Femoral Mycotic Aneurysm Secondary to Community: Acquired Methicillin-Resistant *Staphylococcus aureus* Infection

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Keywords

Methicillin-resistant *Staphylococcus aureus* · Abscess · Femoral artery aneurysm

Abstract

We present the case of a thirteen-year-old, morbidly obese boy admitted with right hip septic arthritis and severe sepsis. Blood and joint aspirate cultures confirmed growth of methicillin-resistant *Staphylococcus aureus*. Parenteral antibiotic therapy was administered according to culture sensitivity reports, and several joint re-explorations were required for drainage of pus recollection at the hip site. Over a month-long inpatient stay culminated in an episode of profuse fresh bleeding from the right hip wound site, with subsequent CT angiography confirming mycotic aneurysm development at the deep branch of the femoral artery. Emergent endovascular embolization and coil insertion ensued, allowing steady improvement till discharge home.

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Published by S. Karger AG, Basel

Introduction

Methicillin-resistant *Staphylococcus aureus*, an organism once linked near exclusively to hospital-acquired infections, has been increasingly observed to cause disease

among the general community. The body of evidence on methicillin-resistant *Staphylococcus aureus* infections is ever expanding across all patient populations and clinical settings. Noteworthy is the broad spectrum of disease, ranging from localized skin infections to cerebral abscesses, necrotizing pneumonias, and mycotic aneurysms.

A mycotic aneurysm is described as an infectious intrusion in the wall of an artery with the development of a blind saccular outpouching which is adjacent and in contact with the arterial lumen [1]. Infective aneurysms can evolve secondary to bacteremia and sepsis, ending in spontaneous arterial rupture and death if treatment was delayed. Hence, it is associated with significant morbidity and mortality. Our report of femoral artery mycotic aneurysm following septic methicillin-resistant *Staphylococcus aureus* arthritis aims to further raise attention toward the close relation between these 2 entities.

Case Report

A thirteen-year-old boy with a known case of morbid obesity, hyperglycemia on metformin with renal dysfunction referred from a tertiary hospital as a case of septic arthritis on IV antibiotics with complaints of fever, right hip and left leg pain, and limping. Six days prior, he had trauma when he was playing volleyball; he hit himself and fell to the ground. The pain started and progressively

increased since then. He did not complain of a history of fever, rash, abdominal pain, or vomiting.

In the ER, the child had a temperature of 102.2 F (39.1°C), heart rate 119 beats/min, blood pressure 113/56 mm Hg, and capillary refill <2 s. He was tachypneic and distressed requiring oxygen supplementation. Joint examination revealed tenderness over the right groin, painful restricted movement of the right hip, no active movement, and the patient kept the right hip in external rotation. The left ankle and leg showed redness, warmth, and tenderness, with intact distal neurovascular state of both lower limbs. Initial investigations were remarkable showing a white cell count of $29.0 \times 10^3/\mu\text{L}$, neutrophils 83%, band neutrophils, 12%, lymphocytes 1%, hemoglobin 9.5 g/dL, platelets $128 \times 10^3/\mu\text{L}$, C-reactive protein 290 mg/L, procalcitonin 5.87 ng/mL, and erythrocyte sedimentation rate 90 mm/h.

The child was admitted to the PICU as a case of severe sepsis with right hip septic arthritis, started on IV meropenem and IV vancomycin. Initial blood cultures, right hip joint fluid aspirate, and biopsy culture revealed MRSA growth. Antibiotics were adjusted according to sensitivity, and biochemical and clinical response, and he completed a course of IV teicoplanin, clindamycin, and rifampicin. A USS Doppler was done, and there was no evidence of thrombosis. DVT prophylaxis was given. A USS hip showed moderate right hip effusion. MRI showed features of myositis involving the iliopsoas, obturator, and the gluteus muscles and osteomyelitis involving the right upper femur, right iliac, and pubis bones. Perfusion and lactate remained normal on serial monitoring.

Right hip arthrotomy was done at presentation and 2 times afterward in a span of 2 weeks due to repeated pus collections. Fever recurred on day 30; complete septic workup was done including fluid and wound culture growing *Pseudomonas aeruginosa*, which responded to IV meropenem course.

On the 25th day of admission, he developed recurrent frank oozing of blood from the wound site that was amenable to pressure with no source identified on exploration. On the 40th day, he underwent a CT angiogram in view of recurrent continuous bleeding from the exploration wound site, which revealed outpouching arising from the deep muscular branch of the right common femoral artery, and an urgent embolization was done with coil insertion (Fig. 1, 2).

Follow-up blood and joint fluid aspirate cultures showed no growth. Distal neurovascular status remained intact. No residual end-organ injury. Outpatient follow-ups in the subsequent months revealed mild pain, residual limitation of right hip movement, and patient preference toward wheelchair ambulation. Serial hip X-rays sadly showed development of right-sided slipped capital femoral epiphysis with steady progression toward avascular necrosis of the femoral head (Fig. 3). He was lost to follow-up thereafter.

Discussion

Community-acquired methicillin-resistant *Staphylococcus aureus* is a major public health problem primarily related to health care but no longer confined to intensive care units, acute care hospitals, or any healthcare institution [2]. Methicillin-resistant *Staphylococcus au-*

Fig. 1. CT scan: the medial and posterior compartments of the thigh are enlarged with heterogeneous enhancement, showing multiple pockets of collections varying in sizes likely representing post-infective/inflammatory collection.

Fig. 2. CT angiography: a lobulated contrast-filled outpouching measuring 16 × 10 mm seen to be arising from the deep muscular branch of the right common femoral artery in medial aspect of the proximal thigh, likely representing a mycotic pseudoaneurysm.

reus septicemia has been implicated in widespread systemic infections, including infective endocarditis [3], meningitis with diffuse cerebral petechial hemorrhages [4], and mycotic aneurysm formation of major arteries [5, 6].

As our case report detailed, children with methicillin-resistant *Staphylococcus* infection are susceptible to de-

Fig. 3. Right hip X-ray: severe right-sided slipped capital femoral epiphysis.

veloping diffuse osteomyelitis, refractory septic arthritis, and fragile mycotic aneurysmal dilation of local arteries, despite aggressive medical therapy. Several authors have described the development of a mycotic aneurysm over a pre-existing structural defect, for example, ductus arteriosus aneurysm [7] or post-cardiac surgery [8]. It is worth noting however that aneurysmal degeneration of the arterial wall can also be a result of infection due to bacteremia or septic embolization [5].

Mycotic aneurysms are a rare but potentially life-threatening condition. Numerous recommendations exist for the management strategies based upon the location of the affected artery, degree of involvement, and most importantly patients' underlying cardiovascular reserve for intervention.

Broadly, the conventional strategy for treatment is via a multidisciplinary approach targeting prompt and aggressive antibiotic therapy, along with surgical intervention as deemed appropriate in the patient's individual circumstance [9]. Severe sepsis followed by persistent elevation of inflammatory markers and poor general condition led our vascular surgery and interventional radiology teams to opt for an endovascular embolization and coil insertion route, rather than open surgery for resection and graft placement. Our patient's postintervention outcome proved to be positive in the short run, but the unfortunate progression toward avascular necrosis of the femoral head seems attributable to the culminated effect of morbid obesity, severe infection, and aneurysm formation.

Conclusion

Methicillin-resistant *Staphylococcus aureus* infections are capable of causing significant end-organ damage, both locally and systemically. Our patient has demonstrated a rare complication of femoral mycotic aneurysmal dilation secondary to severe localized abscess formation, requiring endovascular coil insertion. The aforementioned intervention managed to control acute symptoms; however, over the course of the year, the child has progressed to avascular necrosis of the femoral head with impaired independent mobilization.

Acknowledgements

The authors would like to acknowledge S.S. for her contribution to the Introduction section.

Statement of Ethics

Guardians have provided their informed consent to publish their child's case.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

The authors did not receive any funding.

Author Contributions

F.F.B. and F.F.M. collected data, wrote manuscript, and collated and reviewed the literature. M.A.K. closely reviewed, guided, and edited the final paper. T.A. analyzed and elaborated upon radiologic images.

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