Extra-Aortic Mycotic Aneurysm Due to Group A \textit{Streptococcus} after Pharyngitis

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Mycotic aneurysms, especially outside the aorta, are uncommon, with group A \textit{Streptococcus} a particularly rare cause. We report a case of extra-aortic mycotic aneurysm following a sore throat without demonstrable bacteremia where identification of the pathological organism was made by molecular diagnostic techniques after a standard laboratory culture was negative.

A 58-year-old man was transferred to a tertiary vascular center from a district hospital. Ten days before admission, he had consulted his general practitioner because of a sore throat and was found to have an erythematous throat with tender cervical lymphadenopathy on examination. He was given a 7-day course of pexoyxmethypenicillcin at 500 mg four times a day, but a throat swab was not taken at the time. Three days before admission, he had developed pain in his left groin, which increased in intensity and progressed to involve the thigh and left side of his abdomen. On the day of admission, anemia in the area innervated by the left anterior femoral cutaneous nerve and some mild left leg weakness had developed, impeding his mobility.

His medical history included pancreatitis with a laparotomy for a suspected pseudocyst and laparoscopic cholecystectomy. Regular medication included omeprazole for long-standing gastritis. He was a former smoker for 5 years; gave up drinking alcohol several years ago, having consumed above-average amounts; and worked as a horticulturist.

On examination on arrival, his temperature was 36.7°C, his blood pressure was 120/70 mmHg, and his pulse rate was 95 beats/min. Generally, he appeared well with no abnormalities of the heart sounds and a clear respiratory examination on auscultation. Abdominal palpation revealed mild tenderness in the left iliac fossa with no evidence of peritonitis. Examination of the left groin identified a pulsatile, expandable mass, with a weak popliteal pulse and absent left posterior tibial and dorsalis pedis pulses, but the foot was warm and well perfused. Motor and sensory examination of the left lower limb revealed Medical Research Council grade 4 to 5 power throughout and mild paresthesia in the area innervated by the anterior femoral cutaneous nerve.

Laboratory testing showed a leukocytosis of 15.6 \times 10^9 cells/liter and a C-reactive protein level of 331 mg/liter (normal range, <5 mg/liter). A computed tomography (CT) scan showed a very large left retroperitoneal hematoma (Fig. 1) displacing the left kidney anteriorly and originating from and contiguous with a large pseudoaneurysm (47 by 35 by 44 mm) at the common femoral artery bifurcation (Fig. 2). The femoral artery was not aneurysmal on a CT scan performed 9 months previously for suspected cholecystitis.

He was commenced on intravenous amoxicillin-clavulanic acid at 1.2 g three times a day and underwent an emergency bypass from the left external iliac artery to the superficial femoral artery with an expanded polytetrafluoroethylene graft with ligation of the common and superficial femoral and profunda femoris arteries, reimplantation of the left profundus femoris artery, and a sartorius flap. A large amount of purulence was found surrounding the arteries, with complete destruction of the superficial femoral artery.

Gram staining was performed on the ground remnants of the grossly distorted arterial wall showing numerous pus cells with no visible microorganisms. The ground remnants were plated onto horse blood agar (Oxoid, Basingstoke, United Kingdom) incubated at 37°C in air and anaerobically and onto chocolate agar (Oxoid) incubated at 37°C in air supplemented with 5% CO2, with no growth at 48 h. Gram-positive cocci were identified by microscopy of the surrounding purulence, but again there was no growth of organisms on horse blood agar (Oxoid) or chocolate agar (Oxoid) at 48 h. 16S rRNA gene analysis of the purulence (1) identified the presence of \textit{Streptococcus pyogenes} after a BLAST search.

His postoperative course was uneventful, and a 3-week course of intravenous amoxicillin-clavulanic acid was completed.

Mycotic (meaning mushroom-shaped) aneurysms are caused by infection of the vascular wall and have been described for over 120 years (2, 3). Most have been associated with \textit{Staphylococcus aureus}, \textit{Salmonella} species, \textit{Streptococcus pneumoniae}, viridans group streptococci, and various Gram-negative species (4–8). In adults, both abdominal and thoracic aorta (usually atherosclerotic) infections have most commonly been reported (9–11).
Where femoral mycotic aneurysms have been previously described, they have been associated with percutaneous arterial puncture (12) or intravenous drug use (13, 14). This suggests that the mechanism of infection involves the direct inoculation of microorganisms, a risk that was absent here.

Group A Streptococcus (S. pyogenes), a virulent Gram-positive organism, causes a wide spectrum of diseases, including pharyngitis, skin and soft tissue infections, bloodstream infection, and streptococcal toxic shock syndrome (15–17). Despite its virulence, no cases of penicillin-resistant group A Streptococcus have been reported in the literature, although cases of penicillin tolerance in clinical practice do occur (18). Mycotic aneurysms due to group A Streptococcus are extremely rare. All of those described in the literature were aortic, produced acute aneurysmal symptoms, and were associated with either concurrent bacteremia (19–22) or, in one case, concurrent pharyngitis (22). The mechanism of infection in this case is likely to be hematogenous spread from an infection of the pharynx; however, although group A Streptococcus was considered a relatively common cause of infected aneurysms in the preantibiotic era (23), this is the first time that this organism has been reported as a cause of an extra-aortic mycotic aneurysm in the modern antibiotic era since the application of penicillin in clinical practice do occur (18).

Among reported case series of mycotic aneurysms, a significant proportion of cultures (either blood or tissue) have been negative despite convincing appearances of infection by imaging or at surgery. The incidence of negative blood cultures ranges from 25 to 37%, and that of negative tissue cultures ranges from 22 to 50% (9, 24). The disappointing diagnostic yield may be because prior antibiotic treatment has sterilized the samples. However, by using molecular diagnostic tests utilizing PCR detection and identification of the bacterial 16S ribosomal group, we were able to identify S. pyogenes from the aneurysm despite the administration of antibiotics to which the organism was fully susceptible.

**Conclusion.** Mycotic aneurysm is a rare but potentially serious complication of group A streptococcal infection. Vascular surgeons presented with a case of suspected mycotic aneurysm from the community should inquire about preceding pharyngitis and work closely with infectious-disease physicians to make the most of modern molecular diagnostic technology. Serum antistreptococcal antibodies may also provide useful and inexpensive indirect supportive evidence in such cases. Identification of S. pyogenes also ensures tailored antimicrobial therapy to try to prevent graft infection.

**REFERENCES**

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