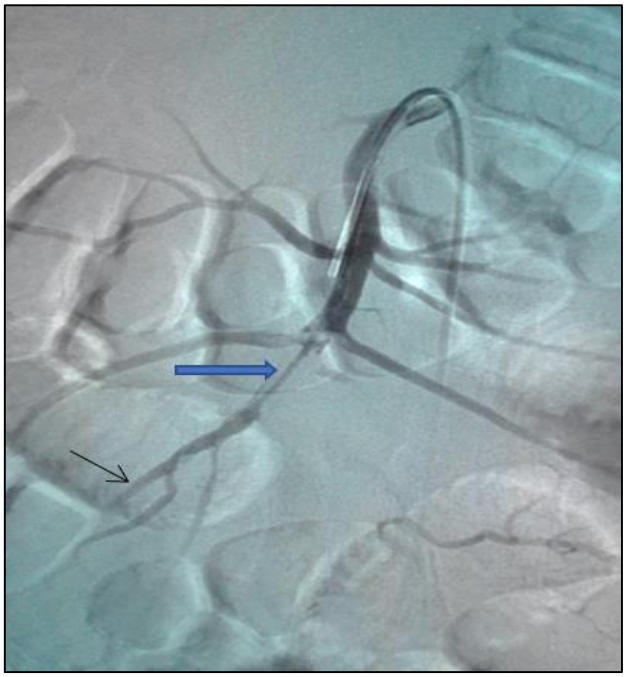

Figure 2: Follow up SMA DSA at 8 hours after CDT showing partial resolution of the SMA thrombus (bold arrow) and slight restoration of flow in the distal intestinal branches (thin arrow).

As there were no contraindications to thrombolysis, the plan was to start thrombolysis with alteplase infusion (recombinant tPA, tissue plasminogen activator) after an initial bolus of 2 mg injected within the clot. The alteplase was diluted and started on an infusion drip appropriately so that the patient receives 1 mg per hour alteplase. Along with alteplase, our hospital protocol was to start heparin intravenously, titrated based on activated partial thromboplastin time. Follow up angiogram in the first 8 hours revealed decrease in the clot load and the patient had significant symptom relief (Figure 2). We continued the alteplase at the same dosage and follow up angiograms were performed every 8 hours to keep an eye on the progress. The dosage of alteplase was reduced to half (0.5 mg per hour) after 16 hours as the restoration of blood flow was significant (Figure 3).

The patient was on supportive treatment including intravenous fluids, nasogastric tube for suction/ feeding and analgesics. Clinical signs, hemodynamics, serum aspartate aminotransferase, lactate dehydrogenase, creatine phosphokinase, C-reactive protein, complete blood counts and serum lactate were closely monitored in the intensive care unit. The surgical team was ready anytime to explore the abdomen at the earliest sign of bowel necrosis. There were no signs of clinical distress, bowel perforation/ infection during the hospital ICU stay. There was no clinical evidence of thrombolysis complications.

Final angiogram at 30 hours showed near complete resolution of the thrombus with opacification of the

majority of the distal intestinal branches (Figure 4). The total alteplase dosage was 25 mg. At 30 hours, thrombolysis was discontinued and the patient was then started on oral warfarin, with heparin cover for 3 days, so that it can be titrated to INR 2-2.5 before discharge. At one week follow up, the patient was stable and his INR was 2 at discharge.

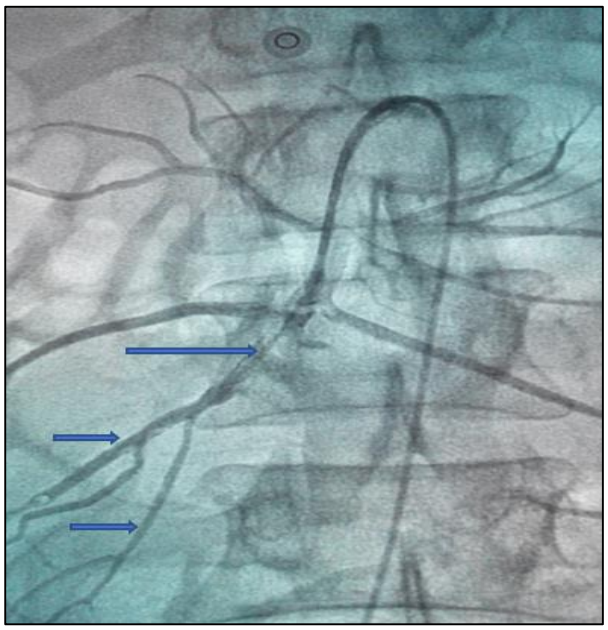

Figure 3: Follow up SMA angiogram at 16 hours show further restoration of flow in the SMA and distal intestinal branches (arrows). The alteplase dose was halved to 0.5 mg per hour infusion.

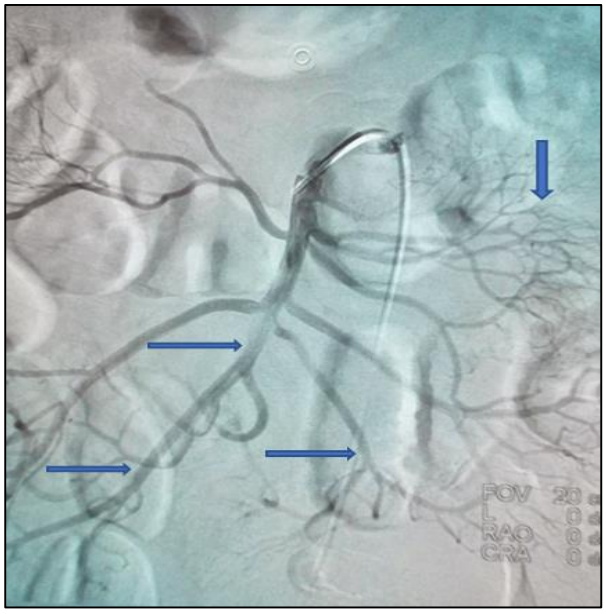

Figure 4: Final SMA angiogram at 30 hours post thrombolysis show near complete restoration of the blood flow in the SMA and distal intestinal branches (arrows). Thrombolysis was stopped and intravenous heparin was continued.

DISCUSSION

AMI secondary to SMA thromboembolism is a rare life-threatening condition which if left untreated leads to long segment bowel gangrene resulting in poor prognosis and significant morbidity.[7] The incidence of AMI is low at around 0.09 to 0.2% of acute abdominal surgical emergencies.[5] The mortality rate of acute SMA occlusion remains high at 60 to 90%.[1,2,7,8] This high degree of mortality calls for a prompt evaluation and early management of acute mesenteric artery occlusion. Early intervention using endovascular therapeutic approaches have been reported with successful outcomes in fewer studies.[9-11] The advantages of early intervention include quick reestablishment of blood flow and less bowel injury. Few studies have shown that surgery followed by endovascular management would result in less bowel resection compared to direct open surgery.[12,13]

The classic clinical scenario is a patient complaining of severe acute abdominal pain without any significant examination findings.[14] Other clinical presentations are nausea, vomiting, diarrhoea and bleeding per rectum. Patients with arterial thrombosis usually will have history of recurrent post prandial abdominal pain, weight loss and history of previous intervention. Embolic occlusions also can be recurrent, but usually present with sudden onset abdominal pain, and majority of the patients have predisposing conditions. Our patient had history of atrial fibrillation and was on warfarin therapy.

Common causes of acute abdominal pain in an emergency setting have to be ruled out and in appropriate clinical setting, a strong suspicion of mesenteric ischemia is necessary for further evaluation. Dual phase CT angiography is imaging modality of choice to evaluate for mesenteric ischemia.[5] Pre-contrast CT scan can show vascular calcification or distending hyperdense clot in SMA. Post contrast CT scan clearly demonstrate the presence and extent of arterial /venous thromboembolism along with evidence of bowel necrosis if any. Features which can give a clue to bowel gangrene include bowel wall thickening, reduced mucosal enhancement, pneumatosis, portal venous gas, and dilated bowel loop.[5] There can also be free intraperitoneal air which indicates bowel perforation secondary to transmural necrosis. Multiplanar reconstructions help us to clearly evaluate ostium and also to look for the extent of occlusion.

CT angiography performed in our patient showed complete thromboembolic occlusion of mid/ distal SMA with resultant occlusion of the distal intestinal branches. The management starts in the emergency department with fluid resuscitation, electrolyte correction and serum tests for close monitoring. The aim of the treatment is to re-establish the blood supply, decrease the extent of ischemia/ bowel necrosis and if need be, resect non-viable bowel.[5] Clinical evidence of peritonitis or CT evidence of bowel necrosis mandates surgery at earliest.

Our patient had acute SMA Thromboembolic occlusion managed by CDT for 30 hours with resultant complete revascularisation and favourable clinical outcome. The total dosage we used was 25 mg alteplase as we halved the dose to 0.5 mg per hour after the 16 hours check angiogram. The dosage of alteplase had been different and extensively been studied in patients with peripheral arterial thrombosis. Different dosages of rtPA have been applied including 0.1 mg/kg/hour and from 0.25 to 10 mg/hour. Generally, higher doses of rtPA have not been considered beneficial.[15] Commonly used alteplase dose today is: bolus, 2 to 5 mg, followed by continuous infusion, 0.5 to 1 mg/hr (40 mg maximum).[15]

Zhang et al in their study performed endovascular treatment in 18 patients of SMA thromboembolism with successful outcome. They suggest endovascular therapy as a promising alternative to surgery in acute SMA thromboembolism.[7] Emori et al have reported successful revascularisation of SMA thrombus following endovascular balloon angioplasty and thrombolysis.[2] According to us, endovascular therapy is a helpful initial strategy to reduce the bowel necrosis, provided it is agreed by the multidisciplinary team based on the clinical background and the surgical back up is ready to explore at the earliest sign of worsening.

CONCLUSION

Acute mesenteric arterial occlusion is a life-threatening emergency. Even with classic clinical presentation, it requires a strong suspicion for making the diagnosis. CT angiography is modality of choice to identify presence and extent of vascular thrombosis. CT also gives clue on the bowel viability apart from clinical signs and serum markers. Early endovascular treatment with CDT can help in restoration of blood flow and reducing bowel necrosis. Though our patient showed improvement in symptoms and restoration of flow in SMA following CDT, we observed him closely in the intensive care unit for one week for any early evidence of bowel necrosis. We had a low threshold to explore him to evaluate for bowel viability, but we did not as he showed appropriate clinical improvement. However, we recommend an institution-based protocol for management of acute mesenteric thromboembolic occlusive disease with a low threshold to explore the abdomen for bowel viability assessment.

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