

Treatment of superior mesenteric artery mycotic aneurysm by synthetic vascular graft: A case report

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Abstract

Superior mesenteric artery (SMA) aneurysm is a rare disease, especially if it is mycotic (infective) in origin. It is difficult to detect the problem during its initial natural course and usually presents in late phase due to its complications such as rupture, dissection, haemorrhage, and mesenteric ischaemia. Initially, the patient present with non-specific symptoms like vague colicky abdominal pain, nausea, vomiting, discomfort, malaise, and low-grade fever but prompt workup and intervention can lead to definitive diagnosis and uneventful outcome. This report describes the case of a 60-year-old male patient who presented with non-specific abdominal symptoms and, on workup, was diagnosed with superior mesenteric artery mycotic aneurysm. It was successfully treated surgically by resection of aneurysm and reconstruction of superior mesenteric artery by inter-positional Polytetrafluoroethylene (PTFE) synthetic vascular graft.

Keywords: Infected Aneurysm, Mycotic Aneurysm, Superior Mesenteric Artery, Splanchnic Aneurysm, PTFE (Polytetrafluoroethylene graft)

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Introduction

Aneurysm of splanchnic arteries was first described around 200 years ago.¹ The prevalence of splanchnic aneurysm is reported to be around 0.1% to 2% but in some publications it has been reported to be up to 1% to 10%, out of which superior mesenteric artery aneurysms encompasses 4-8%.² Mycotic (inflammatory or infectious) aetiologies account for 60% of all superior mesenteric artery aneurysms (SMAAs). De Bakey et al, in 1953, published their paper on SMA mycotic aneurysm to discuss its pathology and, for the first time, its successful surgical treatment.³ Previously, it was difficult to diagnose this disease timely, which usually ended in rupture with high

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mortality (around 40%), but now due to increase and easy availability of Computed Tomography (CT), the rate of correct diagnosis and definitive treatment is increasing.⁴

Here, we report a case of SMA mycotic aneurysm which was diagnosed timely and successfully treated without any complications.

Case Report

A 60-year-old male patient, who was a habitual naswar (oral powdered tobacco) eater and a known case of diabetes mellitus but with controlled glycaemic levels, was referred by a general physician on January 4, 2021 with a history of undocumented low grade fever for three weeks followed by dull generalised abdominal pain irrespective of taking meal, non-radiating, non-shifting, not associated with any aggravating factor but relieved temporarily with antispasmodics. He also had a history of weight loss and anorexia for the last three weeks. He was initially treated with medicines by the physician for gastroenteritis but, on failure to get any relief, he went through full workup. After thorough workup, including CT scan of the whole-abdomen, it was revealed that he had superior mesenteric artery aneurysm with inflammatory findings around it. He was then referred to the vascular surgery unit of Liaquat National hospital (LNH) in Karachi for further evaluation and surgical management.

The patient had no history of intravenous drug abuse, bacterial endocarditis, blood transfusion, extramarital affairs, or prolonged hospitalisation; all of which are significant risk factors for an infective lesion in the vessel wall (Mycotic aneurysm). However, he had multiple tattooing on his limbs at the age of 20, which he got surgically removed at the age of 40. This could be the source of mycotic aneurysm if unsterile needle was used. He had strong family history of diabetes mellitus, hypertension, and ischaemic heart disease.

Clinically, he was a fit and healthy individual with good built. He was vitally stable with unremarkable general physical examination. On abdominal examination, he had a small pulsatile swelling at the supra-umbilical region along with a small reducible umbilical hernia. On deep palpation, the supra-umbilical swelling was tender. Digital rectal examination was unremarkable. On vascular

examination, he had good peripheral pulses in all four limbs.

The patient's baseline workup on admission in LNH was

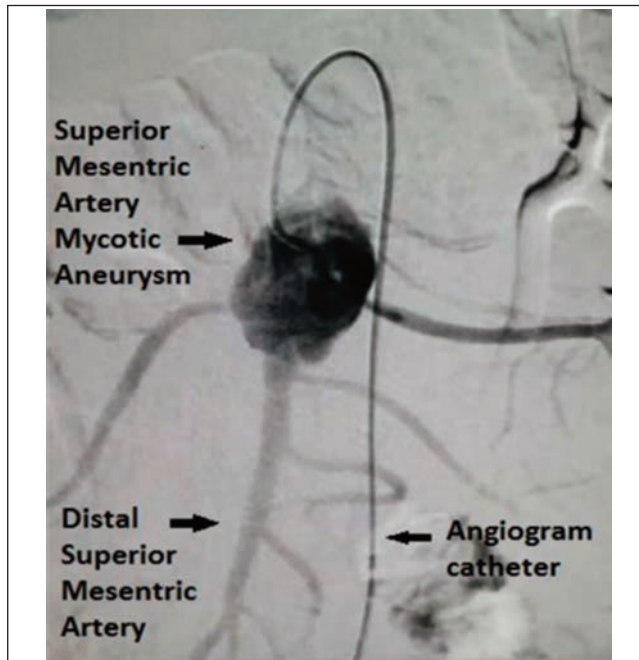


Figure-1: Catheter directed Angiography of Superior Mesenteric Artery Demarcating Aneurysm.

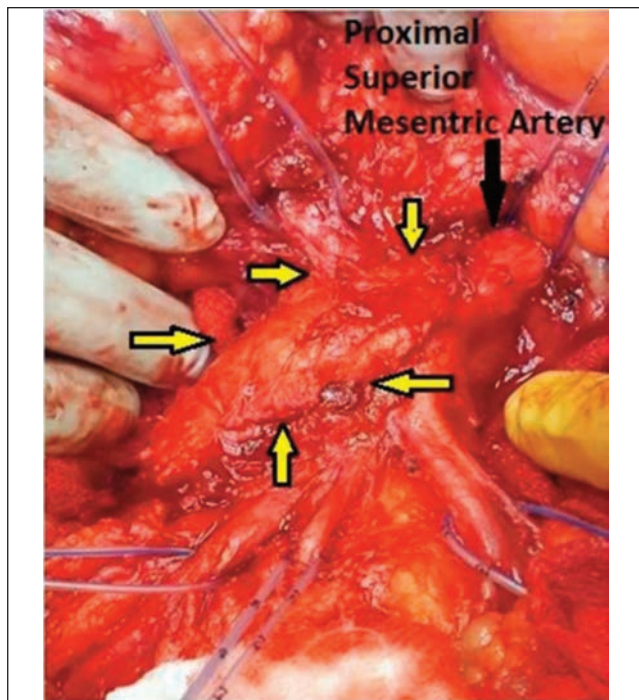


Figure-2: Intra-operative picture of Superior Mesenteric Artery Mycotic Aneurysm (Demarcated with Yellow Arrowheads) with overlying fat adhesions and branches.

normal, including haemoglobin of 12. His C-reactive protein was 16. Pan cultures were negative, and his cardiac evaluation was within normal limits. CT of the abdomen with contrast showed presence of focal aneurysmal dilation of around 2.5x2.6 cm in proximal part of superior mesenteric artery with thick irregular walls of 1.0 cm thickness. Radiological impression was Mycotic SMA aneurysm. For surgical planning a catheter angiogram of SMA was also done which confirmed the above findings. (Figure 1)

After all the pre-operative workup, preparation and with proper Deep Vein Thrombosis (DVT) prophylaxis, the patient underwent exploratory laparotomy which revealed a large aneurysm of SMA just within 2 cm of its origin, densely surrounded by fibrotic tissue that caused difficulty in exploration (Figure: 2). In this case, luckily a 2 cm neck of SMA was present for proximal clamping otherwise supra coeliac aortic clamping was planned to take proximal control. Aneurysmal sac was opened by cutting its anterior wall after clamping SMA proximally, distally and all its involved branches. Aneurysmal sac was filled with degenerative medial tissue and was evacuated. Ideally, natural graft should be used (autogenous vein or artery) due to high risk of infection in the case of synthetic grafts (PTFE, Dacron) when used in already infected vascular bed as in our case. However, in the present case a 5 mm PTFE (Polytetrafluoroethylene) synthetic graft was used instead of natural venous graft which was not available due to small calibre of great saphenous veins and upper arm veins bilaterally. PTFE graft was anastomosed in inter-positional manner with SMA proximally and distally by using Prolene 6/0. All branches of SMA including right colic and middle colic were implanted into the graft via end-to-side anastomosis. Back bleeders in aneurysmal posterior wall were also transfixed. The anterior wall of the aneurysmal sac was resected and sent for histopathology which later on came out as inflamed tissue with diffuse infiltrate of lymphocytes and histocytes; however, special stain Gomori methenamine silver (GMS) and Periodic Acid-Schiff Diastase (PASD) for fungal organism were negative. Intraoperative bleed was around 600 ml and bowel loops viability remained intact at the time of closure of the abdomen. The operation was performed uneventfully and the patient's recovery was excellent.

Postoperatively, the patient was mainly on intravenous fluids, antibiotic regimen covering the gut flora, analgesics, and Lower Molecular Weight Heparin (LMWH). On the fourth post-operative day, the patient was well mobilised with only mild operative site pain. The patient was discharged on the seventh post-operative day on LMWH, oral antibiotics, pain killers, and Proton pump inhibitor.

Immediate follow-up visits were on 14th and 28th day of operation, which were unremarkable. No adverse or unanticipated event was noted during and after the surgical treatment of SMA aneurysm. Later on, the patient visited after three and six months of discharge in the vascular outpatient department. There was no complaint of discomfort and the patient had gained weight along with maintaining his daily routine without any dependence. Moreover, on follow-up CT scan at 12 months, the SMA reconstruction was patent along with the implanted branches in PTFE Graft. At that time, a written and informed consent was taken from the patient to write a case report.

Discussion

On the basis of aetiology and pathology, superior mesenteric artery aneurysms are divided into two types, like other aneurysms: True and Pseudo (false) aneurysms. True splanchnic aneurysm is mostly caused by atherosclerosis, collagen vascular diseases, fibromuscular dysplasia, and medial degeneration,⁵ while Pseudo aneurysms usually results from inflammatory or infectious conditions (usually termed as Mycotic), vasculitis like Polyarteritis Nodosa, surgery/iatrogenic intervention, and trauma.⁵ Historically, infection was the most frequent cause of SMAAs and still the most common pathology (60%).⁶ However, currently some authors claimed that the most common cause is atherosclerosis.⁷ In the present case, the most common symptoms were non-specific abdominal pain and low grade fever as recently observed by Kordzadeh and colleagues, who reviewed 38 cases of mycotic SMAAs from 1944 to 2015 and reported that abdominal pain is the most common presenting symptom (65%), followed by pyrexia (60%).⁸ Moreover, nausea, vomiting, weight loss, gastrointestinal bleeding are also well-known symptoms in non-ruptured SMAAs.⁸

Regarding complications, rupture of the aneurysm is the most common complication of SMAAs (around 38%) with an associated mortality rate variable from 30-90%. In literature, various options have been discussed for the treatment of SMAAs depending upon the symptoms, presentation, anatomical details, and aetiology of the aneurysm. Asymptomatic small aneurysms can be observed only by serial radiological examinations, if less than 2.5cm in size.⁹ On the other hand, asymptomatic SMAAs of a large size (> 2.5 cm), or symptomatic or with inflammatory aetiology (mycotic) as in the current case, should be treated as early as possible.⁹ The treatment of choice is resection of the aneurysm and reconstruction of SMA ideally with autologous venous graft. But it was interesting that in the current case PTFE synthetic graft was used due to unavailability of any suitable superficial vein

and the patient did not develop any complication until the last follow-up at 12 months. This emphasises the use of synthetic vascular graft for reconstruction of a vessel with infected bed as a bail out procedure. However, in these cases, importance of broad spectrum pre-operative and targeted post-operative antibiotic coverage cannot be denied. According to recent ESVS (European Society of Vascular Surgery) guidelines, direct sampling from infected vascular bed during the operation is recommended to culture pathological organism. It helps to choose the correct antibiotic according to sensitivity. Moreover, there is no consensus on optimal duration of antimicrobial therapy and commonly vary between three months to 12 months and even lifelong in patients at higher risk of surgery.¹⁰ Lastly, if any reconstruction is not possible then simple ligation of SMA is the best option with or without implantation of distal segment in the abdominal aorta.⁹

As compared to surgical treatment, endovascular treatment, like stent graft repair or coil embolization, is an advanced therapeutic option for the treatment of SMAAs especially in patients with poor surgical risk, co-morbidities, and hostile abdomen; however, it is still not a first option for the treatment of mycotic SMAAs.⁹

Conclusion

Mycotic superior mesenteric artery aneurysms (SMAAs) are rare and present with vague abdominal symptoms, therefore high index of suspicion, careful examination and precise imaging is needed for its diagnosis. Surgical resection of SMAA and reconstruction with natural venous graft is the main mode of treatment. However, in case of unavailability of suitable natural graft, synthetic graft (PTFE) can be used as a way out as was done in this case.

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