CASE REPORT

Brodie abscess of the femoral capital epiphysis in a 2-year-old child caused by *Kingella kingae*

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SUMMARY

We report the case of a Brodie abscess of the femoral capital epiphysis from which *Kingella kingae* was isolated. This is to the best of our knowledge the first report of a Brodie abscess of the femoral capital epiphysis from which *K. kingae* was isolated.

BACKGROUND

Paediatric primary haematogenous subacute osteomyelitis that develops into a Brodie abscess is a relatively rare phenomenon. Such abscesses, when they do occur, are more often associated with the vascular-rich metaphyseal region of tubular bone. Abscess formation within the epiphysis is even less common. *Staphylococcus aureus* is the organism most often isolated from Brodie abscesses. Other species such as *Kingella kingae* are being identified more frequently with the development of improved diagnostic techniques.¹

CASE PRESENTATION

The parents of a 2-year-old boy brought him to the paediatric assessment unit of our institution with a 48 hour history of an insidious onset of a limp. He had a history of a recent cold. The parents also recounted various falls over the preceding days but nothing of significance. There was no significant medical history.

On examination he was able to walk but had a mild right-sided limp. When standing he took his weight on the left leg and held the right leg with the knee bent and the heel off the floor. He allowed his right hip to be moved but grimaced at the limits of the range of movement.

He was without fever and all cardiovascular and respiratory parameters were normal.

INVESTIGATIONS

His erythrocyte sedimentation rate was raised at 32 mm/hour. C reactive protein, white cells and all other blood tests were normal. His plain film radiograph of the hip showed both metaphyseal and epiphyseal lucency on the right side (figure 1). He had an urgent MRI under general anaesthesia and this showed an apparent abscess extending from the femoral capital epiphysis across the physis into the metaphysis of the femoral neck (figures 2 and 3).

DIFFERENTIAL DIAGNOSIS

The consensus opinion of the clinicians involved in this case was that a Brodie abscess was the most

Figure 1 Initial radiograph of the pelvis.

Figure 2 MRI scan of the right hip (axial STIR). STIR, short τ inversion recovery image.

likely diagnosis. A neoplastic process was considered as a remote possibility.

TREATMENT

Following his MRI the child was taken directly to theatre for drilling and washout of this Brodie abscess. Macroscopically frank pus was drained from the abscess. Microbiological culture subsequently identified the organism to be *K. kingae*.

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Figure 3 MRI scan of the right hip (coronal STIR). STIR, short τ inversion recovery image.

He was treated on intravenous ceftriaxone for 3 months. The organism was sensitive to ceftriaxone, amoxycillin and tobramycin. Intravenous therapy was chosen since the child regularly spat out oral medication. Ceftriaxone was chosen to allow a single daily dose administration regime. The treatment was continued for 3 months because of the highly sensitive location of the abscess. If bone destruction continued and the femoral head collapsed then life-long disability would result. There is no previously described report of a Brodie abscess of the femoral capital epiphysis caused by *K. Kingae*. The advice of our microbiologists and the inclination of the clinicians were to err on the side of caution.

OUTCOME AND FOLLOW-UP

Follow-up radiographs at 6 weeks showed no evidence of collapse of the femoral head (figure 4).

Figure 4 Radiograph of the pelvis 6 weeks postoperative.

DISCUSSION

Osteomyelitis in children is typically caused by haematogenous spread from a distant source. It may occasionally be caused by contiguous spread from a local source or by traumatic or surgical inoculation. Sir Benjamin Brodie presented three cases of chronic abscesses of the tibia to the Medical and Chirurgical Society in 1832.² The first case he treated with below knee amputation and the patient unfortunately died. The other two cases he treated with incision and drainage and the outcomes were successful. Since Brodie's paper purulent abscesses within bone have acquired the eponymous description of Brodie abscesses.

Such lesions can develop insidiously and diagnosis can be difficult. Although soft tissue swelling can be identified on radiographs within a few days of onset, bony changes on plain radiographs, such as osteopenia or osteolytic lesions, may not be detected even 5–10 days after the onset of symptoms.³ Appropriate potent antibiotic therapy is required as in the treatment of any form of osteomyelitis. Surgery (typically drilling and irrigation) is required for abscess treatment. It may also be necessary in diffuse osteomyelitis where medical treatment has failed.³

According to Yeo and Ramachandran³, the incidence of acute primary haematogenous osteomyelitis in children is estimated between 1 and 13 per 100 000, and the incidence of subacute osteomyelitis is generally lower.⁴ The formation of a Brodie abscess is rarer still. Subacute osteomyelitis is, however, a growing problem according to some reports.⁵ Osteomyelitis accounts for around 1% of all hospital admissions in children.³ These infections of the bone most often occur in the vascular-rich metaphysis. The incidence of epiphyseal acute or subacute haematogenous osteomyelitis is extremely rare. Acute or subacute osteomyelitis isolated to the epiphysis has been reported around the knee joint and predominantly affects the distal femur or proximal tibia. There have been several reports in the literature of a Brodie abscess in the femoral neck.

Surgical drainage of these bone infections yields positive cultures in up to 75% of patients, and *S. aureus* is currently considered as the most common organism isolated.⁵ Other organisms that may be encountered include *Streptococcus*, *Pseudomonas*, *Haemophilus influenzae*, *Mycobacterium tuberculosis* and coagulase-negative *S. aureus*.⁵ Brodie abscesses in particular have traditionally been associated with staphylococcal infections, and these are considered more virulent than *K. kingae* infections.^{6 7} Improved diagnostic techniques, including PCR, have recently shown that *K. kingae* is more commonly the primary pathogen for osteoarticular infections in younger children than had previously been recognised.¹ The pathogenesis of disease caused by *K. kingae* is believed to begin with colonisation of the posterior pharynx, and breach of the epithelium to enter the bloodstream. Patients with invasive *K. kingae* disease frequently present with symptoms of a viral respiratory infection, and it has been suggested that viral-induced damage to the respiratory mucosa facilitates *K. kingae* invasion of the bloodstream.¹

In our search of the literature, we noted two case reports and a case series presenting *K. kingae* invasive infections causing osteomyelitis involving the epiphysis,^{8–10} and also two case reports presenting *K. kingae* causing a Brodie abscess' one involving the proximal tibia,⁶ and the other, the distal femur.¹¹ To the best of our knowledge, this is the first report of a Brodie abscess caused by an invasive infection of *K. kingae* involving the femoral capital epiphysis.

Learning points

- ▶ *Kingella kingae* is being more frequently diagnosed as a cause of osteomyelitis in younger children.
- ▶ Paediatric osteomyelitis is more common in the juxtaphysal metaphysis but does also occur in the epiphysis.
- ▶ Epiphysal osteomyelitis appears most common around the knee but does also occur in the hip.

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Competing interests None declared.

Patient consent Obtained.

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