

# Primary Meningococcal Arthritis

Ori Efrati MD<sup>1</sup>, Asher Barak MD<sup>1</sup>, Jacob Yahav MD<sup>1</sup>, Lea Leibowitz MD<sup>1</sup>, Nathan Keller MD<sup>2</sup> and Yoram Bujanover MD<sup>1</sup>

<sup>1</sup>Department of Pediatrics and <sup>2</sup>Department of Clinical Microbiology, Sheba Medical Center, Tel Hashomer, Israel  
Affiliated to Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

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Arthritis is a recognized complication of acute meningococcal sepsis with or without meningitis [1,2]; however, primary meningococcal arthritis without other manifestations or other organ involvement of meningococcal disease is an uncommon phenomenon. A review of the English medical literature shows that since 1980, 23 cases of primary meningococcal arthritis have been reported and only 3 of them were in the pediatric age [1]. Primary meningococcal arthritis is a rare manifestation of meningococcal infection, especially in the pediatric age. We present a case of primary meningococcal knee arthritis in a 6 year old girl.

## Patient Description

A healthy 6 year old girl was admitted due to fever, limping and left knee arthralgia during the previous 2 days, with no evidence of preceding upper respiratory tract infection or skin eruption. On admission, the child had fever (39°C), tachycardia (160 beats/minute), blood pressure 100/50,

and normal room air saturation. Neurologic examination did not demonstrate nuchal rigidity, Kernig or Brudzinski signs. The left knee was painful, swollen, tender and red. Voluntary and passive knee motions were limited. The other joints were normal. The rest of the physical examination including the oropharynx was normal. White blood cell count was  $13.3 \times 10^9/L$  with an absolute neutrophil count of  $9.3 \times 10^9/L$ . Erythrocyte sedimentation rate was 53 mm/hour (Westergren method). Blood chemistry results were within normal limits. On admission, left knee arthrocentesis yielded a large amount of purulent fluid with  $72 \times 10^9/L$  white blood cells and  $67 \times 10^9/L$  absolute neutrophils, glucose 96 mg/dl and protein 50 mg/dl. Gram stain showed gram-negative cocci. Other laboratory data – including blood and throat culture, antistreptolysine-O titers, rheumatoid factor, antinuclear factor, and complement levels (CH50) – were all normal.

The patient was treated for 2 days with intravenous cloxacillin (150 mg/kg/day),

but since the clinical improvement was minimal antibiotic treatment was changed to ceftriaxone (100 mg/kg/day) that led to a marked improvement. Three days after the arthrocentesis, *Neisseria meningitides* serogroup B was isolated from the synovial fluid, which was sensitive to both antibiotics. Twenty-four hours after initiation of ceftriaxone treatment, body temperature returned to normal. Another two knee aspirations were performed as an integral therapy for septic knee arthritis and because of persistent signs of focal inflammation. No other bacterial growth was detected. The girl was discharged on the 14th day with normal knee examination and range of motion, and oral cefuroxime (250 mg twice a day) for another week.

## Comment

Meningococcal infections are transmitted via aerosolization or contact with respiratory secretions leading to upper respiratory infection or colonization. A carrier state

**Table 1.** Pediatric meningococcal arthritis in the English medical literature since 1980

Age	Gen-der	Rash	Joints	Positive cultures		Group	URI	Ref.
				Blood	Synovial fluid			
5 yr	M	Yes	Hand, knee, knee	Yes		B		1
2 yr	M		Knee	Yes		W-135		1
3 yr	M	Yes	Ankle		Ankle	C		1
8 mo	M		Hand		Hand		Yes	1
6.5 mo	F		Knee		Knee			3
4 yr	M	Yes	Hip		Hip	C		4
1.5 yr	M	Yes	Knee, hip		Knee	B		4
12 yr	M	Yes	Hand, knee	Yes		C		4
6 yr	<b>F</b>		<b>Knee</b>		<b>Knee</b>	<b>B</b>		<b>Our case</b>

URI = preceding upper respiratory infection. Throat cultures in all cases were negative.

varies from 3 to 5% in healthy children. Once the organism disseminates through the bloodstream, meningococcal disease occurs. The spectrum of meningococcal disease includes bacteremia without sepsis, meningococemic sepsis without meningitis, meningitis with or without sepsis, and focal organ infection [2].

Isolation of *Neisseria meningitidis* should raise the suspicion of immunologic abnormalities, and vice versa; in children with immunologic abnormalities, an infection with *Neisseria meningitidis* should be considered. Predisposing factors to meningococcal infection include agammaglobulinemia, inherited deficiency of properdin components, deficiency of the late terminal complement components (C5-C8), and diseases that consume complement components (e.g., systemic lupus erythematosus) [2].

Septic arthritis in the pediatric group is most commonly caused by staphylococcal infection. Before widespread vaccination of infants for *Haemophilus influenzae* type B infection was introduced, the organism accounted for more than half of all cases of bacterial arthritis in infants. Invasive group A *Streptococcus* disease and *S. pneumoniae* infection occur in 10–20% of cases [2]. In *Neisseria* spp. arthritis, oligoarticular disease is more common than multiple joint involvement, however monoarticular disease is extremely rare. In both mono- and multiple joint diseases, the

large joints – especially the knees – are most commonly involved [1]. Once the possibility of *Neisseria meningitidis* arthritis is raised, low complement levels and meningococcal antigen with or without bacterial isolation can be detected in the synovial fluid [2].

We present a child with isolated *Neisseria meningitidis* knee arthritis that was not associated with skin rash, upper respiratory tract infection, or other organ involve-

ment. Since 1980, 26 cases of primary meningococcal arthritis have been described in the English medical literature [1,3,4], of which only 2 had pure monoarticular arthritis in the pediatric age group [Table 1]. Other reported cases of meningococcal arthritis included: three of meningococcal sepsis (positive blood culture) with joint involvement (1 to 3 joints) [1,4], a child with preceding upper respiratory tract infection [1], and five children with skin eruption [1,4]. Our case differs from the others because of the monoarticular disease and the absence of extra-articular disease such as upper respiratory tract infection, skin rash or isolation in blood culture.

The *Neisseria meningitidis* serogroups most commonly isolated were: group C in up to 36%, group B in 30%, and group W-135 in 13% [1]. In our case serogroup B was isolated, which was sensitive to the ceftriaxone that was given on the third day.

Two major forms of meningococcal arthritis have been described [1]. Type I, referring to early-onset arthritis, occurs during the first few days of acute meningococemia and arises once bacteria invade the synovium directly. Synovial invasion can occur during acute meningococcal sepsis or can manifest as primary meningococcal arthritis. Skin eruption accompanies the arthritis in 96% and meningitis in 26% of cases [4]. Type II refers to late-onset arthritis, which is a sub-acute, mono- or

oligoarthritis that occurs usually on the fifth day, when the meningococcal infection is subsiding [1]. Usually, this is an immunomediated form of arthritis that occurs during the recovery stage, with sterile effusion and immune complex deposition within the joints due to host immunologic response to the bacterium [1,4,5]. The knee is the most commonly involved joint. The arthritis usually resolves slowly and the synovial fluid tends to re-accumulate despite repeated aspirations. Our case is more closely related to type I because of the monoarticular involvement, with the isolation of pathogen within the synovial fluid.

The prevalence of primary meningococcal arthritis is unknown, however it seems to be underestimated since a routine arthrocentesis is not performed in some of the reported cases [4]. Therefore it is recommended that the involved organ be evaluated thoroughly, including arthrocentesis, before initiating antibiotic therapy.

Although this is a very rare presentation of meningococcal infection, especially in the pediatric population, it is important to be aware of this organism as a potential pathogen in the patient presenting with pure septic arthritis. The prognosis is excellent, and joint complications are rare once rapid diagnosis and treatment are completed.

## References

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**Correspondence:** Dr. O. Efrati, Dept. of Pediatric Pulmonology, Sheba Medical Center, Tel Hashomer 52621, Israel.  
Phone: (972-3) 530-2884  
Fax: (972-3) 530-2884  
email: oreyefraty@hotmail.com