CASE REPORT

Bilateral, simultaneous pneumococcal septic arthritis of the knees: a normal immune system, an unknown source

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SUMMARY

Pneumococcal septic arthritis is a rare clinical entity and is often associated with a systemic bacteraemia. A 60-year-old man was admitted with bilateral swollen, painful knees. He was feeling feverish with raised inflammatory markers. Joint aspiration yielded purulent fluid, which, when cultured, grew *Streptococcus Pneumoniae* bilaterally. The patient underwent repeated arthroscopic knee washouts and was treated with intravenous (IV) antibiotics. During his admission, various investigations and scans were undertaken to find an infective focus or signs of immunodeficiency; none were found. After 4 weeks of IV antibiotics and 4 knee washouts, the patient was discharged. We believe this is the only case documented of bilateral simultaneous pneumococcal septic arthritis of the knees in an immunocompetent patient with no extra-articular infective focus. This case exemplifies the importance of careful assessment of patients who present with bilateral swollen joints.

Urgent Gram stain analysis revealed the presence of Gram-positive cocci and, when cultured, the joint aspirate yielded a heavy growth of *Streptococcus Pneumoniae* bilaterally. The patient underwent bilateral arthroscopic knee washout on the same day, and started treatment on intravenous (IV) antibiotics. Over 19 days, the patient underwent arthroscopic washout a further three times, and was given IV antibiotics as per local microbiology guidance. During his admission, echocardiogram, US of the abdomen, CT of the thorax, abdomen and pelvis, and white cell scan, revealed no source of infection. Assessment for possible markers of immunodeficiency were all normal including an HIV test, white blood cell analysis, blood film, complement levels, serum electrophoresis and others. After his fourth arthroscopic washout, both of the patient's knees were clinically much improved and his inflammatory markers had returned to normal levels. After 4 weeks of IV antibiotics, the patient was discharged on oral penicillin.

BACKGROUND

Pneumococcal septic arthritis (SA) is a rare clinical entity making up approximately 6–8% of SA cases.^{1–3} Pneumococcal SA is polyarticular in 36% of cases, of which half are associated with a septic focus,¹ leading patients to present with associated symptoms including pneumonia or meningitis. Immunocompromised patients such as those with HIV are at a higher risk of SA, and it is uncommon to find polyarticular SA in patients without significant risk factors.¹

The patient described presented with a rare pathology affecting only his knees, with no obvious focus of infection and no significant immunodeficiency. As such, this represents a rare case, and provides a helpful cautionary tale for anyone treating patients with bilaterally swollen knee joints.

CASE PRESENTATION

A 60-year-old man was admitted with a 1-day history of bilateral swollen, painful knees. He was feeling feverish with a temperature of 38.5°C, and initial blood tests showed C reactive protein of 125 mg/L. Examination revealed bilateral red and hot swollen knees with reduced range of movement. There were no clinical signs of meningitis nor of pneumonia. The patient's medical history included only osteoarthritis and a gastric bypass undergone several months earlier. Bilateral joint aspiration of the knees yielded purulent fluid.

INVESTIGATIONS

On admission, the patient underwent routine admission investigations and observations. Observations were grossly normal; however, he was feeling feverish with a temperature of 38.5°C. Blood tests revealed a white cell count of $8.4 \times 10^9/L$, which rose to $13.2 \times 10^9/L$ overnight, and C reactive protein was 127 mg/L, which rose to 271 mg/L overnight. Erythrocyte sedimentation rate was 2 mm/h on admission and remained within normal limits. X-rays of the knees were taken, showing an effusion in the left knee (figure 1).

Figure 1 Lateral X-ray of the patient's left knee.

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Urgent Gram stain analysis of the joint aspirate revealed Gram-positive cocci. Samples were then cultured, and produced a heavy growth of *S. Pneumoniae*. Blood cultures taken on admission grew the same organism after overnight culture. Sensitivities were assessed several days later, when it was established the pneumococci were sensitive to benzyl penicillin.

After initial arthroscopic washout, possible sources of the bacteraemia were investigated. An echocardiogram and chest X-ray both proved normal. Given the patient's history of abdominal surgery undergone several months earlier, a CT scan of the abdomen, thorax and pelvis was organised. This CT revealed no source, neither did a subsequent ultrasound looking for abscesses of the liver. Finally, a full body white cell scan was conducted—this, again, detected no other sources of infection.

Blood tests were undertaken to look for additional risk factors. The patient's white blood cell differential and blood film showed no abnormalities, and his complement level was within normal limits. Given the irregularity of this case, consultant microbiologists recommended tests that could highlight possible malignancy. All tests proved normal, including a prostate-specific antigen (0.8 ng/mL), lactate dehydrogenase (252 U/L) and a serum electrophoresis test, all of which revealed no abnormal paraprotein band. A full autoimmune screen gave no indication of abnormal antibodies, including a negative test for rheumatoid factor. Blood tests for HIV and hepatitis B were also both negative.

DIFFERENTIAL DIAGNOSIS

On presentation, the patient's symptoms of bilaterally swollen, painful knees were suggestive of either a flare-up of his osteoarthritis, a reactive arthritis secondary to an infection elsewhere, or a SA. Given his fever and raised C reactive protein, a SA had to be ruled out, and therefore both knees were aspirated. Urgent Gram stain analysis revealed the presence of bacteria, confirming the diagnosis.

TREATMENT

The patient was initially started on IV flucloxacillin and benzylpenicillin, both at maximum doses, as per hospital protocol. He was also given two doses of vancomycin soon after admission until initial cultures had ruled out the presence of methicillin-resistant *Staphylococcus Aureus*. When cultures revealed a heavy growth of *S. Pneumoniae*, the patient was continued on benzylpenicillin, but other antibiotics were stopped as per advice from the consultant microbiologist. Sensitivities revealed this was an appropriate antibiotic. IV antibiotics were given for 31 days in total, and were converted to an oral dose when clinical features and blood biomarkers were showing sufficient improvement. The patient was discharged on an oral dose of phenoxymethylpenicillin for 2 weeks.

Throughout admission, the patient underwent four arthroscopic washouts. Two of these were bilateral, and two were unilateral. He was reviewed daily and each washout was undertaken if the patient's blood parameters and clinical signs of infection appeared refractory to treatment. He remained in hospital 12 days after his final procedure, undergoing a long period of observation to ensure clearance of infection.

FOLLOW-UP

The patient was discharged after 4 weeks of IV antibiotics. He has been followed up in outpatient clinic twice since his discharge. At present, he presents with only mild joint pain on weight bearing, with no new symptoms. To this date, the patient has not been readmitted with a recurrence of SA.

DISCUSSION

To the authors' knowledge, this case is unique within the literature; being the first case documented involving a bilateral pneumococcal SA that has no obvious septic source, and a patient without immunodeficiency.

SA is a rare condition, and is most commonly caused by *S. Aureus*,^{1–4} with *S. Pyogenes* and *S. Pneumoniae* considered the second and third most frequent causes, respectively.^{1 4}

As with all SA, the gold standard for diagnosis is a positive culture from synovial fluid, with important clinical features including joint pain, swelling, fever and reduced range of movement. IV antibiotics are the gold standard initial treatment, with different hospital trusts having their own local protocols. Penicillins are part of an appropriate initial treatment option, with broad-spectrum cephalosporins also considered reasonable, particularly in Gram-negative disease.⁴ Antibiotic therapy should, however, always be tailored to Gram stain analysis and local guidelines. Regarding surgical treatment, there have been no trials establishing the most effective treatment for SA.⁵ Options extend from simple aspiration, to arthroscopic washout, to full arthrotomy and open washout. Some centre-wide experiences have been published, without significant results.⁵

The largest case series available looking at pneumococcal SA¹ investigated 13 new patients as well as a total of 190 cases (108 adults) in a larger series. Of the 13 new cases, 5 were polyarticular, and 2 affected the knees bilaterally—both these patients had an associated pneumonia. Having no extra-articular infection was not a rarity in itself, with 50% of the adult cases in the larger review (53/105) only showing infection in their joints. Unfortunately, the case series lacks extensive details in the larger series, but does outline the proportion of patients with polyarticular disease (36% of adults) and the proportion of SA cases in the author's hospital that are caused by *S. Pneumoniae* (3%).¹ Two other prominent case series have, respectively, looked at 9 and 11 adult patients with pneumococcal SA.^{2 3} The first did not identify any patient with polyarticular disease,² and in the second, all patients suffered from extra-articular sources of pneumococcal sepsis.³

Several published reports have described cases of pneumococcal SA, showing a rich variety of pathology. Some cases describe immunocompetent patients developing polyarticular SA.^{6 7} These cases exhibit how widely polyarticular pneumococcal SA can disseminate, including disease of the shoulders, wrists and ankles.^{6 7} Other cases have reported patients with bilateral simultaneous onset of knee SA.^{8–10} Two such cases describe a single unifying cause: one being an infusion of infliximab,⁸ and the other an intra-articular steroid injection.⁹ The most interesting case describes a patient who suffered bilateral simultaneous pneumococcal SA following a splenectomy for Felty's syndrome,¹⁰ a patient who would have suffered the dual misfortune of rheumatoid arthritis and an impaired immune system.

Learning points

- ▶ Bilateral swollen painful knees should not be dismissed as an osteoarthritis flare up or a reactive arthritis.
- ▶ In cases of polyarticular septic arthritis, a potential source should be sought, but may not be found.
- ▶ When septic arthritis is considered, aspiration of swollen joints under aseptic conditions should always be considered if sufficient expertise is available.

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