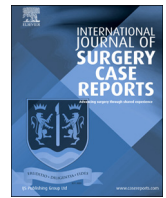




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Endovascular management of acute mesenteric ischemia in a young patient with thyrotoxicosis and atrial fibrillation: A case report and review of the literature

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ABSTRACT

INTRODUCTION: Acute mesenteric ischemia caused by an embolism resulting from atrial fibrillation in a thyrotoxic young male patient is a rare event. Endovascular intervention is increasingly being considered as the primary modality of treatment in selected patients.

PRESENTATION OF CASE: A 41-years male known to have hyperthyroidism presented with atrial fibrillation, acute mesenteric ischemia, splenic infarction, and left renal infarction. He was successfully managed with endovascular intervention of the superior mesenteric artery.

DISCUSSION: Acute mesenteric ischemia has a high mortality rate. CT angiography is the investigation of choice for diagnosis of the mesenteric vessels occlusion and assessment of bowel ischemia. The clinical presentation guides into the treatment and the choice between open surgery and endovascular intervention as the primary modality of treatment. Thyrotoxicosis is a risky comorbid condition for any procedure to be done, so proper perioperative management is essential to decrease morbidity and mortality.

CONCLUSION: Prompt diagnosis and management of acute mesenteric ischemia is essential to decrease the morbidity and mortality rates. Endovascular management can be considered as a primary modality of treatment in selected cases.

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1. Introduction

Acute mesenteric ischemia caused by an embolism resulting from atrial fibrillation in a thyrotoxic young male patient is a rare event. Acute mesenteric ischemia has a high mortality rate of 50%–80% [1,2], therefore, a high index of suspicion, prompt diagnosis, and treatment are essential to reduce morbidity and mortality rates. Endovascular intervention is increasingly being considered as the primary modality of treatment in selected patients with insidious onset and without peritonitis. Here we present our case who was successfully managed by endovascular intervention. This work has been reported in line with the SCARE criteria [3].

Abbreviations: AMI, acute mesenteric ischemia; SMA, superior mesenteric artery; SSE, systemic embolic events.

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2. Case presentation

A 41 years old male patient presented to the emergency department complaining of mild vague abdominal pain, general fatigue, palpitation, agitation, and insomnia of 4 days duration. He also complained of a significant weight loss of 17 Kgs in one month (from 73 to 56 kgs). The patient is a known case of bilateral recurrent kidney stones and hyperthyroidism on Carbimazole and Propranolol. Otherwise, the family and the psychosocial history was negative. On physical examination he was tachycardic with irregular 110 beats/min, afebrile, and with normal blood pressure. The abdomen was soft and lax with mild tenderness. His laboratory values showed markedly elevated WBCs of 36,000/mm³ with neutrophils being 81.40%. Also, there were elevated Lactate Dehydrogenase 723.00 U/L (normal between 264.60–441.00), elevated ESR and CRP, elevated T4 42.44 pmol/L (normal 12.00–22.00), normal T3, and suppressed TSH 0.005 mIU/L (normal 0.270–4.200). Otherwise the kidney function test, electrolyte levels, and liver function test were normal. Blood cultures for aerobic and anaerobic bacteria showed no growth. Four days prior to admission he had a thyroid function test which showed markedly elevated T3 19.56 pmol/L (normal 3.10–6.80), elevated T4 74.74 pmol/L

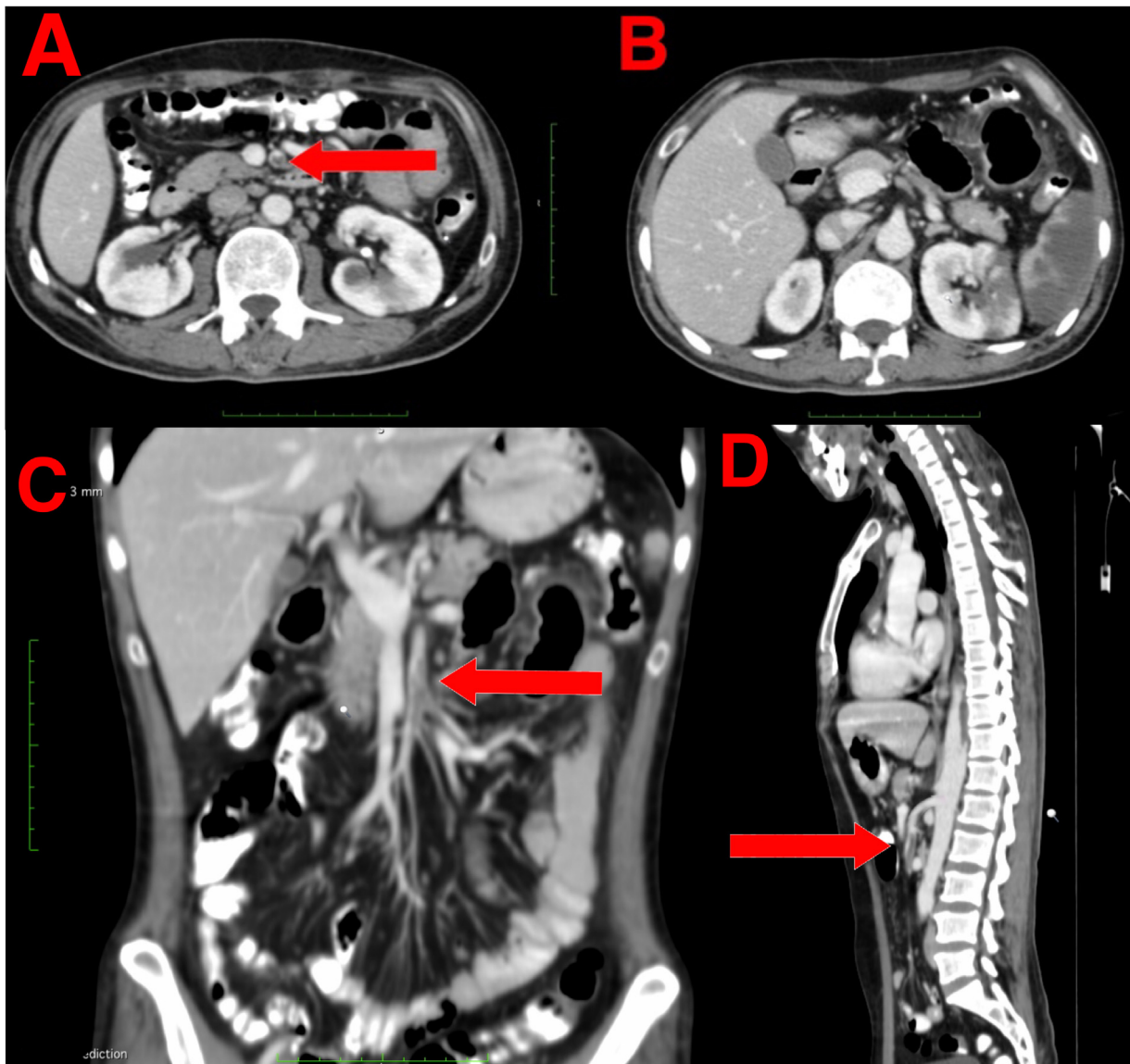


Fig. 1. A CT Angiography of chest abdomen and pelvis done on presentation showing (A) Axial section distal to the origin of SMA showing partial occlusion by embolus (red arrow in the three views), (B) Axial section showing the splenic and left kidney infarcts, (C) Coronal section showing the SMA, (D) Sagittal section showing the SMA and a partially occlusive thrombus in the descending thoracic aorta.

(normal 12.00–22.00), and suppressed TSH 0.005 mIU/L (normal 0.270–4.200). He was managed by increasing the doses of Carbimazole and Propranolol with significant improvement on the levels of T3 and T4 as shown on the day of admission.

The patient had a CT Angiography (Fig. 1) which showed partial occlusive thrombi in the descending thoracic aorta and the superior mesenteric artery (SMA). Also, there was an occlusive thrombus in the splenic artery with the spleen almost replaced by a few large hypodense areas representing splenic infarction. The jejunum appeared thickened, edematous with pneumatosis intestinalis, mostly related to the SMA thrombosis. A Wedge area of subtle enhancement was noted in the upper pole of the left kidney may represent an area of early infarction. Few bilateral renal cortical cysts noted, the largest seen in the midportion of the left kidney measuring about 1.6×1.7 cm. Few bilateral non-obstructing renal stones seen, the largest seen in the lower calyceal group of the left kidney measuring about 2 cm in diameter.

The patient was managed by intravenous heparinization, intravenous Imipenem, and prepared for endovascular SMA intervention by the team composed of the interventional radiologist

and the vascular surgeon. In the catheterization laboratory we managed through the right common femoral artery approach. The angiogram of the SMA showed an embolus distal to the origin of the middle colic artery causing severe stenosis of the SMA and occlusion of some jejunal branches (Fig. 2A). Suction embolectomy was performed with the extraction of thrombotic material followed by intra-arterial injection of 4000 IU of Tenecteplase as thrombolytic agents. The final angiogram showed opening of the occluded branches and better flow in the artery (Fig. 2B). The patient was monitored in the ICU where he had a smooth postoperative course. He was continued on Heparin infusion which was switched to warfarin. The patient improved clinically and lab wise and he was discharged from the hospital after 6 days for follow up in the clinic, and he was continued on warfarin, Carbimazole and Propranolol. The patient was thankful that he was spared an open surgery, and he was compliant with the prescribed medications and the follow-up. A CT Angiography was done 10 months later (Fig. 3) showed patency of the SMA, atrophy of the spleen due to the previous infarction, and right renal hydronephrosis

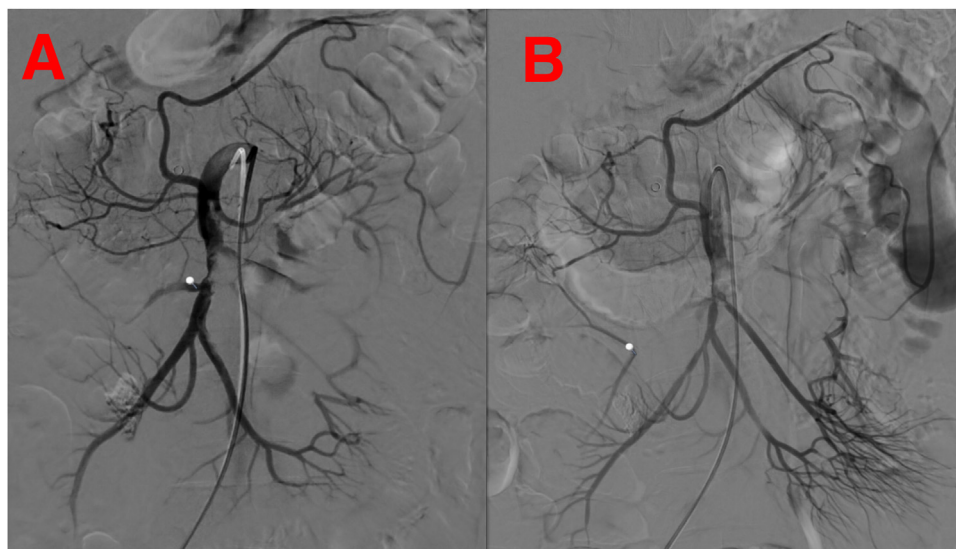


Fig. 2. SMA angiograms done during the endovascular procedure, (A) at the beginning showing a partial occlusion of the SMA and a partial perfusion of the bowel, and (B) at the end of the procedure showing the revascularization and the opening of some closed branches.

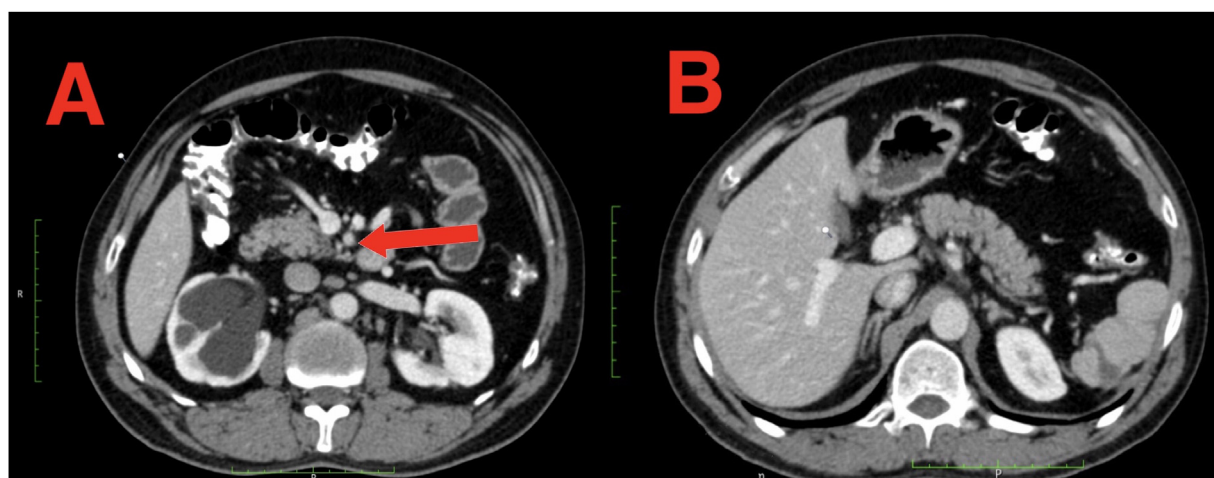


Fig. 3. A CT Angiography 10 months later showing, (A) patent SMA, (B) atrophy of the spleen due to the previous infarction.

due to his kidney stone problem for which he was admitted to the urology department.

3. Discussion

Overt hyperthyroidism has a prevalence of 0.2%–1.3% and it is more common in women than men [4,5]. Atrial fibrillation is a common problem in hyperthyroidism patients with an incidence of 10%–25% [6]. The incidence of atrial fibrillation or flutter within 30 days of diagnosis with hyperthyroidism is 8.3% (1%–20%), and it increases with increasing age and with the presence of preexisting cardiac disease [7]. It was only 1% in patients younger than 40 years like our patient [7].

Hyperthyroidism affects the hemostatic balance leading to a hypercoagulable state, which may contribute to thromboembolism [8,9]. In addition, Atrial fibrillation is a known cause of thromboembolism of cardiac origin which may present in one or more manifestations: The most common manifestation is stroke with an

incidence of 1.92 of 100 patient-years, and less common manifestations are systemic embolic events (SSE) with an incidence of 0.24 of 100 patient-years [10]. The distribution of SSE involved the lower limbs (58%), mesenteric (22%), upper limbs (10%), renal (6%), and splenic (3%) [10].

Acute mesenteric ischemia has a low incidence with 0.09–0.2% of acute surgical emergencies. It can be due to an arterial embolism (40%–50%), arterial thrombosis (20%–35%), arterial dissection or inflammation (5%), venous thrombosis (10%), or non-occlusive mesenteric ischemia (20%) [1,2]. CT angiography is highly valuable in the diagnosis of acute mesenteric ischemia, as it may show the occlusions in the mesenteric vessels and the signs of bowel ischemia which would guide the treatment and intervention. Thrombotic occlusion usually occurs in the elderly with previously diseased vessels, and it usually happens at the proximal main stem of the superior mesenteric artery with catastrophic consequences. Embolic occlusion occurs usually at sites of anatomical narrowing distal to the ostium, thus keeping patency of the inferior pancreatico-

coduodenal and the middle colic artery and sparing the proximal jejunum and colon from the ischemia and infarction [2,11].

Acute mesenteric ischemia presents usually with severe pain out of proportion to physical signs. Our patient presented with mild symptoms and signs in an insidious onset of four days duration, probably due to incomplete ischemia as the embolus was causing only partial occlusion, and due to the presence of good collaterals in this patient as a young man. In addition, the patient's condition was considered a high risk as he was thyrotoxic and have atrial fibrillation, so the least invasive procedure would be the most appropriate for him. These considerations of the condition of the patient led us to take the decision of endovascular management followed by observation, although endovascular procedure is still risky for him as a thyrotoxic patient with the need to take all perioperative preparations to prevent or manage a thyroid storm [12–14]. The open surgical management was spared due to the absence of peritoneal signs, and it would have been considered in case they developed on serial physical examination. Endovascular management is increasingly being considered as the main modality of management of AMI in case of partial occlusion with the absence of peritonitis, and this was associated with a high success rate and less morbidity and mortality than the open surgical revascularization [15–17]. Endovascular management of AMI involves aspiration thrombectomy, thrombolysis, and/or possible angioplasty and stenting in case of associated chronic lesions [15–17]. High-quality observational data supports the endovascular-first strategy, however, there is no level 1 evidence, and there is debate in the scientific community as endovascular management may preclude the direct visualization and assessment of the bowel and delay the open surgery [18]. A systematic review has concluded that patients who present with peritonitis or hemodynamic instability should undergo open surgery, and patients with less severe and insidious onset may be considered for endovascular intervention [19]. Endovascular therapy reduces the need for open surgery, so it reduces the morbidity and mortality especially in comorbid patients, and reduces the length of bowel resection if surgery is needed thereafter [20].

4. Conclusion

Prompt diagnosis and management of acute mesenteric ischemia is essential to decrease the morbidity and mortality rates. Endovascular management can be considered as a primary modality of treatment in selected cases.

Declaration of competing interest

The authors report no declarations of interest.

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Ethical approval

Ethical approval has been exempted by my institution.

Consent

Informed consent has been obtained from the patient for publication of the case report and accompanying images.

Author contribution

Ennab: Study concept or design, data collection, data analysis or interpretation, writing the paper.

Al-Omari: Study concept or design, data collection, data analysis or interpretation.

Jaradat: Data analysis or interpretation, writing the paper.

Aljabali: Data analysis or interpretation, writing the paper.

Registration of research studies

N/A.

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Dr. Raed Ennab.

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