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Streptococcus pyogenes presenting as infrarenal abdominal aortic mycotic aneurysm: Exploring the potential for conservative management

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ABSTRACT

Introduction: Infrarenal abdominal aortic mycotic aneurysm (MAA) is an uncommon and life-threatening condition caused by septic emboli that degrade the arterial wall. Standard treatment involves antibiotic therapy, aneurysm resection, and reconstruction of the affected area. However, in patients with significant comorbidities, surgery presents substantial risks, raising the question of whether conservative treatment might be a viable therapeutic option.

Case presentation: An 80-year-old male with a history of aorto-monoiliac prosthesis placement for an infrarenal abdominal aortic aneurysm presented with fever, malaise, and lower back pain. Initially diagnosed with pyelonephritis, imaging CT scan revealed a dilated aorta with suspicious infected collections but no active bleeding. PET-CT demonstrated hypermetabolism confirming an active infectious focus. The patient was diagnosed with Szilagyi Grade III MAA. Blood cultures revealed an infection by Streptococcus pyogenes, a microorganism that is extremely infrequently associated with mycotic aneurysms. Due to comorbidities, conservative management with suppressive antimicrobial therapy was chosen. After 12 months of follow-up, the patient remains asymptomatic with negative blood cultures and disappearance of perianeurysmal soft tissue mass on follow-up CTA.

Conclusion: MAA is a rare and fatal condition requiring early detection to prevent severe complications. Diagnosis relies on imaging studies. Standard treatment involves antibiotics and surgery, but in elderly patients with comorbidities, a conservative approach is a viable option. Treatment should be individualized and discussed by a multidisciplinary team.

Introduction

Mycotic aneurysm, or infectious native aortic aneurysm of the infrarenal abdominal aorta (MAA), is a rare but potentially life-threatening condition. It occurs due to septic embolism within the vasa vasorum, secondary to hematogenous dissemination or contiguous spread, leading to degeneration of the arterial wall. The standard treatment involves antibiotic therapy, aneurysm resection with debridement of necrotic tissue, and reconstruction of the affected segment. In some cases, the removal of the infected endograft may be required. For patients with significant comorbidities where surgical intervention poses substantial risks, the therapeutic approach becomes more complex and necessitates individualized management. Could conservative treatment be a viable therapeutic option?

Case report

We present the case of an 80-year-old man who had undergone surgery 13 years earlier for an infrarenal abdominal aortic aneurysm with implantation of a right aortomonoiliac prosthesis. He presented with a two-day history of fever (up to 38 °C) and malaise. Examination revealed diffuse abdominal tenderness without a palpable pulsatile mass and dull lumbar pain. On arrival, initial vital signs were blood pressure was 127/81 mmHg, heart rate 72 bpm, and oxygen saturation 93 %. Given a hospitalization one month earlier for Streptococcus pyogenes bacteremia secondary to malignant ureteral obstruction, the initial working diagnosis was pyelonephritis. Past history included ischemic heart disease treated with percutaneous coronary revascularization (single-vessel disease with multiple lesions) 16 years earlier,

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hyperuricemia, and dyslipidemia. He was a former smoker (< 15 pack-years) with occasional alcohol intake. He also had prostate adenocarcinoma, stage T4N1M1b, under androgen deprivation therapy and with an antiresorptive agent.

An emergency contrast-enhanced computed tomography angiography (CTA) scan in the arterial phase showed a 6 cm dilatation of the infrarenal abdominal aorta with an endoprosthesis, as well as disruption of atherosclerotic calcification in two areas, from which two hypodense collections emerged. No endoleak or signs of active bleeding were observed (Fig. 1). Blood analysis, including biochemistry, complete blood count, and coagulation profile, revealed a hematocrit of 31 % (normal values (NV) in males: 42–50 %), hemoglobin of 10.6 g/dL (NV: 14–17.5 g/dL), prothrombin time of 15 s (NV: 12–15 s), fibrinogen of 603 mg/dL (NV: 200–400 mg/dL), C-reactive protein (CRP) of 204 mg/dL (NV: < 1 mg/dL), and leukocytosis of 16,000/μL (NV: 4000-11,000/μL). A transthoracic echocardiogram was performed during the etiological work-up and showed no evidence of infective endocarditis. Transesophageal echocardiography was not performed because transthoracic imaging study offered adequate acoustic windows, the pre-test probability of endocarditis was low and there were no clinical or imaging features suggestive of valvular involvement.

The workup was completed with a positron emission tomography scan using 18-fluorodeoxyglucose (18-FDG PET-CT). This scan revealed hypermetabolism consistent with soft tissue attenuation extending caudally, enveloping the infrarenal abdominal aorta with the aortoiliac endograft, suggestive of an active infectious focus. Based on these findings, the diagnosis of MAA (Grade III in the Szilagyi classification) was established.

Given his advanced age and significant comorbidity (previously treated ischemic heart disease with cardiovascular risk factors and advanced prostate cancer) the multidisciplinary team deemed open or endovascular repair disproportionately risky on comorbidity grounds and opted for conservative, antibiotic-only management with close surveillance, involving two weeks of targeted intravenous therapy with ampicillin plus clindamycin, followed by suppressive treatment with Amoxicillin 1 g intravenous every 8 h given his S. pyogenes monomicrobial infection, later transitioned to the oral route and periodic follow-ups every three months. At that time, the removal of the prosthetic material was deferred.

Around the sixth month, multidisciplinary discussion considered the possibility of structured withdrawal of antibiotic therapy, though it was ultimately decided to continue treatment until completing one full year. At the 12-month mark, follow-up CTA and PET-CT demonstrated complete resolution of inflammatory findings and no evidence of persistent infection. Follow-up CTA showed the disappearance of the soft tissue mass around the aneurysm (Fig. 2), and follow-up PET-CT indicated the resolution of periprosthetic hypermetabolism. These findings led to the consideration of discontinuing antibiotic therapy.

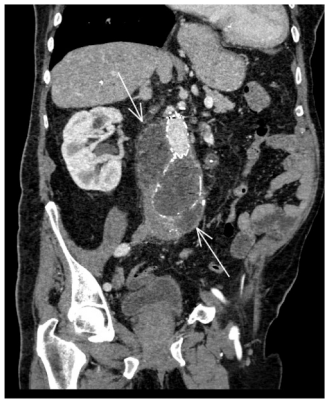

Fig. 1. Image of MAA visualized through CTA. An aneurysmatic dilation of the infrarenal abdominal aorta with a prosthetic graft is observed, with no evidence of contrast extravasation. These findings are consistent with MAA without signs of active bleeding.

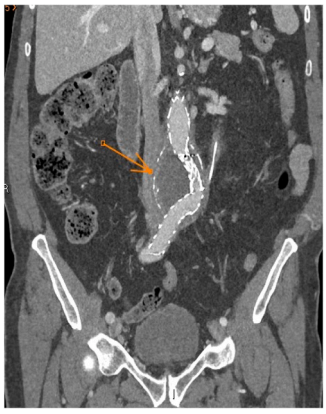

Fig. 2. Follow-up CTA after treatment shows the infrarenal abdominal aortic aneurysm with an endoprosthesis extending from just below the superior mesenteric artery to the common iliac arteries. Resolution of the previously visible perianeurysmal soft tissue mass and no evidence of endoleaks.

Subsequent evaluation at six weeks post-withdrawal confirmed sustained remission and stable laboratory parameters, leading to discharge from infectious disease follow-up.

Discussion

MAA has an estimated incidence of 0.5–1.5 %, and it typically progresses rapidly with a high risk of rupture, with an estimated 30-day mortality rate of 98 % in the absence of treatment [1,2]. Its etiology involves microbial aortitis, leading to arterial wall weakening. Common causes include percutaneous coronary angioplasty, infectious endocarditis, and systemic infections. The aorta is the most commonly affected artery, although any artery in the body can be involved. Predisposing factors include atherosclerosis, preexisting aneurysms or aortic damage, concurrent infections, or immunosuppression [1,3,4].

While non-typhoidal *Salmonella* species were historically the most frequently implicated microorganisms, *Staphylococcus aureus* and gram-positive streptococci have become increasingly recognized as causative agents, particularly in Western countries [5,6,7]. *Streptococcus pyogenes* is linked to a wide range of clinical conditions, such as skin, mucosa, blood and glomerulonephritis diseases. However, it is rarely associated with endovascular infections, including cases of endocarditis or mycotic aneurysms [1,4].

Clinically, MAA often presents as a rapidly growing mass, sometimes associated with constitutional symptoms and back or flank pain. Laboratory findings typically include leukocytosis and elevated acute-phase reactants. Blood cultures are a valuable diagnostic tool, although negative results do not rule out the disease. Imaging, particularly CTA, plays a critical role in confirming the diagnosis, characterizing the lesion, and assessing the extent of infection. CTA is the imaging modality of choice due to its high accessibility and rapid acquisition of images (Class I, Level of Evidence B) [8,2]. As the infection progresses, the arterial wall weakens, potentially leading to saccular dilation or rupture. Additionally, nearby retroperitoneal structures may become involved. Based on imaging findings, the infection is categorized into four grades, ranging from periaortic inflammatory changes without arterial wall destruction (Grade 1) to extensive periarterial hemorrhage with active contrast extravasation (Grade 4). Findings such as increased fat density in the periaortic space and asymmetry of surrounding soft tissues are nonspecific and may also be seen in other conditions, such as lymphoma or fibrosis. However, the clinical context helps orient the diagnosis toward an infectious process [9].

For patients with suspected intra-abdominal vascular graft infections

and unclear results on CTA, alternative imaging options such as PET-CT with 18-FDG can help assess the metabolic activity of the infection (Class IIb; Level of Evidence C) [2]. However, when this test is performed shortly after aortic surgery, false positives due to postsurgical inflammation can occur, as the degree of uptake is similar. A distinguishing feature in the diagnosis of mycotic aneurysms and infected prosthetic grafts is that the uptake pattern is generally focal rather than diffuse. Therefore, careful interpretation is required, and PET-CT findings should be correlated with CT results to reach a diagnosis [10].

While PET/CT with 18F-FDG is currently the preferred imaging modality when CTA is inconclusive, radiolabeled white blood cell scintigraphy (WBC-SPECT/CT) may also be considered as an alternative, particularly in cases of low-grade or chronic infection. According to the guidelines of the European Association of Nuclear Medicine (EANM) and the European Society for Vascular Surgery (ESVS), both modalities are complementary [11].

The Management of Aortic Graft Infection Collaboration (MAGIC) proposed diagnostic criteria for prosthetic graft infection in 2016. These criteria are divided into major and minor categories across clinical, radiological, and microbiological domains. The presence of at least one major criterion or two minor criteria from different domains is required for diagnosis. Major clinical criteria include purulent discharge from the graft or aneurysm sac confirmed during surgery, the presence of a fistulous tract, or a mycotic aneurysm. Radiological major criteria include periprosthetic fluid or gas observed 3 or 7 months post-implantation, respectively. Microbiological criteria require positive cultures from the graft or periprosthetic fluid [12].

In cases involving prosthetic grafts, two classifications are helpful for managing the infection. The first, proposed by Szilagyi in 1972, helps define the extent of endoprosthesis involvement. Grade 1 is characterized by cellulitis confined to the surgical wound. In Grade 2, cellulitis extends beyond the skin surface, involving subcutaneous tissue. Grade 3 represents more advanced infection, directly involving the vascular prosthesis [13]. The second classification, proposed by Bunt, focuses on the extent of infection in the endoprosthesis, ranging from P0 (intracavitary graft infections) to P3 (infections of prosthetic patches used in angioplasty) [2].

Based on the level of involvement, therapeutic strategies are guided by the latest 2024 ESVS guidelines. Optimal management of mycotic abdominal aortic aneurysm is fundamentally combined: prompt empiric intravenous antibiotics with subsequent culture-directed therapy together with source control by surgical repair. Source control can be achieved either by open repair—excision of the infected aneurysm, thorough debridement, and revascularization via extra-anatomic bypass or in-situ reconstruction—or by endovascular repair (EVAR), with selection individualized to anatomy, extent of infection, and overall risk. Compared with antibiotics alone, this combined strategy improves infection eradication, facilitates resolution of inflammatory changes, and reduces relapse risk. Antibiotics-only management should be reserved for highly selected scenarios as extreme frailty or prohibitive surgical risk, under strict clinical and imaging surveillance. EVAR may also serve as a bridge to definitive open surgery once stabilized, or as a definitive option when open repair is not feasible. Early empirical intravenous antibiotics targeting *S. aureus* and gram-negative bacilli should be administered, followed by culture-guided antibiotic therapy, with duration ranging from 4 weeks to lifelong. Treatment duration should be individualized (from 4 to 6 weeks to prolonged or lifelong suppression in selected cases), and patients require long-term imaging follow-up (CTA and, when appropriate, PET-CT) to ensure durable infection control [1].

In infected prosthetic grafts, in situ reconstruction involves explantation of the infected material, debridement of vascular tissue, and arterial reconstruction using autologous veins, cryopreserved allografts, or synthetic grafts treated with rifampicin or silver-coated materials. Partial graft resection with in situ reconstruction or extra-anatomic bypass (e.g., axillofemoral or axillopopliteal bypass) may also be considered on a case-by-case basis [2,13].

As previously discussed, for patients not suitable for open surgery due to severe comorbidities, palliative therapy is an option. This decision should be made by a multidisciplinary team, including specialists in vascular surgery, infectious diseases, radiology, and general surgery. In patients without active bleeding, long-term or even lifelong antimicrobial therapy may be feasible, aiming to control the infection rather than achieve complete eradication [2].

Prior reports of *S. pyogenes*–associated aortic aneurysm largely favor early surgery (often urgent open repair) with antibiotics as adjuncts rather than sole therapy [14,15]. In our patient, the multidisciplinary team considered operative risk prohibitive given his advanced age, frailty, previously treated ischemic heart disease with cardiovascular risk factors, and advanced prostate cancer, and therefore pursued a conservative strategy. Culture-confirmed *S. pyogenes* guided targeted treatment: an acute-phase course of intravenous antibiotics, including amoxicillin 1 g IV every 8 h, followed by long-term oral suppressive therapy. Although penicillin remains first-line for *S. pyogenes*, as supported by Cochrane evidence, oral amoxicillin was chosen for its efficacy, gastrointestinal tolerability, and high bioavailability, features that favor prolonged outpatient use when surgery is not feasible [16].

This therapeutic strategy enables effective infection control, promotes the resolution of periaortic inflammatory changes, and helps prevent recurrence, particularly in cases demonstrating a good clinical response, microbiological clearance, and normalization of imaging findings during follow-up.

Conclusion

MAA is an uncommon but life-threatening condition that requires early recognition to prevent severe complications. Its insidious progression presents a therapeutic challenge, making early detection essential to prevent severe complications such as sepsis, fistulas, osteomyelitis or aneurysm rupture. Healthcare professionals must maintain a high index of suspicion for this condition in patients with risk factors, even in the presence of nonspecific symptoms. In this case, the importance of combining imaging techniques, such as contrast-enhanced CTA and 18-FDG PET-CT, for precise diagnosis is highlighted.

The 2024 ESVS guideline advocates a combined medical–surgical strategy: early antimicrobials plus operative source control via open or endovascular repair. When intervention is feasible, surgery confers superior survival; among operative options, EVAR is an acceptable alternative to open repair in appropriately selected patients, offering better early outcomes and no late survival disadvantage.

By contrast, antibiotic therapy alone should still be regarded as a third-line strategy, restricted to carefully selected scenarios (refusal of surgery, prohibitive surgical risk, or non-operability) and undertaken with close clinical and imaging surveillance and individualized duration. However, this case shows how suppressive antimicrobial therapy can be a feasible therapeutic alternative in elderly patients with multiple comorbidities, focusing on infection control.

Decisions should be multidisciplinary and patient-centered, taking into account the patient's overall clinical condition and the feasibility of more aggressive interventions.

CRediT authorship contribution statement

Ruiz-Sancho Andres: Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Formal analysis, Conceptualization. **Bedmar-Perez Antonio:** Writing – review & editing, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Conceptualization. **Francisco Javier Torre-Gomar:** Writing – review & editing, Visualization, Supervision, Resources, Project administration, Methodology. **Carmen Pérez-Valencia:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology,

Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Ethics

The study is exempt from ethnical approval in our institution.

Patient Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

Data will be made available on request.

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