CASE REPORT

Group C streptococcal septic arthritis of a prosthetic hip joint following dental treatment

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SUMMARY

We report a case of a prosthetic joint infection occurring secondary to group C *Streptococcus* following dental treatment in a 66-year-old woman. This patient presented 11 years following a right hip resurfacing procedure with increasing pain and difficulty mobilising the right hip. An ultrasound and MRI scan identified a collection in the right hip joint, which was subsequently aspirated. Cultures revealed a group C *Streptococcus*. Extensive washout and surgical debridement of the hip joint was undertaken and the patient was treated with a protracted course of antibiotics. At 1 year follow-up, the patient demonstrated no evidence of recurrent infection. We discuss the evidence underlying prophylactic antibiotic usage regarding dental procedures in the prevention of septic arthritis in patients with prosthetic joints. We also review the spectrum of diseases caused by this organism.

BACKGROUND

The administration of prophylactic antibiotics before or during dental procedures in patients with metal joint prostheses is controversial. Currently, guidelines in the UK do not support the use of prophylactic antibiotics in patients with metal joint replacements. We report the case of a patient who presented with a group C streptococcal infection of the hip following dental treatment, in this instance, the infection affected a metal on metal resurfaced hip joint. The consequences of infected joint prostheses may be devastating for patients; further surgical washout procedures may be required, protracted antibiotic use may be necessitated and, usually, the joint replacement requires removal. In this article, we review the evidence behind the administration of prophylactic antibiotics for dental surgery in patients with joint prostheses and review the diseases caused by a rare organism. We also recommend revisions to the current guidelines.

CASE PRESENTATION

A 55-year-old woman was treated for right hip osteoarthritis with a metal on metal hip joint resurfacing procedure. Eleven years post hip resurfacing and following recent dental treatment, 2 weeks prior to presentation, she attended with acute onset of increasing pain and difficulty mobilising, with raised inflammatory markers. She had no history of trauma preceding the pain, no recent febrile illness and no sore throat or skin infections. A severe toothache had led her to visit the dentist for treatment. At this point the patient had a temporary filling in situ in the left lower premolar tooth. This

was removed under anaesthetic and root canal treatment was undertaken. The patient did not receive any antibiotics following the treatment.

Examination revealed discomfort in the right groin with straight leg raise limited to 25°, with reproduction of right hip pain on flexion and extension of the hip. At this time, blood tests revealed white cell count (WCC) 15.0, C reactive protein (CRP) 278 and erythrocyte sedimentation rate (ESR) 128. Ultrasound scan demonstrated synovial hypertrophy, though no effusion was identified and no fluid was aspirated from the joint under ultrasound guidance. Blood cultures taken from the patient grew group C *Streptococcus*. Other potential sources of this organism were excluded (including infective endocarditis and urinary tract infection) and the patient was started empirically on intravenous benzylpenicillin and flucloxacillin. An MRI was conducted, which demonstrated a soft tissue lesion centred around the right hip joint and the right iliopsoas muscle. Post-contrast examination confirmed the presence of a large fluid collection. The hip was explored, when the collection of 100 mL of pus-like fluid was washed out and the tissues debrided. Intraoperative specimens of the hip did not grow any organisms but histopathological examination revealed the presence of granulation tissue containing some particulate black material. Washout of the hip joint was undertaken on three occasions and a negative pressure dressing was applied to the wound postoperatively. The patient was continued on gentamicin and benzylpenicillin as per microbiology advice and antimicrobial sensitivities for 2 weeks followed by 4 weeks of oral antibiotics. Inflammatory markers improved over the subsequent 2 weeks with final values being CRP 7 and ESR 4. Delayed wound closure was undertaken following completion of antibiotic therapy.

The past medical history of this patient included hypertension. The patient took amlodipine and ramipril and had no known drug allergies. She had no pertinent family history and did not drink alcohol.

INVESTIGATIONS

Investigations undertaken included bloods with inflammatory markers on presentation: WCC 15.0, CRP 278 and ESR 128. Blood tests were also undertaken to assess for metallosis with plasma chromium 36.6 µg/dL (<0.5) and plasma cobalt 44.7 µg/dL (0.1–0.4).

Plain radiographs of the hip (figure 1), an ultrasound scan (figure 2) and a MRI (figure 3) were performed on the patient.

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Figure 1 Plain anteroposterior radiograph of the pelvis performed on admission, demonstrating a metal on metal resurfaced right hip. No periprosthetic fractures or acute pathology is visualised.

Blood cultures grew *Streptococcus C*, though intraoperative specimens did not grow any organisms.

Histopathological examination revealed the presence of granulation tissue containing particulate black material.

DIFFERENTIAL DIAGNOSIS

The main differential diagnosis in this patient was that of septic arthritis of a prosthetic hip joint, with *Streptococcus C* the causative organism.

Metallosis was largely excluded by the lack of inclusion lymphocytes histologically, the reducing metal ion levels postoperatively and the absence of masses around the hip.

TREATMENT

The patient was treated with a protracted course of intravenous antibiotics according to microbiological sensitivities and following discussion with a microbiologist. The hip joint was also washed out in theatre three times and a negative pressure dressing applied to the wound.

OUTCOME AND FOLLOW-UP

The patient required three subsequent washout procedures followed by application of a negative pressure dressing. Delayed closure was undertaken following completion of a long course of antibiotics.

At 1 year follow-up, she had no evidence of recurrent infection in the hip joint.

Figure 2 Ultrasound scan of the right hip demonstrating the presence of a collection around the hip joint.

Figure 3 MRI demonstrating a soft tissue lesion centred on the right hip joint and the right iliopsoas muscle. Post-contrast examination confirmed the presence of a large fluid collection.

DISCUSSION

Hundreds of thousands of patients undergo joint arthroplasties annually, with numbers projected to continue to increase year by year.¹ The presence of prosthetic devices in the deep joint cavity introduces both an early and/or late postoperative risk of infection. Early joint infections are thought to be associated with intraoperative wound contamination, with *Staphylococcus epidermidis* among the most common causative organisms identified. Late joint infections have been associated with the haematogenous spread of bacteria, such as *S. viridans*, through seeding of bacteria to the joints.² Some clinicians have associated joint infections occurring following dental treatment with the transient bacteraemia that may occur following certain dental procedures.³ Late prosthetic joint infections may lead to significant morbidity and mortality among patients and therefore prophylaxis warrants serious consideration.

For many years, controversy has surrounded the administration of prophylactic antibiotics before or during dental treatment in patients with prosthetic joint replacements. The Working Party of the British Society for Antimicrobial Chemotherapy currently advises that patients with prosthetic joint implants are not administered antibiotic prophylaxis prior to dental treatment.⁴ The Working Party does advise that patients who develop concurrent infection are promptly treated with antibiotics to which the organisms are sensitive.⁴ This advice is also in line with the American Dental Association (ADA) advice from a systematic review updated in 2014. This group did not recommend that prophylactic antibiotics be administered prior to dental treatment, either. The advice does also advocate consultation with the patient's orthopaedic surgeon as required and consideration of patient-specific needs and preferences.⁵

Several authors have advocated the administration of antibiotics prior to dental treatment,^{6–10} while others advise against their use with concerns that risks of adverse effects outweigh the risk of utilising them.^{11–12} Additionally, the idea of risk stratification has been advised by some authors, with those high-risk patients offered antibiotic prophylaxis.^{13–15} Jacobson and Matthews evaluated infection rates following dental treatment

in 2693 patients with prosthetic joint replacements. A total of 1.1% (n=30) of patients developed infection in the joint prostheses.⁶ The majority of microbial isolates were *S. epidermidis* and *S. aureus*, accounting for 76% of the organisms cultured. On the basis of the sensitivities, cephalosporins were identified as being the most suitable prophylactic antibiotics to be administered.^{6–8}

Certain dental procedures present a higher risk of bacteraemia, including dental extractions, periodontal procedures, dental implant placement, reimplantation of avulsed teeth and endodontic instrumentation or surgery. In patients with prosthetic joints who are undergoing these procedures and presenting with pain in the joint, there should be a high index of suspicion for septic arthritis.

Group C *Streptococcus* has been identified as part of the normal flora of the nasopharynx, skin and genital tract.¹⁶ The diseases caused by group C *Streptococcus* include primary bacteraemia (in normal and immunocompromised hosts), endocarditis, pericarditis, purulent skin and wound infections, ophthalmic and central nervous system infections, suppurative tonsillitis, osteomyelitis, urinary tract infections and septic arthritis.¹⁶ Of the cases of group C infections reported by Salata *et al*,¹⁶ 74% included bacteraemia.

A total of 10 cases of group C streptococcal arthritis are reported in the literature. Predisposing factors reported in these patients include the presence of pre-existing rheumatological disease and the presence of comorbidities (including heart failure, diabetes mellitus and hypertension). Five of the cases developed bacteraemia and two cases presented with other infections associated with group C *Streptococcus*: one patient had streptococcal pneumonia and the other had infective endocarditis. No cases of streptococcal C infection in prosthetic joints have previously been reported.⁶

Patients with streptococcal C infections have a very high risk of bacteraemia and, thus, a likelihood of seeding to the prosthetic joint. When contemplating the administration of prophylactic antibiotics prior to significant dental treatment in patients with prosthetic joints, one must consider the relative ease of administration of antibiotics compared with the huge impact on morbidity and mortality that an infected joint replacement may have on a patient. Patients should be fully informed of these risks as well as the relative risks of adverse effects from the antibiotics. A review of 25 randomised controlled trials assessing the use of prophylactic antibiotics prior to total hip or knee replacement did conclude that antimicrobial prophylaxis is effective in preventing surgical wound infections postoperatively.¹⁷ Given that most patients receive prophylactic intravenous antibiotics prior to surgery anyway, we do not feel that the risk of adverse effects of a dose prior to significant dental procedures should outweigh the potentially life-threatening complications that may arise from an infected prosthesis.

We recommend revision to the current guidelines regarding antibiotic prophylaxis for patients with prosthetic joints undergoing high-risk dental treatment. In particular, we recommend the use of oral augmentin (amoxicillin and clavulanic acid) 625 mg 2 h prior to and a further similar dose 4 h after high-risk dental treatment in non-penicillin allergic patients. Patients should be warned regarding the adverse effects associated both with the antibiotics and with their omission.

Learning points

- ▶ Prosthetic joint infection leads to a high rate of patient morbidity and mortality.
- ▶ Group C streptococcal infections in most cases lead to a bacteraemia and should be promptly treated.
- ▶ High-risk dental procedures present a significant risk of bacteraemia.
- ▶ We recommend revisions to the current guidelines to include the administration of two doses of oral augmentin prior to high-risk dental procedures in non-penicillin allergic patients with prosthetic joint replacement, following discussion of the adverse effects and benefits prior to administration.

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