CASE REPORT

Painful knees and hearing-loss: a rare presentation of meningococcal disease

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SUMMARY

A 49-year-old woman with a medical history of rheumatoid arthritis presented to the emergency room, with high fever and painful knees. In addition, she had had a mild headache for several days and some hearing loss over several months. We saw an ill patient with arthritis of both knees, from which purulent fluid was aspirated. Antibiotics were started for septic arthritis of both knees and her condition improved rapidly. However, the headache persisted and the hearing loss worsened. At the time, meningitis was suspected. Initial knee aspiration culture was positive for *Neisseria meningitidis*. PCR of the cerebrospinal fluid sample also was positive for *N. meningitidis*. The patient was finally diagnosed with bilateral septic gonarthrititis secondary to a bacterial meningitis caused by *N. meningitidis*.

BACKGROUND

The incidence of invasive meningococcal disease (IMD) is <1 cases per 100 000 in North America and Europe, and has declined over the past decades due to effective vaccination programmes.¹ However, the mortality and morbidity, respectively around 10% and 18%, remain high and have not improved in the past years.² The most common presentation of IMD is meningitis, and this occurs in 30–60% of patients.³ The typical signs and symptoms of meningitis are: fever, neck stiffness and decreased level of consciousness. These symptoms can be absent in up to two-thirds of patients.⁴ A more specific finding for meningococcal disease is petechial rash, but this is only observed in 45–65% of patients.⁴ However, meningococcal disease can present with various symptoms.⁵ Immunocompromised patients, especially, can present atypically, which may hamper diagnosis. However, early diagnosis and prompt treatment are essential to decrease morbidity and mortality.^{2,5}

CASE PRESENTATION

A 49-year-old woman with a medical history of rheumatoid arthritis presented to the emergency room, with high fever and painful knees. She had also experienced nausea, vomiting and a mild headache for 3 days. Furthermore, she had experienced hearing loss over several months, which had become worse a few days before presentation. The rheumatoid arthritis was in remission with a combination of methotrexate with folic acid and hydroxychloroquine. Additional medication consisted of salmeterol/fluticasone for asthma, and pantoprazole.

We saw an ill patient with a temperature of 39.2°C and a respiratory rate of 24 breaths/min. Other

vital signs were normal. Cardiac, pulmonary and abdominal examinations were normal. She had bilateral arthritis of the knees. A few subtle purpura were visible on the left foot and elbow. We were concerned about the neck stiffness at presentation. The consulting neurologist found no signs of meningism and therefore did not perform a lumbar puncture. Purulent fluid was aspirated from both knees. Blood drawn at presentation showed: C reactive protein 349 mg/L, leucocytes 34.9×10^9 , haemoglobin 7.0 mmol/L and mean corpuscular volume 92 fL, and renal and liver tests were normal. Chest X-ray and urinary tests were normal, excluding urinary tract infection and pneumonia as a cause of this patient's fever.

The most likely diagnosis at the time seemed to be septic arthritis of both knees. The patient was admitted and treated with cefuroxime, and a single dose of gentamicin, intravenously. The methotrexate and hydroxychloroquine were discontinued. The fever disappeared, inflammatory markers decreased and the patient's condition improved rapidly. However, she still had a mild headache and the hearing loss worsened. A hearing test showed hearing loss of 60 db in low-frequency tones, which could not be explained by the use of hydroxychloroquine. Meningitis was reconsidered. Around this time, cultures of the knee aspirate were shown positive for *Neisseria meningitidis*. A lumbar puncture showed an increased leucocyte count. Cerebrospinal fluid (CSF) culture remained sterile, which may be explained by the prior antibiotic treatment. However, PCR analysis of the CSF detected DNA of *N. meningitidis*. The isolate of the knee aspirate was fully susceptible to penicillin (minimal inhibitory concentration, MIC=0.032 mg/L), cefotaxime (MIC≤0.002 mg/L) and ciprofloxacin (MIC=0.004 mg/L).

OUTCOME AND FOLLOW-UP

The patient finally was diagnosed with septic arthritis secondary to bacterial meningitis caused by *N. meningitidis*. Antibiotic treatment was changed from cefuroxime to ceftriaxone intravenously and after 10 days to oral ciprofloxacin. The ciprofloxacin was continued for 10 days. The patient was discharged after 10 days of hospitalisation. A few weeks later, she visited the outpatient clinic. The hearing impairment resolved to the pre-existing level of mild hearing loss and no other symptoms remained.

DISCUSSION

This case report describes the clinical course of a patient with disseminated meningococcal disease.

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The clinical spectrum of meningococcal disease is broad and consists of: meningitis, septicaemia, meningitis in combination with septicaemia, chronic meningococcal infection and focal meningococcal infections (such as isolated pneumonia, conjunctivitis, pericarditis, myocarditis and arthritis).³ Arthritis due to *N. meningitidis* is a less-known presentation of meningococcal disease and is described in about 2–12% of cases.^{6–8} The arthritis can be septic secondary to meningococcal bacteraemia or can be reactive due to immune complex precipitations in the affected joint.⁹ The presentation can be monoarticular or polyarticular. Large joints are most commonly affected, mainly the knee or ankle. Treatment for septic arthritis consists of antibiotic therapy and joint aspiration.^{6 8} When immune complex-mediated reactive arthritis is suspected, treatment with corticosteroids can/may be indicated.⁶

A relatively common complication of IMD is hearing loss, and this occurs in 3.3% of adult patients.² It is more frequently seen—about 8%—in patients with meningococcal meningitis.⁴ Hearing loss as an initial symptom of meningococcal disease is rare. Only one case report described a presentation similar to that in our case.¹⁰

Another complicating factor in diagnosing our patient correctly was her rheumatoid arthritis, and possibly also her anti-rheumatic medication. Rheumatoid arthritis is associated with increased infection rates and mortality from infections, which may be related to the disease itself, or to medication side-effects.^{11 12} Our patient used methotrexate and hydroxychloroquine for rheumatoid arthritis. There is no clear evidence whether the use of disease-modifying antirheumatic drugs (DMARDs) such as methotrexate and hydroxychloroquine is associated with a higher risk of infections. As far as we know, it is not known whether the use of methotrexate is associated with a higher risk of bacterial meningococcal infection.^{11 12}

Treatment of IMD consists of antibiotics and supportive therapy. Antibiotics should be given within 1 hour after presentation if IMD is suspected.^{2 5} Current guidelines advise antibiotic treatment for 5–7 days in case of meningococcal meningitis or sepsis.^{5 13 14} In general, septic arthritis is treated with antibiotics for 4–6 weeks, although in arthritis with *Neisseria gonorrhoea*, treatment duration is only 7 days.¹⁵ Optimal duration of antibiotic treatment in case of meningococcal arthritis is not known. Our patient was treated with antibiotics empirically for 20 days, taking into account the clinical improvement of her symptoms.

The guidelines for antibiotic treatment vary slightly between different countries, depending on the antibiotic resistance profile. In general, the preferred antibiotic treatment is either penicillin, ceftriaxone or cefotaxime.^{5 13 14} Penicillin resistance is common and ciprofloxacin resistance is described as well.^{16 17} The first choice according to the Dutch guidelines is penicillin G intravenously, or in case of penicillin resistance, ceftriaxone or cefotaxime.¹⁴ Recently, a new guideline in the UK was published in which it is recommended to start treatment with ceftriaxone or cefotaxime in all patients with suspected meningitis or meningococcal sepsis.¹³

Despite advancement in outcome due to improved treatment and vaccination programmes, mortality and morbidity of IMD remain high. Early recognition of patients who may develop severe IMD is important to improve prognosis. Recently, in a large prospective cohort study on children and adults, the most significant risk factor for mortality was septic shock.² Another major risk factor was older age. Common complications in adults were: deafness, skin scarring, motor neurological deficits and renal dysfunction. Important risk factors for developing

complications were septic shock and thrombocytopenia. Less complications were seen if the administration of antibiotic occurred before admission.²

This case report illustrates the various presentations of IMD. IMD can progress rapidly and can be fatal. Therefore recognition and prompt treatment is crucial.

Learning points

- ▶ The spectrum of meningococcal disease is broad and the presentation is often non-specific. Diagnosis should also be considered when a patient presents with a focal infection, such as arthritis, or less frequent symptoms such as hearing loss.
- ▶ Meningococcal disease is a severe condition that can be fatal. Early recognition and prompt treatment with appropriate antibiotics improve the prognosis remarkably.
- ▶ In immunocompromised patients, performing more invasive diagnostic tests such as a lumbar puncture should be considered even when the suspicion of meningitis is low.

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Patient consent Obtained.

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