Case Report

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Radiology Section

Endovascular Management of an Unusual Mycotic Aneurysm of the Inferior Mesenteric Artery: A Case Report

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ABSTRACT

Mycotic or infected Aneurysms (MA) are rare and typically affect major arteries. However, infective causes (mycotic) resulting in the formation of aneurysms in the Superior Mesenteric Artery (SMA) and Inferior Mesenteric Artery (IMA), despite their substantial rarity, are often symptomatic and may present acutely. Hereby, the authors present a case of a 29-year-old male patient who presented with abdominal pain, fever, and generalised weakness. Contrast-enhanced Computed Tomography (CECT) of the abdomen revealed peripherally enhancing hypodense collections with air foci along the subhepatic, peri-splenic, peri-gastric, bilateral paravertebral, and posterior pararenal spaces, extending to the lumbar region. Furthermore, multilobar saccular outpouching with irregular margins and soft-tissue thickening was observed, originating from the proximal IMA. Pigtail drainage was performed, and culture showed the growth of polymicrobial flora. Due to the irregularity of the aneurysm, with a high-risk of rupture, coil embolisation of the IMA aneurysm was carried out. The imaging characteristics of infected aneurysms should alert clinicians and radiologists to the diagnosis, enabling timely treatment, which may involve endovascular techniques.

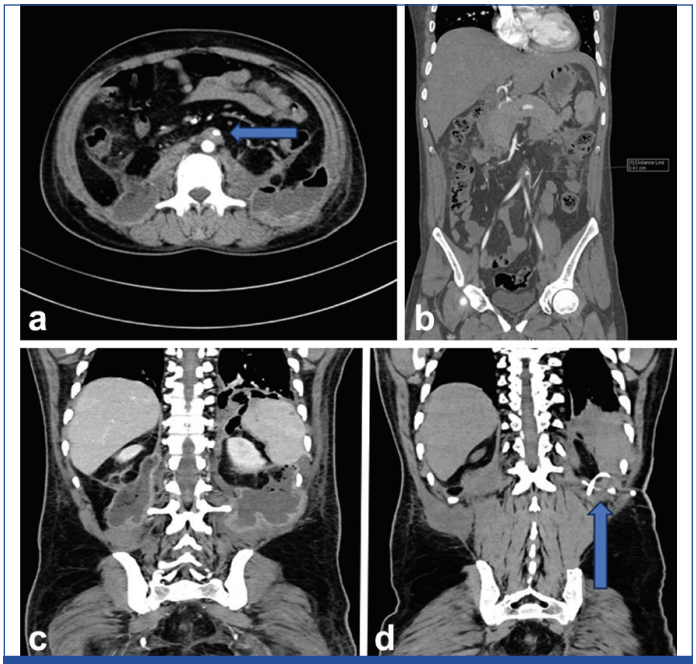
Keywords: Coil embolisation, Digital subtraction angiogram, Visceral arteries

CASE REPORT

A 29-year-old male presented to the Emergency Department with complaints of left flank pain for four months. The pain had an insidious onset, gradually progressed, and was of a colicky nature, radiating to the back. It did not respond to medication. The patient also had a history of high-grade fever for the last three months, accompanied by generalised weakness and loss of appetite. He had no known co-morbidities or previous surgical history.

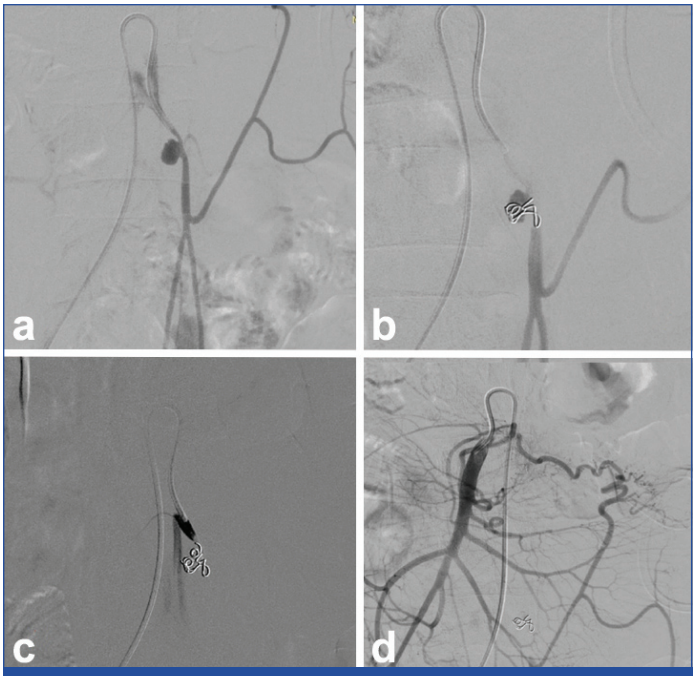
Upon admission, the patient exhibited fever, tachycardia, and tachypnoea, with a blood pressure of 120/80 mm Hg and oxygen saturation of 90% on room air. Abdominal examination revealed tenderness in the left lumbar region. Blood tests revealed the following results: haemoglobin-8.5 g/dL, White Blood Cell count (WBC)-12.1 cells/mm^3 (Neutrophils-66%, lymphocytes-20%), platelet count-562×10^3/µL, serum amylase-31 U/L, and serum lipase-56.6 U/L.

A transabdominal ultrasound showed an anechoic collection with dependent echogenic contents within the left lumbar region. A Contrast-enhanced Computed Tomography (CECT) abdomen [Table/Fig-1a-d] was performed, revealing well-defined, peripherally enhancing hypodense collections with air foci along the subhepatic, peri-splenic, peri-gastric, bilateral paravertebral, and posterior pararenal spaces, tracking until the lumbar region. Additionally, bilateral anterior and posterior pararenal and lateral conal fascial thickening noted without any signs of mesenteric ischaemia. A multilobar, contrast-filled saccular outpouching measuring 19×13 mm with a neck measuring 3 mm with irregular margins, along with perianeurysmal soft-tissue thickening, was observed arising from the proximal IMA. Pigtail drainage of the collections was performed using a 10F Pigtail catheter under Ultrasonography (USG) guidance. Gram staining of the collection showed plenty of pus cells and occasional Gram negative bacilli. The culture exhibited a polymicrobial flora consisting of more than three types of organisms. During the hospital stay, the patient was treated with Inj. Meropenem+Sulbactam 1.5 g i.v. (intravenous) for 14 days and was discharged. After discharge, Tab. Ciprofloxacin 200 mg bd was administered for four weeks, and the patient recovered well.



[Table/Fig-1]: CECT abdomen shows: a and b) Irregularly marginated IMA aneurysm with perianeurysmal soft tissue thickening (Arrow), c) Peripherally enhancing, bilateral paravertebral hypodense collections, d) Pigtail in collection (Arrow).

Due to the risk of impending rupture of the irregularly marginated IMA aneurysm, endovascular management was planned after four weeks. Under strict aseptic precautions, a Digital Subtraction Angiogram (DSA) of the visceral arteries was performed through right transfemoral arterial access. A selective IMA arteriogram with a 5F Simmons-1 catheter revealed a multilobar, saccular aneurysm with irregular margins arising from the proximal IMA. Subsequently, super-selective cannulation of the IMA was achieved using a 2.7/2.9F Progreat microcatheter, and pushable microcoils of varying sizes (6×30 mm and 3×20 mm) were deployed in the artery, both proximal and distal to the neck of the aneurysm, as well as within the aneurysmal sac. A post-embolisation control angiogram showed obliteration of flow in the occluded segment of the artery and aneurysm. IMA circulation was re-established through flow from the SMA [Table/Fig-2a-d].



[Table/Fig-2]: a) DSA of IMA shows irregularly marginated IMA aneurysm, b and c) Coil embolisation, d) SMA arteriogram shows reformation of IMA circulation through SMA.

One month after the endovascular management, the patient demonstrated significant improvement with complete resolution of symptoms, without any evidence of bowel disturbances.

DISCUSSION

The MA is uncommon, comprising merely 1-3% of arterial aneurysms, often affecting major arteries. The aorta, peripheral arteries, cerebral arteries, and visceral arteries are involved, with decreasing occurrence. Visceral mycotic aneurysms are infrequent, commonly affecting the SMA. The incidence of aneurysms in the IMA remains uncertain. These aneurysms are primarily without symptoms and are usually detected inadvertently during diagnostic imaging performed for other clinical presentations [1].

Nevertheless, even though infective factors (mycotic) leading to the development of aneurysms in the SMA and IMA are extremely uncommon, they tend to be symptomatic and can manifest suddenly. The primary pathogens responsible for this condition are frequently *Staphylococcus* and *Streptococcus* species [2].

The development of mycotic aneurysms involves the deterioration of the arterial wall, accelerated by the infiltration of immune cells due to bacterial infection. This infection can occur through haematogenous or lymphatic spread, contiguous extension, or direct inoculation [3]. Mycotic aneurysms are linked to significant morbidity and mortality, even with surgical or endovascular intervention. Timely identification and treatment are crucial for reducing mortality. However, diagnosis is frequently challenging due to vague symptoms. Thus, maintaining a high degree of suspicion is vital for an accurate diagnosis [3]. Initial symptoms are typically nonspecific, often starting with a feverish condition, gradual malaise, and weight loss, which can progressively evolve into uncontrolled sepsis. Patients diagnosed later might display severe septicemia or face the consequences of rapid aneurysm enlargement or rupture [4].

Advanced imaging techniques such as CT and Magnetic Resonance Imaging (MRI) have taken the initial modality of choice for detecting infected aneurysms in suspected cases [5]. Imaging features of infected aneurysms include a lobulated vascular mass, an indistinct irregular arterial wall, perianeurysmal oedema, and a perianeurysmal soft-tissue mass [5,6], all of which are observed in present case. Uncommon findings include the presence of gas around the aneurysm, clotting within the aneurysm, calcification of the aneurysmal wall, and disruption of arterial calcification at the site of infection. Radiologists must be familiar with these imaging patterns of infected aneurysms to promptly recognise the diagnosis and enable timely intervention, which may involve endovascular techniques [6,7].

Without delay, it is important to initiate aggressive and comprehensive antibiotic treatment, which can be adjusted based on microbiological results. A duration of 3-6 months is sufficient, and treatment should only be discontinued when there is no longer clinical evidence of ongoing sepsis, and blood cultures are sterile. A persistent infection is a strong predictor of poor long-term outcomes, with a one-year survival rate of only 39% [7].

The operative method chosen depends on the specific location of the aneurysm, the available local expertise, and the primary source of the endovascular infection. This consideration includes managing infections that are either nearby or distant. In the case of visceral aneurysms, surgical options such as clipping or excision, as well as endovascular approaches like cyanoacrylate occlusion or coiling, can be used for treatment [8].

Coil embolisation is the predominant endovascular approach used for treating Visceral Artery Aneurysms (VAA). These aneurysms can be managed by employing metallic coils, either as a standalone intervention or in combination with other embolic agents or devices. The coils contribute to mechanical obstruction and secondary clot formation, achieved through their thrombogenic fibers and the inflammatory response they incite [8].

Coils should be selected in a suitable size, typically exceeding the vessel's inner diameter by around 20%. If the coils are too small, there's an increased chance of incomplete blockage or displacement towards the vessel's end. On the contrary, overly large coils cannot conform effectively, reducing their capacity to promote clot formation [9]. When dealing with the embolisation of medium to large vessels, caution is necessary due to the increased risk of coil migration. Either pushable or detachable coils can be used [9]. Aneurysmal sac coiling can be done if it is small. If the aneurysm is big, coil embolisation should be done at both the distal and proximal segments of the involved artery. Achieving dense packing with high-density coils is critical for achieving lasting exclusion of the aneurysm [9].

The anatomical course of Drummond's marginal artery mirrors the curvature of the right colon, serving as an anastomotic link that connects the vascular territories supplied by the SMA and the IMA. In instances where either the SMA or IMA becomes occluded, the marginal artery undergoes hypertrophy to accommodate the increased circulatory requirements. This adaptive dilatation of the marginal artery allows it to be used as a conduit, bridging the branches of the SMA and IMA during catheter angiography procedures [10]. In present case, IMA circulation is instantly restored through SMA circulation.

Unfavourable predictive indicators include older age, delayed diagnosis, infection caused by Gram negative microorganisms, compromised immune system, aortic lesions located in the thoracic region, non surgical interventions, rupture, occurrences of embolism, and the presence of septic shock [11].

CONCLUSION(S)

Mycotic aneurysms are rare but can be lethal without appropriate treatment. The pentad of abdominal pain, pyrexia of unknown origin, malaise, weight loss, and nausea remains the most unmistakable presentation of mycotic aneurysms of the SMA and IMA. Surgical or endovascular intervention, along with intensive antibiotic therapy, is the definitive treatment, though patients must be evaluated on a case-by-case basis. Coil embolisation serves as an alternative and minimally invasive management for mycotic aneurysms.

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