Other full case

Streptococcus pneumoniae causing septic arthritis with shock and revealing multiple myelomaMoussa Albert Riachy^{1,2}¹Hotel Dieu de France Hospital, Beirut, Lebanon;²Saint Joseph University, Faculty of Medicine, Beirut, Lebanon**Correspondence to** Dr Moussa Albert Riachy, riachy@dm.net.lb**Summary**

The authors present the case of a 43-year-old male who presented at the emergency department, with a mean arterial pressure of 48 mm of Hg, a sinus tachycardia of 142/min and shallow breathing at 30/min. Two days previously, he started a high-grade fever with a concomitant reddish and painful left knee and right elbow, without any treatment. Septic shock was diagnosed and the patient was started on empiric antibiotics combining ceftriaxone and vancomycin and vasopressors (norepinephrine). The painful knee and elbow joints were aspirated and cultures grew *Streptococcus pneumoniae*. The patient's clinical condition improved progressively and after investigation, the diagnosis of multiple myeloma was concluded. Pneumococcal septic arthritis, an extraordinary cause of septic arthritis, is a manifestation of an underlying disease and can be responsible for septic shock. Its diagnosis should direct further investigations. It can occur in patients with joint disease but should emphasise the search of systemic immunosuppression.

BACKGROUND

Pneumococcal septic arthritis, an extraordinary cause of septic arthritis, is a manifestation of underlying disease and can be responsible for septic shock. Its diagnosis should direct further investigations. It can occur in patients with joint disease but should emphasise the search of systemic immunosuppression.

CASE PRESENTATION

We present the case of a 43-year-old male. He had a history of smoking, stopped 3 years ago, arterial hypertension and dyslipidaemia. He experienced a severe myocardial infarction 2 years ago and sustained a left heart failure (ejection fraction 30%). An implantable ventricular defibrillator was implanted electively 2 months ago. Two days before his actual admission, he started a high-grade fever with a concomitant reddish and painful left knee and right elbow. At presentation to the emergency department, his blood pressure showed a mean arterial pressure of 48 mm of Hg, a sinus tachycardia of 142/min and shallow breathing at 30/min. He was admitted to the intensive care unit (ICU).

INVESTIGATIONS

Chest x-ray showed no pulmonary congestion. His complete blood count on admission: haemoglobin of 10 g/l, haematocrit of 28.9%, white blood cells of $5.3 \times 10^9/l$ with neutrophils of 81% and the platelet count of $97 \times 10^9/l$. Biochemistry results showed a high serum creatinine of 190 $\mu\text{mol/l}$ and C reactive protein of 360 mg/dl. A complete investigation was done for the septic origin. Uroculture was negative but three blood cultures grew *Streptococcus pneumoniae*. The painful knee and elbow joints were aspirated. A direct Gram stain after aspiration

showed a Gram-positive cocci. Later on, the cultures grew penicillin-sensitive *S pneumoniae*.

DIFFERENTIAL DIAGNOSIS

Differential diagnosis of septic shock and cardiogenic shock were explored. Acute renal failure, anaemia and thrombopaenia were attributed to the severity of sepsis. Trans-thoracic and trans-oesophageal echocardiography excluded endocarditis and superficial echography excluded abscess at the site of the defibrillator.

TREATMENT

Septic shock was adopted and the patient started on empiric antibiotics combining ceftriaxone 1 g every 12 h per day, vancomycin 1 g every 12 h per day and vasopressors (norepinephrine). The painful knee and elbow joints were aspirated and cultures grew *S pneumoniae*. Antibiotics were adjusted to renal and liver functions.

OUTCOME AND FOLLOW-UP

The patient's clinical condition improved progressively. He succeeded to be weaned off from vasopressors after 7 days. Laboratory results also improved except for the platelet count which kept dropping with a nadir of $9000/\text{mm}^3$ that subsequently needed to be transfused with 14 units of platelet. Additional investigation was then undertaken. Abdominal ultrasound was negative; serum protein electrophoresis which yielded a monoclonal peak of 3.1 g/dl. Serum protein immunoelectrophoresis determined its IgG κ type with depressed levels of all other immunoglobulins. Bone marrow aspiration showed 20% plasmacytes. Urine protein immunoelectrophoresis showed also an IgG κ peak. Serum calcium level was 1.97 mmol/l, serum albumin 23 g/l and β -2-microglobulin 3.45 mg/l with a

high serum lactate dehydrogenase 590 U/l. The patient has therefore stage II disease following the International Staging System. The diagnosis was concluded as IgG κ multiple myeloma. He was discharged from the ICU after a 10-day ICU stay and a 14-day hospital stay. A skeletal survey was performed after discharge from the ICU which showed multiple bone lytic lesions. After the infection was controlled, he started a chemotherapy regimen associating high-dose dexamethasone and an induction regimen with bortezomib. Combination treatment followed with bortezomib, thalidomide and dexamethasone. One month after discharge, the patient received pneumococcal vaccine. The patient recuperated a complete motion without any limitation.

DISCUSSION

S pneumoniae, a Gram-positive bacterium, is currently the major invasive pathogen of children and older adults and is the principal cause of otitis media, pneumonia, bacteraemia and meningitis.^{1–3} Its case death rate is approximately 40% for bacteraemia in the older and 35% for meningitis in children population.^{4 5}

The lipoteichoic acid (LTA) of Gram-positive cell wall bacteria is considered to be analogous to the lipopolysaccharides of Gram-negative bacteria and shares many of its biochemical and physiological properties.⁶ Recently, it was shown that pneumococci activate the innate immune system via Toll-like receptor 2 (TLR2).⁷ Pneumococcal LTA is a potent inducer of acute inflammation⁸ and may be important in causing septic shock and/or other diseases, perhaps by stimulating TLR2.⁹

Non-gonococcal bacterial arthritis is the most potentially dangerous and destructive form of acute arthritis. The most common causative organisms remain staphylococcal (40.6%) and streptococcal (28%) species.¹⁰ *S pneumoniae* was responsible for 9%. In other studies *S pneumoniae* septic arthritis varies between 6%¹¹ and 8.2%.¹² It remains an uncommon infection in adults. Six of 7 (85%) children with pneumococcal septic arthritis were aged <2 years and 20 of 25 (80%) adults were aged >60 years.¹² Moreover in a recent study, Ross *et al*¹¹ reported that older patients are more prevalent than previously reported.^{13 14} The hip was the most frequently involved joint.

Bacterial arthritis can result from direct inoculation of bacteria during trauma or joint surgery or, rarely, from extension of infection from adjacent bones. However, most cases of bacterial arthritis arise from haematogenous spread to the joint.^{15–17} A retrospective review of 191 cases of septic arthritis found that 72% had arisen haematogenously.¹⁷ Common predisposing factors include injection drug use, indwelling catheters and underlying immunosuppression such as HIV infection. Patients with haematogenously-induced bacterial arthritis can present with joint abnormalities in the absence of signs of sepsis or bacteraemia. These patients presumably acquired their infection from a transient or self-limiting bacteraemia. The incidence of pneumococcal septic arthritis in patients with pneumococcal bacteraemia is extremely low ranging from 0.5% to 0.7%.¹¹ Gram-positive cocci have a higher propensity to cause haematogenously

joint infections than Gram-negative bacilli. In a review of 190 cases of pneumococcal septic arthritis, it is noted that 64% of cases were monoarticular and only one-half had another clinically apparent focus of pneumococcal infection.¹⁸ When present, polyarticular septic arthritis should emphasise the search of systemic connective tissue disease such as rheumatic arthritis or an overwhelming sepsis.¹⁸ Only 50% of adults with pneumococcal septic arthritis had another focus of pneumococcal infection, such as pneumonia. Functional outcomes were good in 95% of patients. Definitive diagnostic test is done by the identification of bacteria in the synovial fluid. Blood cultures are positive in 50% of cases and should be obtained in any patient with suspected bacterial arthritis. Mortality was 19% among adults and nil among children. Our patient had a worrisome initial presentation with polyarticular septic arthritis and septic shock. The same microbial agent was isolated in the arthritis and in the bloodstream without any other organ involvement. No drainage procedure was done; the treatment was conservative with adapted antibiotics. No specific treatment was made to the joint apart from the starting aspiration. No subsequent surgery was indicated after the healing process.

Early diagnosis and management determines the good prognosis of bacterial arthritis.¹¹ Pathogen type, adapted antibiotics and surgery have an important impact on the outcome.^{11 16} In pneumococcal bacterial arthritis, 95% of adults and 90% of children had a return to baseline joint function or only mild limitation of joint motion.¹¹ These results are in contrast to *Staphylococcus aureus* arthritis that evolves with 50% of joint sequelae.¹⁶

Underlying local or systemic risk factors in septic arthritis were described in 20.1% of cases.¹⁰ The most commonly cited risk factor was the presence of a prosthesis. Patients with streptococcal arthritis when compared to staphylococcus arthritis were more likely to be female (56% and 36%, respectively), less likely to have comorbidities (36% and 56% respectively), less rheumatoid arthritis (5% and 19% respectively), less diabetes (2% and 15% respectively), and more likely to have malignancies (13% and 7% respectively).^{19 20} Immunosuppression also seems to be a major risk factor. Reported cases are secondary to HIV positive patients,²¹ after splenectomy in Felty's syndrome,²² after allogeneic bone marrow transplantation²³ and as the initial manifestation of X linked agammaglobulinaemia.²⁴ To our knowledge, pneumococcal septic arthritis was reported as the initial manifestation of multiple myeloma in only two patients.²⁵ In our case, pneumococcal septic arthritis, a very rare clinical entity diagnosed by clinical and microbiological findings, was the first manifestation revealing the multiple myeloma admitted to ICU for a concomitant septic shock.

The use of pneumococcal polysaccharide vaccine is recommended in immunocompromised persons aged more than 19 years, including those with HIV infection, malignancy, chronic renal disease, nephrotic syndrome, congenital immunodeficiency; those receiving immunosuppressive chemotherapy (including glucocorticoids); asplenia and postorgan or bone marrow transplantation.²⁶

Learning points

- ▶ Pneumococcal septic arthritis, an extraordinary cause of septic arthritis, is a manifestation of underlying disease and can be responsible for septic shock.
- ▶ The diagnosis of pneumococcal septic arthritis should direct further investigations.
- ▶ Pneumococcal septic arthritis can occur in patients with joint disease but should emphasise the search of systemic immunosuppression as multiple myeloma.
- ▶ Pneumococcal vaccine should be administered in immunocompromised patients.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. **Friedman G**, Silva E, Vincent JL. Has the mortality of septic shock changed with time. *Crit Care Med* 1998;**26**:2078–86.
2. **Ahmed AJ**, Kruse JA, Haupt MT, *et al*. Hemodynamic responses to gram-positive versus gram-negative sepsis in critically ill patients with and without circulatory shock. *Crit Care Med* 1991;**19**:1520–5.
3. **Pollack MM**, Fields AI, Ruttimann UE. Distributions of cardiopulmonary variables in pediatric survivors and nonsurvivors of septic shock. *Crit Care Med* 1985;**13**:454–9.
4. **File TM Jr**, Tan JS. Incidence, etiologic pathogens, and diagnostic testing of community-acquired pneumonia. *Curr Opin Pulm Med* 1997;**3**:89–97.
5. **Schuchat A**, Robinson K, Wenger JD, *et al*. Bacterial meningitis in the United States in 1995. Active Surveillance Team. *N Engl J Med* 1997;**337**:970–6.
6. **Ginsburg I**. Role of lipoteichoic acid in infection and inflammation. *Lancet Infect Dis* 2002;**2**:171–9.
7. **Yoshimura A**, Lien E, Ingalls RR, *et al*. Cutting edge: recognition of Gram-positive bacterial cell wall components by the innate immune system occurs via Toll-like receptor 2. *J Immunol* 1999;**163**:1–5.
8. **Riesenfeld-Orn I**, Wolpe S, Garcia-Bustos JF, *et al*. Production of interleukin-1 but not tumor necrosis factor by human monocytes stimulated with pneumococcal cell surface components. *Infect Immun* 1989;**57**:1890–3.
9. **Koedel U**, Angele B, Rupprecht T, *et al*. Toll-like receptor 2 participates in mediation of immune response in experimental pneumococcal meningitis. *J Immunol* 2003;**170**:438–44.
10. **Ryan MJ**, Kavanagh R, Wall PG, *et al*. Bacterial joint infections in England and Wales: analysis of bacterial isolates over a four year period. *Br J Rheumatol* 1997;**36**:370–3.
11. **Ross JJ**, Saltzman CL, Carling P, *et al*. Pneumococcal septic arthritis: review of 190 cases. *Clin Infect Dis* 2003;**36**:319–27.
12. **Ispahani P**, Weston VC, Turner DP, *et al*. Septic arthritis due to *Streptococcus pneumoniae* in Nottingham, United Kingdom, 1985–1998. *Clin Infect Dis* 1999;**29**:1450–4.
13. **Cooper C**, Cotton DW, Jones SK, *et al*. Antikeratin antibody in rheumatoid and psoriatic arthritis. *Ann Rheum Dis* 1986;**45**:349–50.
14. **Newman JH**. Review of septic arthritis throughout the antibiotic era. *Ann Rheum Dis* 1976;**35**:198–205.
15. **Goldenberg DL**. Septic arthritis and other infections of rheumatologic significance. *Rheum Dis Clin North Am* 1991;**17**:149–56.
16. **Goldenberg DL**, Reed JL. Bacterial arthritis. *N Engl J Med* 1985;**312**:764–71.
17. **Morgan DS**, Fisher D, Merianos A, *et al*. An 18 year clinical review of septic arthritis from tropical Australia. *Epidemiol Infect* 1996;**117**:423–8.
18. **Dubost JJ**, Fis I, Denis P, *et al*. Polyarticular septic arthritis. *Medicine (Baltimore)* 1993;**72**:296–310.
19. **Dubost JJ**, Soubrier M, De Champs C, *et al*. Streptococcal septic arthritis in adults. A study of 55 cases with a literature review. *Joint Bone Spine* 2004;**71**:303–11.
20. **Lohse A**, Despau J, Auge B, *et al*. Pneumococcal polyarticular septic arthritis in a patient with rheumatoid arthritis. *Rev Rhum Engl Ed* 1999;**66**:344–6.
21. **Sewall NH**, Tikly M. Invasive pneumococcal infection presenting as septic arthritis and Austrian-like syndrome involving the tricuspid valve in a patient with underlying HIV infection. *Joint Bone Spine* 2005;**72**:86–8.
22. **Brzeski M**, Smart L, Baird D, *et al*. Pneumococcal septic arthritis after splenectomy in Felty's syndrome. *Ann Rheum Dis* 1991;**50**:724–6.
23. **Schwellla N**, Schwerdtfeger R, Schmidt-Wolf I, *et al*. Pneumococcal arthritis after allogeneic bone marrow transplantation. *Bone Marrow Transplant* 1993;**12**:165–6.
24. **Peters TR**, Brumbaugh DE, Lawton AR, *et al*. Recurrent pneumococcal arthritis as the presenting manifestation of X-linked agammaglobulinemia. *Clin Infect Dis* 2000;**31**:1287–8.
25. **Cuesta M**, Bernad M, Espinosa A, *et al*. Pneumococcal septic arthritis as the first manifestation of multiple myeloma. *Clin Exp Rheumatol* 1992;**10**:483–4.
26. Centers for Disease Control and Prevention. Recommended adult immunization schedule – United States, 2009. *MMWR* 2008;**57**(53). <http://www.immunize.org/catg.d/p2011.pdf> (accessed 16 December 2008).

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