Iliac osteomyelitis and gluteal muscle abscess caused by *Streptococcus intermedius*

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*Streptococcus intermedius*, included in the ‘milleri group’, is a commensal of the mouth and upper respiratory tract but it has often been associated with various pyogenic infections, such as endocarditis, pneumonia, abdominal or cerebral abscess, rarely with osteomyelitis, and exceptionally with muscular abscess. The first observed case of iliac osteomyelitis with gluteal muscle abscess caused by *S. intermedius* is reported. It is essential to recognise members of the ‘milleri group’ as possible agents of bone and muscle pyogenic infection because its management requires a timely diagnosis and prolonged antimicrobial treatment to achieve complete clinical and radiological recovery.

Introduction

*Streptococcus intermedius* is a micro-aerophilic streptococcus included in the ‘milleri group’, together with *S. constellatus* and *S. anginosus*. Although usually regarded as trivial commensals of the mouth, upper respiratory and intestinal tract, these organisms are capable of causing various pyogenic infections in a broad range of sites [1, 2]. In particular, *S. anginosus* strains, usually non-haemolytic, are generally isolated from gastrointestinal and genitourinary tract infections. On the other hand, the majority of *S. constellatus* isolates are β-haemolytic, and are isolated from lower respiratory tract infection, empyema and thoracic abscesses. *S. intermedius* strains were found to be β-haemolytic in 16.6% of cases and were responsible for brain and liver abscesses, although they have also been isolated from skin and soft tissues, and intra-abdominal and bone infections [3, 4].

Haematogenous osteomyelitis is known to be caused by a single organism in 95% of cases (mostly *Staphylococcus aureus*, more rarely *Staph. epidermidis*, *Escherichia coli*, *Pseudomonas aeruginosa* and other gram-negative organisms) [5]. ‘S. milleri’ is a very rare causal agent of osteomyelitis: only nine cases of spondylodiscitis or osteomyelitis due to this viridans streptococcus have been reported to date [6], to the best of our knowledge. Exceptionally, it can be responsible for muscle abscesses, specifically paravertebral secondary abscesses associated with vertebral or sacroiliac osteomyelitis; the psoas muscle is usually involved. Only two cases of psoas abscesses caused by members of the ‘milleri group’ have been described and there have been no previous reports of gluteal muscle abscess caused by these organisms [5, 7]. Therefore, we believe this case of iliac osteomyelitis with gluteal muscle abscess due to *S. intermedius* to be of interest.

Case report

A 30-year-old man was admitted to hospital with intermittent fever, chills, asthenia, lack of appetite and pain at the right flank, gluteus and leg, of 2 weeks duration. He did not report injuries, traumatic events or surgical operations in the recent past. He appeared ill, with a temperature of 37.8°C; the liver was enlarged but the spleen was not palpable. The right gluteus appeared erythematous and warm, with moderate pain on palpation. The haemogram showed leucocytosis (total leucocyte count, 16 800 cells/μl; absolute neutrophil count, 14 450 cells/μl), and an erythrocyte sedimentation rate (ESR) of 110 mm/h. Uralysis, electrocardiogram, echocardiographic study, chest X-ray and abdominal ultrasonography showed no significant abnormalities. Contrast-enhanced pelvic CT scan revealed an osteolytic lesion of the right ilium (Fig. 1) and an abscess of the homolateral gluteal muscle (with a measured diameter of 38 mm) (Fig. 2). CT-guided percutaneous drainage of the bone and muscle lesions
and five consecutive blood cultures yielded *S. intermedius* sensitive to penicillin, erythromycin, clindamycin, chloramphenicol and glycopeptides. Oral examination and oral X-ray showed general periodontitis.

The patient was treated with intravenous (i.v.) ampicillin-sulbactam (1000 mg and 500 mg, respectively, every 6 h) for 14 days and he became afebrile with disappearance of pain and other inflammation signs at the right gluteus within 5 days; moreover, he underwent a thorough treatment of his periodontitis. A repeated pelvic CT scan 2 weeks after the start of antimicrobial therapy demonstrated a reduction of lesion extent at both glutes and right ilium, but also disclosed multiple small abscesses in the opposite gluteal muscle. Antimicrobial treatment was modified; ampicillin was replaced with i.v. clindamycin (600 mg every 6 h) and levofloxacin (500 mg daily) and oral rifampicin (600 mg daily), all administered for 4 weeks.

The patient was discharged from hospital 6 weeks after admission, afebrile and with complete resolution of systemic signs and symptoms. Both leucocyte count and ESR were normal. A new pelvic CT scan showed that the abscesses at both gluteal muscles had disappeared, but confirmed the persistence of a small osteolytic area in the right ilium. Therefore, antimicrobial therapy was continued on an outpatient basis with i.v. and intramuscular ampicillin-sulbactam (1000 mg and 500 mg, respectively, twice a day) and oral levofloxacin (500 mg daily) for 3 more weeks. The last pelvic CT scan, 9 weeks after the first tomography, showed complete resolution of bone lesions.

**Discussion**

The ‘milleri group’ of streptococci is microbiologically characterised by micro-aerobic or anaerobic growth requirements, formation of tiny colonies (usually <0.5 mm in diameter) and production of a typical caramel-like odour when cultured on agar plates (probably due to the formation of a diacetyl metabolite). Clinically, members of this group show a propensity for causing invasive, pyogenic infections, unlike other viridans streptococci [8]. It is possible to distinguish ‘milleri group’ members from other streptococci by several biochemical reactions. *S. intermedius* strains are able to produce α-glucosidase, β-galactosidase, β-D-fucosidase, β-N-acetylglucosaminidase, β-N-acetylglucosaminidase and sialidase detectable after incubation for 3 h at 37°C with 4-methylumbelliferyl-linked fluorogenic substrates in microtitration trays, together with hyaluronidase production [2, 9]. Osteomyelitis usually occurs through haematogenous spread of pathogenic organisms and, in >90% of cases, is caused by a single agent, most commonly *Staph. aureus*. Paravertebral abscesses (generally involving the psoas muscle) are associated in >50% of cases with vertebral or sacroiliac osteomyelitis (secondary abscesses) and the causal micro-organism is mostly *Mycobacterium tuberculosis*, followed by *Staph. aureus* and mixed infection [5, 7].

*S. intermedius* (like the other two species belonging to the ‘milleri group’) usually colonises the mouth and upper respiratory tract, but it shows a tendency to cause pyogenic infections in different organs, principally endocarditis, pneumonia, cerebral and intra-abdominal abscesses [1, 10–12]. Osteomyelitis caused by members of the ‘milleri group’ is a very uncommon process and muscular abscess is an exceptional event [13]. In a literature review with the comprehensive database Index Medicus-Medline, and including the period 1966–Oct. 2000, only nine cases of osteomyelitis and two episodes of psoas muscle abscess induced by the ‘milleri group’ were found, while no cases of gluteal muscle abscess caused by these organisms were reported.
S. intermedius may produce hyaluronidase in vitro as well in vivo and this enzyme or its components can play an essential role in tissue degradation and pyogenic infections of bone and muscle caused by this organism [14]. The literature review suggests that viridans streptococci (which include the ‘milleri group’) may cause episodes of osteomyelitis which are usually associated with a more acute onset and lower back pain. On the other hand, the clinical presentation of muscular abscesses induced by these micro-organisms is characterised by flank, hip or lumbo-sacral pain and a prolonged course. Continuous or intermittent fever, leucocytosis and elevated ESR are generally present. CT scan and magnetic resonance imaging suggest a diagnosis of pyogenic infection, which may be confirmed by blood cultures, gallium scanning, ultrasonographic- or CT-guided percutaneous drainage, or surgery [7, 15].

Several studies of the in vitro antimicrobial suscepti-
bility of the ‘milleri group’ showed that penicillin, cephalosporins, clindamycin and erythromycin all possess reliable activity against these streptococci. Moreover, glycopeptides have shown very good activity and imipenem represents the most active β-lactam agent tested. The strains isolated during the last 5 years in Southern Europe were characterised by an increasing susceptibility to ciprofloxacin, and the concurrent appearance of intermediate resistance to penicillin [1, 16].

The patient described in this report represents the tenth report of osteomyelitis, the third case of muscular abscess, and the first described case of iliac osteomyelitis and gluteal muscle abscess caused by S. inter-
medius reported to date. In conformity with prior studies, this case had an acute onset with intermittent fever, flank and hip pain, leucocytosis and elevated ESR; contrast-enhanced pelvic CT scan suggested the diagnosis, confirmed by percutaneous drainage and repeatedly positive blood cultures. S. intermedius isolates were susceptible to penicillin and a 2-week treatment with ampicillin produced clinical improvement, although associated with the appearance of multiple abscesses in the opposite gluteal muscle. A prolonged (4-week) period of therapy with clindamycin, levofloxacin and rifampicin, continued with ampicillin and levofloxacin for a further 3 weeks, led to complete disappearance of all bone and muscle lesions.

In conclusion, although such localisations of pyogenic infection are infrequently reported, it is important to recognise S. intermedius, and the whole ‘milleri group’ of which it is a member, as elusive pathogens in osteomyelitis and muscular abscess. Moreover, it is suggested that a detailed dental examination should be performed in all patients with osteomyelitis caused by these organisms with different pathogenic organisms. A timely diagnosis (supported by CT scan and blood cultures) and an appropriate and prolonged course of antimicro-
bial therapy (with penicillin, macrolides, clindamycin or ciprofloxacin for 6–8 weeks) seem necessary to achieve full clinical and radiological recovery.

References

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