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CASE REPORT

Primary meningococcal oligoarthritis of the knee—case report and review of the literature

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Abstract This report is of a healthy 49-year-old male with an isolated primary single-joint septic arthritis of the right knee. The patient had no clinical symptoms or signs of systemic meningitis or detectable meningococci in the blood. The presentation is rare and can be unusual. Complete recovery does usually occur if appropriate antibiotics therapy, joint aspiration and repeat washouts are performed early.

Keywords Septic arthritis · Oligoarthritis · *Neisseria meningitides*

Introduction

Septic arthritis is a debilitating and costly arthropathy with serious sequelae, particularly, when it occurs in the younger 20- to 60-year-old age group. Many causative organisms have been identified and although gram-positive *Staphylococcus aureus* is the most common accounting for nearly 50% of cases [1], it is important to consider the age and context of the patient. Gram-negative enteric species such as *Escherichia coli* and *Pseudomonas* are much less common and affect mainly neonates and immunocompromised patients. While in younger sexually active adults, *Neisseria gonorrhoea* remains the most common gram-negative cause of bacterial arthritis [2]. Gonococcal disease, in decline since 1985, is again on the increase, which may in part be explained by escalating antibiotic resistance [3].

The earliest reports of joint infection due to *Neisseria meningitides* date back to the nineteenth century [4]. Many, however, are described in conjunction with or after symptoms of acute meningitis and involve multiple joints [5].

Primary meningococcal arthritis (PMA) represents a very rare form of meningococcal disease. PMA is defined as an acute septic arthritis without the classical syndrome of meningococcemia (fever, rash and hemodynamic instability) [6]. Medline-based search of the English literature revealed only 10 cases in healthy adults, the last of which was in 2003. This article presents a healthy adult male with an isolated primary meningococcal joint infection.

Case report

A 49-year-old male financial analyst presented to our accident and emergency department with a sudden onset of right knee and right wrist pain. This was preceded by a 4-day history of lethargy and fever. There was no history of trauma or penetrating injury, and he had no associated symptoms such as headache, neck stiffness, photophobia or dysuria. His past medical history was unremarkable; he is allergic to aspirin and was not taking any regular medication. In addition, he is a non-smoker, drinks alcohol infrequently and does not use recreational or illicit drugs.

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He reported being homosexually active and having four casual homosexual partners in 3 months preceding his illness. Our patient also had an ex-wife and two young children. There had been no recent febrile illness in any of his family members or sexual contacts who were traced and investigated.

At presentation, the patient was alert and in no distress. His temperature was 37.4°C, heart rate 92 beats/min and blood pressure 148/94 mmHg. On examination the right knee was extremely tender and swollen with a moderate effusion and reduced range of motion. His right wrist was equally tender with moderate effusion and skin colour changes mimicking a cellulitis picture.

Plan radiograph of the right knee was normal (Fig. 1). The right wrist X-ray was similarly normal. Non-blanching rash was clearly seen on the dorsal aspect of both forearms. Head to toe examination showed no other rash in the trunk and lower limbs. Aspiration of the knee yielded 50 mL of thick cloudy yellow pus. Gram stain of the aspirate was positive for gram-negative cocci; there were numerous pus cells, and no crystals were detected.

The white cell count was elevated to 17.4×10^9/L (normal range $4.5–11.0\times10^9$/L) with neutrophils 65%. The C-reactive protein (CRP) was 410 mg/L, and the erythrocyte sedimentation rate (ESR) was 71 mm/h.

Arthroscopic right knee washout was performed the day following presentation. Pus was drained, and there were signs of an inflammation within the synovium (Fig. 2). Adhering to our microbiology department advice, intravenous antibiotics were commenced immediately, ceftriaxone 1 g once daily for 2 weeks.

The joint fluid culture result returned 48 h after and showed growth of group C *N. meningitides*, sensitive to ciprofloxacin, penicillin and rifampicin. An isolate was sent to the National Reference Laboratory for further confirmation. Acute infection was established by polymerase chain reaction. In line with the reference laboratory recommendation, antibiotics were changed on day 14 to intravenous ciprofloxacin 400 mg BD and oral rifampicin 300 mg BD.

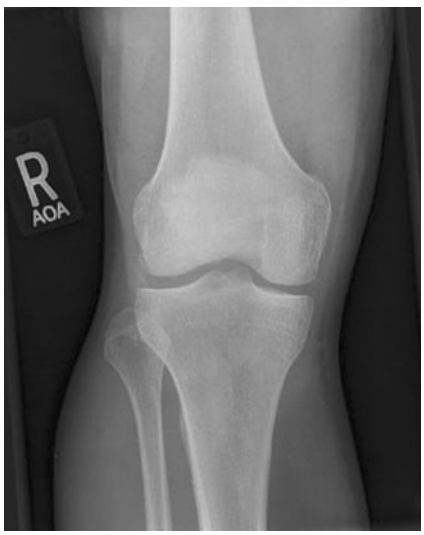

Fig. 1 Normal (AP) plain radiograph of the right knee

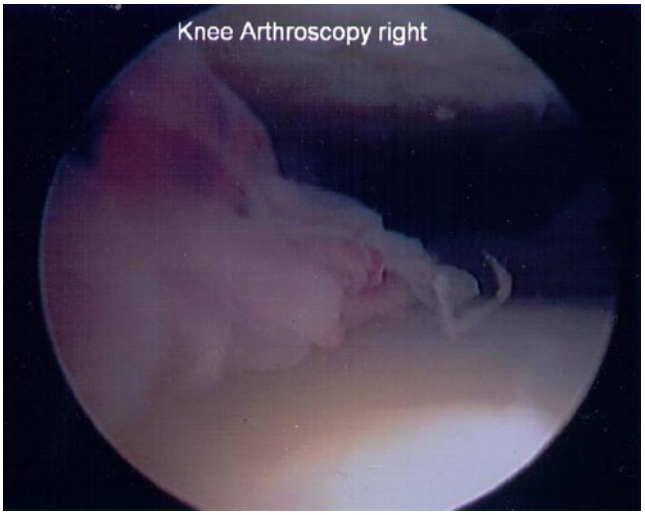

Fig. 2 Inflamed synovium seen during the initial arthroscopic washout

Histological examination of the synovial biopsies confirmed acute on chronic inflammation consistent with infective aetiology. There was no evidence of crystal arthropathy or malignancy.

Peripheral blood cultures were negative for any bacteria after incubation for 5 days. Peripheral blood serology was also negative for human immunodeficiency virus 1 and 2 antibody.

The patient's reactive right wrist symptoms improved following the initial knee washout and the commencement of intravenous antibiotics. No formal aspiration of his wrist was required. He underwent further arthroscopic washouts of his knee until the inflammatory markers returned to normal. Nineteen days of intravenous antibiotics were followed by oral ciprofloxacin 500 mg twice daily and rifampicin 300 mg twice daily for another 4 weeks.

By discharge date, the patient had made full symptomatic and functional recovery. Two follow-up outpatient appointments ensured no early relapse and full resolution. Eight weeks after admission, his white cell count was 6.4×10^9/L, CRP of <1 mg/L and an ESR of 7 mm/h.

Discussion

N. meningitides as a cause of meningitis and meningococcal septicaemia is a well-known entity. Similarly, septic arthritis as part of the meningococcal syndrome is also well recognised. Concomitant septic arthritis has been reported in 2–11% of cases [2, 5, 7].

Septic arthritis caused by *N. meningitides* in the absence of meningococcal syndrome (PMA), however, is much less well known. A review of the literature from 1980 to 2011 found 49 cases of PMA; only 22 cases, however, involved isolated joints and of these nearly 50% were children under 4 years [5, 8, 9]. Of the 13 remaining adult cases, 11 men and two women [4, 9] were identified. Three of the adult males were immunocompromised, leaving only 10 reported cases of PMA in healthy adults [2, 4, 5, 9].

Another barrier to recognition is the similarity to *Neisseria gonorrhoeae*. Both gram-negative diplococci bacteria present as an oligoarticular process, rash and pyrexia [10]. In contrast, septic arthritis-associated meningococcal syndrome tends to occur between 5 and 10 days post-infection, with rapidly resolving effusions in multiple joints [5].

It is of utmost importance to make the correct diagnosis since management requires not only treatment of the patient but also patient isolation and prophylaxis of contacts. Microscopically *N. gonorrhoeae* and *N. meningitides* are indistinguishable. Blood cultures for meningococcus are positive in only 40% of cases. Although synovium cultures are positive in 90% of cases [11], these also can be negative especially if antibiotics are given early prior to a diagnostic aspirate or a formal arthroscopic washout [7]. In such cases polymerase chain reaction can provide a specific diagnosis even if the organism is not viable [12].

In addition, if left untreated, any meningococcal infection can rapidly destroy a joint. Intravenous antibiotics are required for a minimum period of 2 weeks [13]. Repeat arthroscopic washouts are often the preferred method for pus drainage and joint irrigation in joint infections.

Certain co-morbidities such as a pre-existing joint disease place the patient at a particularly high risk and are found in 47% of patients who were diagnosed with septic arthritis [2]. Other categories of risk include psoriasis, intravenous drug use and any condition associated with immune deficiency [14]. Our patient did not exhibit any of these recognised risk factors.

Since the earliest reports of PMA, efforts have been made to classify the various presentations according to the clinical types and pathogenic mechanisms [5]. Schaad postulated that four different mechanisms may be involved [1]:

- Direct bacterial invasion of the synovium (septic arthritis)
- Hypersensitivity reaction (allergic arthritis)
- Intra-articular or peri-articular haemorrhage (haemarthrosis)
- Iatrogenic causes

Septic arthritis is seen in both acute meningococcemia as well as PMA. Allergic arthritis is thought to be secondary to deposition of circulating immune complex or the development of an Arthus reaction to a fixed antigen in that tissue [5]. Haemarthrosis is thought to occur in rare instances of fulminant meningococcemia complicated by disseminated intravascular coagulation [1]. The last category of iatrogenic causes is thought to include toxic reactions to sulphonamides and post-meningitic lumbar spondyloarthritis [1]. These are both rare and ill-defined conditions.

There are different subtypes of *N. meningitides* that cause PMA. Groups A, B, C, W135, Y and Z are the six currently recognised forms of meningococcus. The majority of cases are caused by group B, C and Y [15]. Serotyping may not be obviously apparent, but the introduction of meningococcal conjugate vaccine may play an important role in the future eradication of this infection [2]. Of note, our patient had never received meningococcal vaccination in the past and found to be infected with serotype C.

Conclusion

Septic arthritis is a medical emergency that requires prompt diagnosis and treatment. Meningococcal and gonococcal infection should be considered in the differential diagnosis of isolated monoarthritis. PMA is a rare form of septic arthritis caused by *N. meningitides*, with relatively few cases reported in the literature. It is very similar to and can easily be mistaken for a disseminated gonococcal disease. Early recognition, joint aspirate, arthroscopic washouts and appropriate antibiotics are required to avoid joint destruction and its sequel. PMA should be considered in the differential diagnosis of any acute septic arthritis and especially in those who are at high risk to allow public health interventions.

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Conflict of interest None declared.

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