Red Knee Riddle

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Introduction

A 5-year-old previously healthy male child presented to a tertiary center in Oman with a day history of high-grade fever reaching up to 39C, left knee pain, swelling, and restricted movements. There is no history of proceeding infective symptoms, trauma, animal exposure, or travel. His immunization was up-to-date. He was born at 33 weeks of gestation, and at 2 weeks of life, he was managed for culture-negative septic arthritis complicated by osteomyelitis of the proximal tibia. He underwent a left knee arthrotomy and managed with 6 weeks of intravenous antibiotics at that stage. He has made a full recovery since then. The physical examination revealed a temperature of 39 C, associated with tachycardia of 149 beats/minutes and tachypnea of 32 breaths/minute. His left leg was fixed and flexed and his left knee was swollen, erythematous, hot, tender, and externally rotated with a healed scar from the previous surgery. The other systemic examination was unremarkable. Initial investigations revealed leukocytosis (WBC) of 18.2×10^9/L ($4.5 – 14.5 \times 10^9$/L) and a C-reactive protein of 309 mg/L (0 – 5 mg/L). The left knee MRI showed a moderate left knee joint effusion with complex internal contents, septa and, thickened and enhanced synovium with extensive periarticular soft tissue edema (figure 1). Gram positive cocci in chains grew from the joint fluid. Consent for publication was obtained from the family.

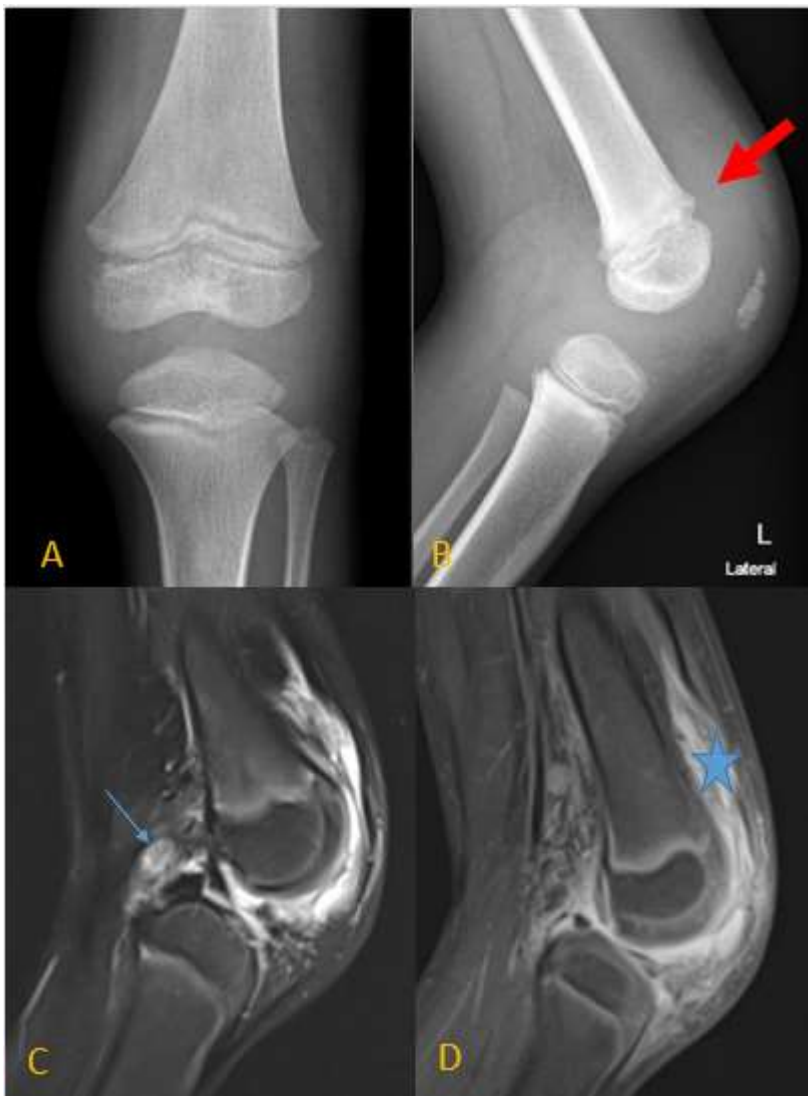

Figure 1: Knee radiographs and MRI. Radiographs of the left knee AP and lateral views (A and B) show periarticular soft tissue swelling, which is better seen on the lateral radiograph. There is suprapatellar pouch effusion (thick arrow in B). No fractures or destructive bony lesions are observed, and the joint space is preserved. Sagittal T2 FS and post-contrast T1 FS MRI of the knee (C and D) reveal a small knee joint effusion with synovial thickening and periarticular soft tissue edema. There is thick enhancing synovium on the post-contrast images (denoted as Star). Enlarged lymph nodes in the popliteal fossa are also noted (thin arrow).

Questions

1. What is your diagnosis?

2. What is the gold standard test to make the diagnosis?

3.What is the most common organism causing this infection in healthy children?

4. How would you manage this patient?

Answers

1. Left knee septic arthritis

2. Joint fluid aspiration for bacterial culture

3. Staphylococcus aureus

4. Anti-staphylococcus penicillin or 1st generation cephalosporin like cefazolin as empiric antibiotics and then targeted antibiotic therapy according to the culture results.

Discussion

The enhancement suggests features of septic arthritis and synovitis, with no osteomyelitis or sizable collection (Figure 1). He was started on intravenous cefazoline and underwent a left knee open arthrotomy. *Streptococcus agalactiae*, susceptible to ampicillin, grew from his synovial fluid. He was slow to improve after the first arthrotomy but improved significantly after the second arthrotomy, done 12 days post the first procedure. He was managed with 3 weeks of antibiotics post the second washout. He had a full recovery at the two-month follow-up.

Group B streptococci (GBS) are a major cause of perinatal infections in pregnant women and can cause invasive infections in neonates.[1] GBS invasive infections are rare beyond infancy.[1] People with underlying medical conditions are reported to be the most vulnerable group to GBS infection, especially obese patients, patients with poor glycemic control, and immunocompromised patients.[2] Phares et al.[1] reported 233 cases (1.6%) of invasive GBS infection in children aged 90 days through 14 years in a population-based surveillance regarding GBS infection in 10 American participating states between 1999 and 2005 from a total of 14,573 cases with GBS disease. Only 5% of childhood invasive GBS disease (age 90 days-14 years) in this cohort manifested as septic arthritis, while 58% of cases presented as bacteremia without focus. Close to half (44%) of infected patients, aged 1 - 14 years, with invasive GBS disease had at least one underlying medical condition.[2] The most common comorbidities in this study were neurologic disorders (25%), followed by immunosuppressive conditions (23%), asthma (23%), malignancy (15%), and renal disease (13%). Apart from having early septic arthritis during the neonatal period, our patient has been previously healthy with no known underlying medical conditions.

There is limited data regarding GBS septic arthritis beyond infancy.[2] Most GBS septic arthritis cases are monoarticular, with the knee being the most affected joint in a large adult study, similar to our patient presentation, followed by the shoulder and ankle joints.[3] An adult study from Singapore, comparing patients with GBS septic arthritis with a group of patients with non-GBS septic arthritis, reported that patients with GBS septic arthritis tend to have significantly higher CRP, a higher rate of bacteremia, a longer hospital stay, and a longer duration of treatment while the mortality rate and limb loss were lower, which may not be the same in children.[4] Our patient required arthrotomy twice during his illness and was slow to improve. He stayed at the hospital for 3 weeks for intravenous antibiotics before discharge but attained full recovery afterwards. In conclusion, pediatricians should be aware that GBS can cause osteoarticular infections beyond infancy, particularly in children with underlying medical conditions, but not exclusively.

Disclosure

The authors declare no conflicts of interest. Consent for publication has been received from the patient's family.

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