CASE REPORT

Invasive group G streptococcal infection in a paediatric patient

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SUMMARY

We present a paediatric case of group G streptococcal bacteraemia and vertebral osteomyelitis. The patient is a 14-year-old girl with Gaucher disease type 1 who presented with severe thoracolumbar pain. She was treated with a 4-week course of antibiotics for presumed osteomyelitis with clinical improvement.

BACKGROUND

Group G streptococci are normal flora of the nasopharynx, skin, gastrointestinal and female genital tract. In recent years, serious infections caused by group G *Streptococcus* have been reported but mostly in the elderly. This case describes a paediatric patient with group G streptococcal bacteraemia and vertebral osteomyelitis.

CASE PRESENTATION

A 14-year-old girl with a medical history significant for Gaucher disease type 1 and left ankle/tibia osteomyelitis in 2013 presented to the emergency department (ED) with a 4-day history of thoracolumbar pain. She had been having intermittent back pain for the past week. Two days prior to presentation, she awoke with more severe back pain which became progressively worse. She described the pain as spasmodic, squeezing sensations in her lower back bilaterally. She also reported a 2-day history of sore throat and cough. She denied any fevers, urinary frequency, haematuria, dysuria, abdominal pain, vomiting, diarrhoea or rash.

In the ED, she was afebrile with a heart rate of 92, blood pressure of 119/58, respiratory rate of 20 and an oxygen saturation of 99% on room air. She was well appearing with benign cardiopulmonary and abdominal examinations. She was noted to have tenderness to palpation of the right and left thoracolumbar paraspinal muscles and limited range of motion of her back due to pain. No point tenderness, erythema or swelling was noted along the thoracic, lumbar or sacral spine. She had normal range of motion of her bilateral lower extremities along with normal strength and deep tendon reflexes. Initial laboratory studies showed a white cell count of 15.5 with 75% neutrophils, 18% lymphocytes and normal haemoglobin and platelet counts. C reactive protein was 7.4 mg/L. She also had unremarkable electrolytes, liver function tests, creatinine and urinalysis studies. Owing to the symptom of sore throat and cough, a rapid strep antigen test was performed and was negative. A throat culture was obtained. She was discharged home from the ED and returned the following day

due to persistent back pain which was not improving with over the counter pain medications. Her vital signs and physical examination findings were consistent with her prior visit. Her throat culture results returned with heavy growth of group G β haemolytic *Streptococcus*. Antibiotics were not given. She was admitted to the general paediatrics floor for pain control and further diagnostic evaluation of her back pain. Shortly after admission, she became febrile to 104°F. A blood culture was obtained and the C reactive protein at that time was increased to 82.4 mg/L. Within 6 hours of obtaining the blood culture, it was reported to be growing Gram-positive cocci in pairs and chains which were later identified as group G β haemolytic *Streptococcus*.

INVESTIGATIONS

During her admission, she was seen by the adolescent medicine, paediatric infectious diseases, orthopaedic surgery, genetics and pain management teams. She underwent multiple imaging modalities to find a source of her infection. She had a normal echocardiogram, renal ultrasound and CT scan of her abdomen and pelvis. She had a bone scan which showed an absence of technetium-99m HDP activity and indium-111 white cell count activity in the T10, T11 and T12 vertebral spine, associated with loss of disc space and loss of vertebral definition, compatible with osseous infarction. MRI of her spine showed a heterogeneous signal abnormality at the T11 and L1 levels but no clear evidence of discitis, osteomyelitis or spinal abscess (see figures 1 and 2).

Figure 1 Heterogeneous signal abnormality at the T11 and L1 levels but no clear evidence of discitis, osteomyelitis or spinal abscess.

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Figure 2 Heterogeneous signal abnormality at the T11 and L1 levels but no clear evidence of discitis, osteomyelitis or spinal abscess.

TREATMENT/OUTCOME

After the blood culture from admission was reported as growing Gram-positive cocci in pairs and chains, she was empirically started on ceftriaxone and vancomycin. She continued to have positive blood cultures for 2 days. On hospital day 4, her antibiotics were narrowed to intravenous penicillin G based on identification of the organism. Despite the MRI findings, a decision was made to treat for presumed vertebral osteomyelitis due to her symptoms and bacteraemia. Her fever curve and back pain improved during her admission. Her C reactive protein decreased to 29 mg/L from a peak earlier in her admission of 148.2 mg/L. On hospital day 10, she was discharged home to complete the remainder of her 4-week antibiotic course with high-dose amoxicillin.

DISCUSSION

The β -haemolytic streptococcal strains carrying the group G antigen were first described by Lancefield and Hare in 1935.^{1 2} These organisms were considered non-pathogenic in humans and are part of the normal flora of the nasopharynx, skin, gastrointestinal and female genital tract.¹ They are catalase-negative, Gram-positive cocci that share a number of virulence factors with *Streptococcus pyogenes* including the production of streptolysin O, streptolysin S, DNAase B and M protein.³ Both groups C and G streptococci have now been associated with the same spectrum of illnesses caused by *S. pyogenes*. In children and adults, these organisms are implicated most commonly in respiratory tract infections, particularly pharyngitis. The true incidence of groups C and G streptococcal pharyngitis remains difficult to determine because colonisation in asymptomatic patients is reported between 1% and 11%.^{3–7} Postinfectious glomerulonephritis has been associated with both groups C and G streptococcal infection and reactive arthritis has been described after group C streptococcal infection. Acute rheumatic fever has not generally been associated with groups C and G streptococcal pharyngitis, arguing against the need for antibiotic treatment in pharyngitis cases to prevent this complication.^{3 5 8}

In recent years, serious infections caused by group G *Streptococcus* have been described, including skin and soft tissue infections, pneumonia, meningitis, peritonitis, endocarditis, arthritis, osteomyelitis and necrotising fasciitis. These infections seem to follow a similar course to invasive infections caused by

group A *Streptococcus*.⁵ They frequently occur in elderly patients, often in association with alcohol abuse, diabetes mellitus, malignancy, cardiac and peripheral vascular diseases.⁹ In the paediatric population, two cases of invasive group G *Streptococcus* have been reported. One case presented as neonatal sepsis in an infant without any risk factors¹⁰ and the other was a case of necrotising fasciitis in a 2-year old with a history of a vascular/lymphatic malformation.¹¹ Both of these paediatric patients had good outcomes after treatment.

Group G streptococcal bacteraemia is relatively uncommon, constituting ~0.3–0.4% of all bacteraemia cases.¹² Among patients with Group G *Streptococcus* bacteraemia, the most common types of infection appear to be skin and soft tissue (particularly cellulitis), primary bacteraemia, and bone and joint infections, although reports of osteomyelitis due to group G *Streptococcus* are rare.^{13 14} There are fewer than 15 cases reported in the literature, and many of these patients had underlying comorbidities such as malignancy, alcoholic cirrhosis, osteoarthritis and joint prostheses. Of the published cases of osteomyelitis, four were vertebral, one was postoperative and one was a case of subacute femoral osteomyelitis that mimicked a bone tumour.^{5 14–16} None of the reported cases of osteomyelitis involved paediatric patients.

Group G streptococci are highly susceptible to penicillin and therefore it is the drug of choice in most circumstances.³ Other antibiotics with activity against group G streptococci include other β -lactam agents, carbapenems, linezolid, quinupristin-dalfopristin and vancomycin.^{3 5 17} Oxacillin and nafcillin are not effective therapeutic agents. Clindamycin, erythromycin and tetracycline have relatively poor bactericidal activity against group G streptococci.^{5 18} For penicillin allergic patients, vancomycin should be used.

Learning points

- ▶ Group G streptococci are normal flora of the nasopharynx, skin, gastrointestinal and female genital tract.
- ▶ In recent years, serious infections caused by group G *Streptococcus* have been described, including skin and soft tissue infections, pneumonia, meningitis, peritonitis, endocarditis, arthritis, osteomyelitis, and neonatal sepsis.
- ▶ These serious infections usually occur in elderly patients or those with underlying conditions/immunodeficiencies.
- ▶ In paediatrics, group G *Streptococcus* usually manifests as pharyngitis. Serious infections are rare but can occur.
- ▶ The drug of choice in most circumstances is penicillin.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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