Primary Meningococcal Arthritis and Endogenous Endophthalmitis: A Case Report

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Abstract

Introduction: *Arthritis and endophthalmitis are both recognised complications of meningococcal infection. They may occur in the presence or absence of meningitis or meningococcaemia. Primary meningococcal arthritis (PMA) and endophthalmitis are important diagnoses to recognise as delayed treatment would result in permanent joint and eye damage. We report the first patient with both PMA and meningococcal endophthalmitis and present a review of the literature.* ***Clinical Picture:*** *An afebrile, non-toxic, 54-year-old female presented with arthritis and a painful red left eye following an episode of diarrhoea. An initial diagnosis of reactive arthritis with uveitis was made. However, subsequent microbiological investigations isolated* **Neisseria meningitides** *thus confirming the final diagnosis.* ***Treatment:*** *Antibiotics were instituted.* ***Outcome:*** *There was complete resolution of the arthritis but her left eye vision had deteriorated to just perception of light.* ***Conclusion:*** *The presentations of PMA and meningoccocal endophthalmitis are often confusing. This should be considered in the differential diagnosis of reactive arthritis and acute dermatitis-arthritis syndrome.*

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Key words: Infectious arthritis,* Neisseria meningitides*, Reactive arthritis, Suppurative uveitis

Introduction

Primary meningococcal arthritis (PMA) and endogenous meningococcal endophthalmitis are both uncommon presentations of meningococcal infection that should be considered in the differential diagnosis of reactive arthritis and acute dermatitis-arthritis syndrome. We describe a case of PMA and meningococcal endophthalmitis occurring together.

Case Report

A 54-year-old Indian female hawker who had no past history of note except well-controlled hypertension was admitted complaining of pain and impaired vision of the left eye for 2 days. This was associated with painful swelling of the small joints of both her hands and feet. In addition, she described non-bloody diarrhoea and vomiting occurring a day prior to the onset of the eye symptoms. She had no fever or localising symptoms In particular, there was no neck stiffness or headache. She denied any recent foreign travel, recent genitourinary infection or insect bite. Her last sexual exposure was more than 5 years ago. There was neither positive contact history nor any family members who had been on religious pilgrimage.

On examination, she was comfortable, afebrile and her neck was supple. Her left conjunctiva was injected and the cornea was hazy with a diminished visual acuity of 6/24 (Fig. 1). Cells were seen in the anterior chamber. She had synovitis of all the metacarpal-phalangeal joints and right middle finger proximal interphalangeal joint of the hands. There was flexor tenosynovitis of all the flexor tendons of both hands with concomitant oedema of the hands and bilateral Achilles tendonitis. Bilateral lower limb oedema up to the proximal third of the shin was noted. Examination was otherwise unremarkable.

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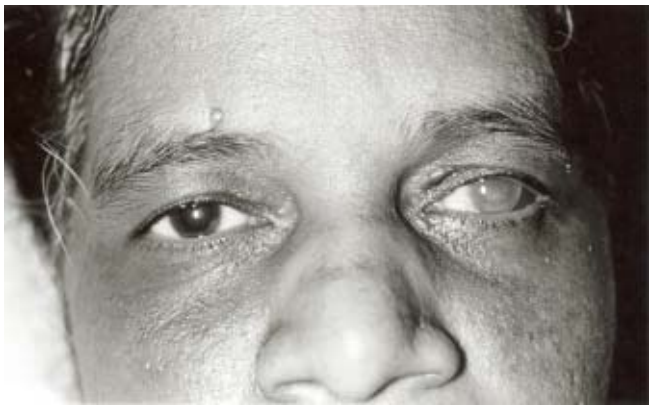

Fig. 1. Hazy cornea with cells present in the anterior chamber of the left eye.

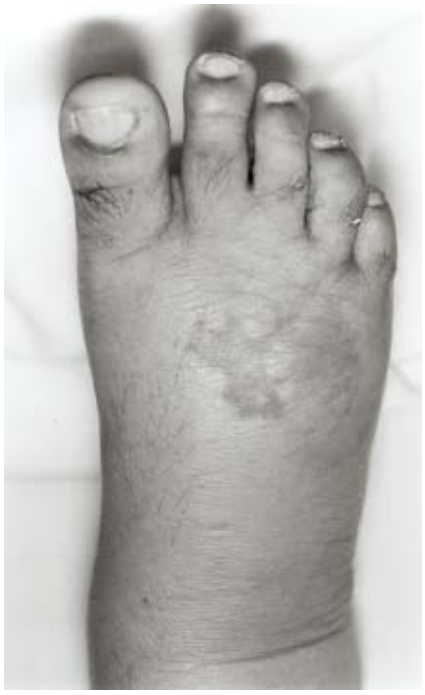

Fig. 2. Purpuric rash over the dorsum of the right foot.

Laboratory investigations revealed: haemoglobin, 10.5 g/dL; white blood cell count, 12,100/mm^3; creatinine, 480 umol/L; and erythrocyte sedimentation rate, 120 mm/h. Urine microscopy did not show white blood cells or casts but 225/uL red blood cells were seen. CH50, C3 and C4, coagulation profile, liver function tests, chest X-ray and electrocardiogram were normal.

A diagnosis of reactive arthritis and severe left anterior uveitis was made. However, her left eye vision deteriorated to that of counting fingers by the next day. The left cornea was now extremely hazy with a fibrin plaque in the anterior chamber. An ultrasound scan of the eye revealed vitreous opacities. The diagnosis was revised to endogenous endophthalmitis, implying that the severe inflammation of the eye was caused by organisms that had spread haematogenously into the eye. A vitreous tap was performed and intravitreal amikacin and vancomycin were given empirically together with hourly topical cephazolin and gentamicin. In view of the possible systemic sources of causative organisms resulting in metastatic endophthalmitis and septic arthritis, the patient was also started on intravenous ceftriaxone, metronidazole and cloxacillin.

Gram stain of the vitreous fluid revealed gram-positive diplococci and *Neisseria meningitides* was isolated on culture. Cornea and throat swab also isolated *Neisseria meningitides.* Blood and urine cultures were sterile. Synovial and cervical cultures were not performed in view of positive culture results from the vitreous fluid.

Despite treatment, her visual acuity deteriorated to hand movements only with increased inflammation of the left eye; a vitrectomy was therefore performed two days after admission. Postoperatively, inflammation of the left eye resolved and her vision stabilised at that of counting fingers.

Two days after admission, she also developed a purpuric rash over the dorsum of both feet (Fig. 2). However, the creatinine had normalised after institution of antibiotics. She remained afebrile until the fifth hospital day when she developed a low-grade fever but was non-toxic. The fever subsided on day 11 of admission and she was discharged on day 20 after completion of 14 days of ceftriaxone

The tenosynovitis resolved one month after discharge and full range of movement of hands was only regained 4 months later. Unfortunately, vision in her left eye had deteriorated to just perception of light.

Discussion

Meningococcal infection is a disease that has a varying incidence of 2.5 to 6 per 100,000 in developed countries.[1] The infection usually presents as meningitis or septicaemia. However, joint and ocular involvements can occur.

Risks factors for meningococcal infection include young age, close contact with an individual with meningococcal disease, overcrowding, complement and properdin deficiencies, asplenia, AIDS and multiple myeloma.[2] Interestingly, our patient had none of these predisposing factors.

From 1887 to 1943, 64 cases of primary meningococcal arthritis (PMA) and 23 cases of meningococcal endophthalmitis have been reported respectively (using Medline search). A review of the 23 cases of meningococcal endophthalmitis showed that the young were particularly at risk (mean age ± SD, 9.2 ± 13.0 years) and the majority (21 cases) occurred in the setting of meningitis. Rash was the most common non-ocular manifestation (50%). Arthritis occurred in 6 patients (27%) and all these 6 patients had

associated meningitis. Only 6 (27%) cases had full recovery of vision.

In 1980, Schaad[3] reviewed all *Neisseria meningitidis* arthritis since 1887 and described 3 clinical types: 1) arthritis complicating acute meningococcal disease 2) arthritis associated with chronic meningococcaemia, a rare clinical entity presenting with fever, recurring rash and arthritis. 3) PMA, an uncommon entity in which an acute arthritis develops without meningitis or classic syndrome of meningococcaemia. The two main postulated mechanisms of all these 3 forms of meningococcal arthritis are: a) direct bacterial invasion of the synovium and b) hypersensitivity reaction in which antigen-antibody reaction results in sterile effusion.

The characteristics of the 65 cases (including our patient) of PMA are summarised in Table I. None were reported to have concomitant endophthalmitis except our patient. Skin involvement and upper respiratory tract infection prodome occurred in 30% to 50% of the patients. Diarrhoea is not a common prodrome in PMA and since 1980 only 2 patients (including our patient) have been reported to have diarrhoea prior to onset of arthritis. There was monoarticular involvement in 60% to 70% of the cases and the knee joint was the most commonly affected joint. In patients who had polyarticular involvement, the pattern of involvement was asymmetrical with predilection for the large joints of the lower limb, most commonly the knees. However, joints of the hands, wrists and elbow joints had been reported to be involved as well. The yield of *N. meningitidis* was highest in the synovial fluid (70% to 90%), followed by blood (28% to 40%) and pharynx (13% to 30%). These findings demonstrate the importance of prompt aspiration of synovial fluid from any acutely swollen joint for culture, as diagnosis of septic arthritis would be missed in 70% of cases if only blood culture was performed. Prognosis of PMA is excellent with appropriate antibiotic treatment as most patients did not have any permanent joint damage. There has only been one report of permanent joint damage after PMA since 1980.[6] However, response to specific antimicrobial treatment therapy is slow with arthritis persisting for 1 to 4 weeks and, occasionally, surgical drainage may be required.[3,4] In a few cases (including our patient), there was recurrence or persistence of sterile arthritis with complete recovery occurring only after a few months.[5,6,9,12,13]

TABLE I: CHARACTERISTICS OF 65 CASES OF PMA REPORTED SINCE 1887[2-15] INCLUDING OUR PATIENT

	Schaad's review[3] (1887-1980) (25 cases)	Recent cases (1980-present) (40 cases)
Male	80% (20)	65% (26)
Age (years ± SD)*	Bimodal distribution with peak in infancy and early adulthood	No bimodal distribution 32.3 ± 23.9
Skin eruption	30% (8)	53% (21)
URI prodrome	50% (13)	35% (14)
Polyarticular arthritis	30% (8)	40% (16)
Monoarticular arthritis	70% (17)	60% (24)
Cultures†		
Blood	40% (10)	28% (11)
Synovial fluid	80% - 90% (21)	70% (28)
Pharynx	30% (8)	13% (5)

PMA: primary meningococcal arthritis

* Based on the recent 40 cases from 1980 till present.

† Cases may have more that one positive result.

In our afebrile and non-toxic patient, the presentation of diarrhoea followed by a painful red left eye, enthesitis, tenosynovitis and asymmetrical polyarthritis mimics that of reactive arthritis and uveitis following a primary gastrointestinal infection by organisms such as *Yersinia, Salmonella, Shigella* and *Campylobacter*. The development of endogenous endophthalmitis prompted the need for a vitreous tap and full septic workup thus revealing the diagnosis. The gamut of incriminating bacteria in endogenous endophthalmitis includes both common gram-positive organisms such as *Staphylococcus* sp, *Streptococcus* sp; and gram-negative organisms such as *Klebsiella*, *Escherichia coli*, which may also cause septic arthritis. Despite the initial empirical antibiotic coverage, the patient lost her vision. The delay in commencement of systemic antibiotics could have contributed to the poor visual outcome. Septic arthritis and endophthalmitis are therefore important differential diagnosis of reactive arthritis with uveitis. In our patient, the history of diarrhoea preceding the painful left eye and arthritis by only 1 day would be more in favour of an infective cause, as typically reactive arthritis tend to occur about 1 to 3 weeks after a primary gastrointestinal or genitourinary infection.

Our patient developed a purpuric rash on both feet only 2 days later. In the presence of rash, the presentation would mimic the acute arthritis/dermatitis syndrome seen commonly in gonococcaemia. Another possible differential diagnosis would be systemic vasculitis either primary or secondary. Tenosynovitis is common in gonococcaemia but not in meningococcaemia and maybe used to differentiate between the two.[4] However, tenosynovitis was present in our patient. Since 1980, only 2 cases of PMA have been reported to have tenosynovitis. The nature of skin eruptions is another differentiating features. In gonococcaemia, 50% of patient developed early petechial lesion that begin on the distal extremities and later progress to papules and pustules on an erythematous base. On the other hand, skin eruptions in meningococcaemia occurs in 79% of patients and are either petechial or maculopapular

with a more generalised distribution. Eleven per cent have more distal purpuric or ecchymotic lesion.[4] The presence of the purpuric lesion on the dorsum of the foot of our patient would have favoured meningococcal infection. However, rash appears to be common in both gonococcal and meningococcal infections and may not be useful in differentiating the two.

In conclusion, this case illustrates the importance of excluding infection in a non-toxic, afebrile previously fit patient with acute polyarthritis. Meningococcal infection with ocular and joint involvement though rare is an important diagnosis to consider as delayed antibiotic institution may result in poor visual and joint outcome.

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