Case Reports

Healthy Adolescent with a Mycotic Aortic Aneurysm

from Community-Acquired Methicillin-Resistant *Staphylococcus aureus*

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Mycotic aneurysm after bacteremia is a rare diagnosis in children and adolescents. We report the case of a previously healthy adolescent who presented with chest pain and fever and who developed a mycotic aneurysm of the aorta after contracting community-acquired, methicillin-resistant Staphylococcus aureus. *Early recognition of widening of the patient's superior mediastinum, noted during a comparison of the patient's initial and follow-up chest radiographs, prompted computed tomographic angiography of the chest and led to a timely diagnosis, rapid surgical intervention, and a good clinical outcome. To our knowledge, this is the first reported case of mycotic aortic aneurysm from community-acquired methicillin-resistant* S. aureus *in a healthy adolescent who had no predisposing cardiac or aortic anomalies.* ***(Tex Heart Inst J 2017;44(4):279-82)***

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A rare condition in adults, mycotic aneurysm of the thoracic aorta is even rarer in children and adolescents.[1] Diagnosing the condition is often difficult, which leads to delayed surgeries and high mortality rates.[2,3] We report a case of mycotic aortic aneurysm secondary to community-acquired, methicillin-resistant *Staphylococcus aureus* (MRSA) in a previously healthy adolescent boy.

Case Report

In September 2013, a 15-year-old boy presented at the emergency department of his local hospital with a 4-day history of intermittent sharp pain in his upper-left chest that radiated to his back. He also reported a 2- to 3-week history of general malaise without fever. The patient's medical history included the repair of an anterior cruciate ligament tear in his right knee, made necessary after a sports injury at 13 years of age. Results of the patient's physical examination, chest radiograph, and electrocardiogram were normal. A diagnosis of musculoskeletal chest pain was made, and the patient was discharged with instructions to take ibuprofen for pain as needed. The ibuprofen only partially relieved his chest pain, so he returned to the emergency department the next day and was discharged with the same diagnosis. On the 3rd day, he returned with chest pain, a fever (temperature, 102 °F), nausea, vomiting, and worsening fatigue. He also had oral lesions suspicious for herpes labialis. His white blood cell count was 8,800/μL, with 84 polymorphs and 4 bands of neutrophils. Blood and urine samples were obtained.

The patient was admitted to the hospital with the diagnosis of presumed sepsis. Vancomycin, ceftriaxone, and acyclovir were started. The chest radiograph showed normal results (Fig. 1A). The next day, the patient continued to have intermittent fever and developed nontender erythematous macules resembling Janeway lesions on his left palm. Infective endocarditis was suspected. A transthoracic echocardiogram (TTE) showed a structurally normal heart with normal left ventricular systolic function. This initial echocardiogram also showed normal dimensions of the aortic arch and proximal descending thoracic aorta. Blood cultures were positive for MRSA. On the 4th day of hospitalization, a chest radiograph showed widening of the superior mediastinum (Fig. 1B), and a computed tomographic angiogram (CTA) of the chest revealed a 4-cm saccular aneurysm involving the distal transverse aortic arch, proximal descending thoracic aorta, and proximal left subclavian artery (Fig. 2). A para-aortic arch abscess was also noted.

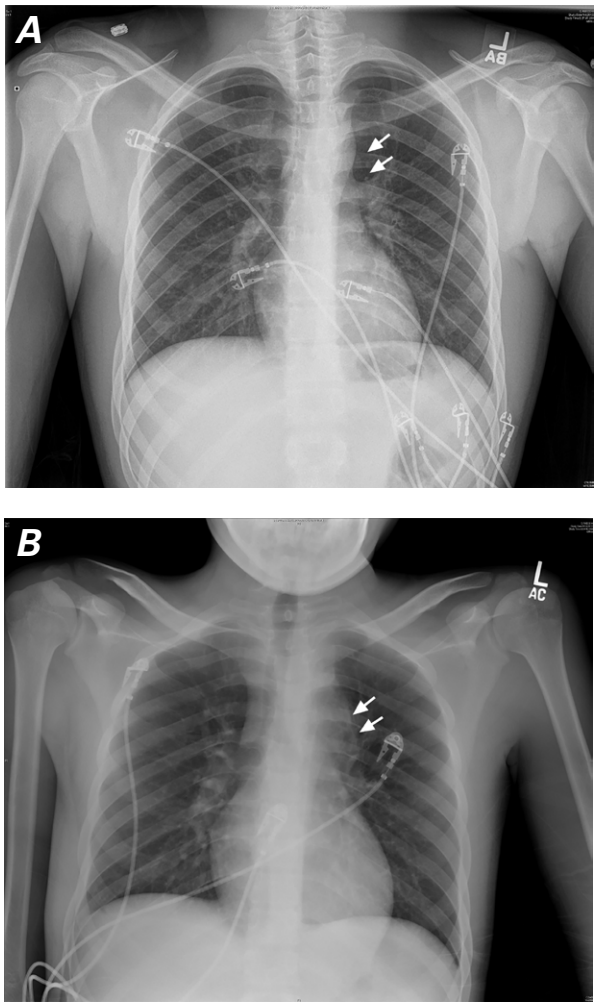

Fig. 1 ***A****) Chest radiograph upon initial admission shows a normal cardiac shadow, a clearly delineated aortic arch (arrows), and normal lung fields.* ***B****) On hospital day 4, the superior mediastinum (arrows) had widened. The lung fields remained normal.*

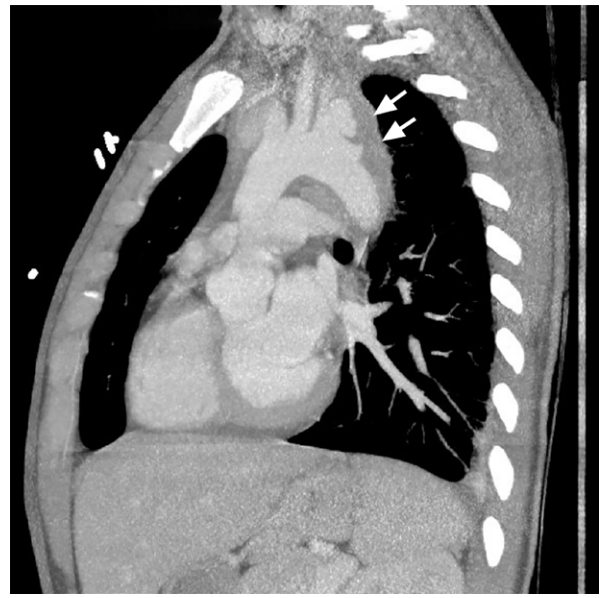

Fig. 2 *Computed tomographic angiogram (sagittal view) obtained on hospital day 4 shows a saccular aneurysm of the distal transverse aortic arch, proximal descending thoracic aorta, and proximal left subclavian artery (arrows).*

The patient was transferred to our tertiary-care facility for further evaluation and management. Upon admission, he was afebrile and hemodynamically stable. His erythrocyte sedimentation rate (80 mm/hr) and C-reactive protein level (60.7 mg/L) were elevated. Results of rapid plasma reagin titers and human immunodeficiency virus tests were negative. The patient's MRSA had intermediate sensitivity to vancomycin (minimum inhibitory concentration, 2 µg/mL); infectious disease specialists were consulted, and the antibiotic was changed to daptomycin. A TTE revealed a dilated distal aortic arch and a proximal descending thoracic aortic diameter of 28 mm (Z score, 4). Even with prior knowledge obtained from the CTA, it was difficult to clearly define the aneurysm by means of the TTE because of poor echocardiographic windows.

The next morning, the patient underwent successful surgical resection of the aneurysm and reconstruction of the aortic arch with use of a HEMASHIELD® graft (MAQUET Cardiovascular, LLC; Wayne, NJ). The graft was covered with a left latissimus dorsi muscle flap. Pathologic examination of the resected tissue revealed aneurysmal aortic tissue, and cultures from the resected tissue grew MRSA. While the patient was still taking daptomycin, he was started on a 10-day course of intravenous ceftaroline. When the course of ceftaroline was completed, he began a course of oral rifampin, as recommended by an infectious disease specialist. No immunodeficiency was found after completion of extensive laboratory investigations and a thorough patient history.

A CTA performed one week after surgical repair showed no recurrence of aortic aneurysm. Four weeks later, however—while the patient was still receiving intravenous daptomycin and taking oral rifampin—his chest pain returned. An aortic angiogram showed recurrence of the aneurysm, and repeat surgery was performed. Intraoperatively, we noted an extensive aneurysm of the ascending aorta, transverse aortic arch, and proximal regions of the head and neck branches of the aorta. Surgery included resection of aneurysmal tissue, replacement of the previous graft, and additional graft placement in the ascending aorta and aortic arch. Both the replacement and the new grafts were HEMASHIELD grafts. Pathologic examination revealed aneurysmal aortic tissue; however, tissue cultures were negative for MRSA.

Intravenous daptomycin and oral rifampin were continued for 4 weeks after the second surgery. The patient recovered uneventfully and was discharged from

the hospital 3 months after the initial hospitalization, with instructions to take oral cotrimoxazole long-term as suppressive therapy for MRSA. At the patient's one-year follow-up examination, he was doing well and had had no interim illnesses or hospitalizations. A CTA of his chest revealed no recurrence of aneurysms.

Discussion

To our knowledge, ours is the first reported pediatric case of community-acquired MRSA sepsis leading to mycotic aortic aneurysm of the aorta in a previously healthy adolescent with no predisposing cardiac or aortic abnormalities. Additional challenges in our patient were the resistance of his MRSA to vancomycin and the progression of inflammation despite appropriate postsurgical antibiotic coverage, leading to a second operation. We chose to provide long-term, suppressive antibiotic therapy for MRSA on the advice of the infectious disease specialists. However, the value of suppressive therapy and its optimal duration in the presence of an aortic graft are unclear.

Mycotic aneurysm after bacteremia is a rare diagnosis in children and adolescents.[1] In adults, mycotic aortic aneurysm resulting from infection with organisms other than MRSA has been reported after percutaneous intervention for coarctation,[2] coronary artery bypass grafting,[3] and the concomitant spread of infection (in a patient with purulent pericarditis).[4] Methicillin-resistant *S. aureus* bacteremia leading to aortic aneurysm after dialysis-catheter placement was reported in another adult patient.[5] Septicemia from MRSA and mycotic aneurysm of the iliac arteries after femoral artery catheterization has been reported in a 4-month-old infant.[6] A history of bacteremia in the presence of umbilical arterial catheters is a risk factor for mycotic aneurysm among infants; the position of the catheter tip reportedly predicts the future location of aortic aneurysm.[1]

Aortitis or the development of aortic aneurysm in a previously healthy adult, adolescent, or child is also rare. To our knowledge, there are no reports of children or adolescents with community-acquired MRSA mycotic aortic aneurysm, and we found only 2 reports of adults with the condition: one of a 20-year-old man with an ascending aortic aneurysm,[7] and one of a 62-year-old woman with a left common iliac artery aneurysm.[8] Timely diagnosis and appropriate management led to successful outcomes in both cases. In contrast, late diagnosis, which can lead to rupture or late surgical intervention, is the main cause of morbidity and death.[1-3] In our patient, vigilance in recognizing widening of the superior mediastinum, as seen on chest radiographs, led to prompt surgical management.

In general, color-flow Doppler echocardiography (TTE or transesophageal) is a useful, first-line tool for diagnosing aortic aneurysm. However, the location of the aortic aneurysm and the patient's body habitus might limit evaluation by echocardiography, as was the case in our patient. In such situations, magnetic resonance imaging or CTA can more clearly define the aortic arch and surrounding structures, as well as any extravasation at the site of the aneurysm and any distant mycotic aneurysms that might not be captured on echocardiograms.[6] Magnetic resonance imaging is preferred in stable, cooperative patients; however, infants and younger children undergoing the procedure require general anesthesia.

There is no consensus regarding the optimal duration of intravenous antibiotic therapy, although it is generally given for 6 to 8 weeks.[2-9] There is also no consensus on the benefits of long-term suppressive therapy with cotrimoxazole[10]; and to the best of our knowledge, there are no reports in the literature regarding the risks and benefits of suppressive antibiotic therapy in children or adolescents. In treating our patient, we followed the recommendations of the infectious disease specialists.

Chest pain is a relatively common symptom in pediatric patients and is almost always noncardiac in origin. However, if it is associated with fever, malaise, or weight loss, broad differential diagnoses should include cardiac and infectious causes. Mycotic aortic aneurysm should be considered as a differential diagnosis in patients with bacteremia and a history of prolonged indwelling lines, percutaneous cardiovascular interventions, or recent cardiopulmonary bypass.[1-6]

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