Septic Arthritis due to *Neisseria meningitidis* in the Absence of Meningitis

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Introduction

Septic arthritis is an inflammation of a joint space usually secondary to a bacterial infection.[1] The route of infection is usually hematogenous, however, it may occur through direct inoculation from an adjacent site of infected tissue or during trauma. *Staphylococcus aureus* is the most common organism, affecting 44% of patients, followed by streptococcal and other staphylococcal species. *E. coli* and *Pseudomonas* also have been described, but are more common in neonates and in people with immunodeficiency. *N. gonorrhea* presents mainly in young adults.[2]

Meningococcal arthritis associated with meningitis has been reported since the 19th century.[3] Primary meningococcal arthritis is rare with only 1% being isolated from synovial fluid. Most cases usually involve the knee.[4] This case is a female patient who presented with right elbow arthritis with *N. meningitides* as the infecting pathogen.

Case Report

A 46-year-old female patient presented to the emergency department with a 24-hour onset of painful swelling of the right elbow with decreased range of motion. She denied any recent febrile illness, headache, or sick contacts. She had no history of trauma to the elbow. In the emergency department, she had low grade fever of 100.6°F. Physical examination of her right upper extremity revealed a minimal effusion, with swelling and warmth around the elbow. No ecchymosis or abrasion was noted. Her lateral epicondyle was tender to palpation. Neurological exam was intact and no meningismus was noted. Her skin examination was normal with no notable rash.

A complete blood count showed leukocytosis at 17,900 with 74% neutrophils. She had an elevated sedimentation rate (56 mm/hr) and C reactive protein (7.1 mg/L). Plain film of the right elbow revealed a small anterior fat pad sign indicative of effusion but no fracture or dislocation (Figure 1). An arthrocentesis revealed 96,000 nucleated cells and 50,000 red blood cells, with 60% neutrophils and 20% bands but no crystals. Gram stain revealed innumerable white blood cells and few gram negative diplococci.

She underwent an arthrotomy with irrigation and debridement of the right elbow. Intraoperative cultures as well as synovial fluid cultures grew *N. meningitides*. Blood cultures taken prior to antibiotic administration remained negative. Human immunodeficiency virus antibody was negative and complement levels were normal. The patient received a four week course of ceftriaxone one gram daily. She had complete resolution and full range of motion of her elbow.

Figure 1. A small anterior fat pad sign is indicative of effusion but no fracture or dislocation.

Discussion

Incidence of meningococcal disease is low, ranging from 2.5 to 6 per 100,000 in developing countries.[5] *N. meningitides* most commonly presents as meningitis in 50% of patients, followed by meningococcemia. Less common presentations include pneumonia, epiglottitis, otitis media, conjunctivitis, urethritis, pericarditis, and arthritis.[6]

Meningococcal arthritis occurs via direct inoculation to the synovium or a hyper-sensitivity reaction where an antigen antibody reaction results in a sterile effusion.[5] It can present in three clinical scenarios. One presentation would be a complication of acute meningitis. It can lead to either a septic or aseptic arthritis, secondary to deposition of immune complexes. It also could be associated with chronic meningococcemia, a rare entity that presents with rash and fever, and leads to migratory arthritis or arthralgias. Primary meningococcal arthritis is a joint infection without any evidence of meningitis or meningococcemia.[4-6]

A review of literature revealed 46 cases of patients with meningococcal joint infection without meningeal signs. Of those, only 19 patients had an isolated joint infection with 10 cases being children less than four years old. In addition, three other patients had an associated immune suppressive state: lupus, multiple myeloma, and leukemia. The remaining seven were healthy men with ages ranging from 50 to 60.[3]

A multilingual review of literature revealed seven cases of females with an isolated joint infection (Table 1). They were young with a median age of 19 and the knee was the most commonly infected joint.[2, 7-11] Those cases easily can be misdiagnosed as disseminated *gonococcus* prior to final culture results. *Neisseria gonorrhea* is the most common cause of septic arthritis in sexually active young adults, with four times preponderance in females.[8] It is difficult to separate the two *Neisseria* species on microscopy as both are morphologically indistinguishable.[11] Differentiating the two species is important, especially in regards to

Table 1. Multilingual review of literature resulting in seven cases of females with isolated joint infection.

Author/Year publication	Age	Joint	Treatment	Outcome
Giamarellos-Bourboulis et al.[7]	16	Knee	IV Penicillin G	Resolution
Bonsell[8]	18	Knee	IV Ceftriaxone	Resolution
Cartolano et al.[9]	19	Knee	IV Ceftriaxone, IV Amoxicillin, PO Ofloxacin	Resolution
Christiansen[10]	19	Hip	IV Penicillin G	Resolution
Harwood et al.[2]	29	Knee	IV Ceftriaxone	Resolution
Garner et al.[1]	75	Shoulder	IV Ceftriaxone	Resolution
Joyce et al.[11]	19	Knee	IV Benzylpenicillin	Resolution

antimicrobial prophylaxis of close contacts; airborne for *meningococcus* and sexual for *gonococcus*.

The knee joint is affected most commonly, followed by the ankle.[3,5] The patient described in our report was immunocompetent and presented with elbow involvement which had not been described previously. The yield of culture specimens is highest from the synovial fluid (70 to 90%), followed by blood and pharynx. These numbers highlight the importance of performing an arthrocentesis to establish a diagnosis, preferably prior to antibiotic administration.[5]

Treatment is challenging due to lack of evidence based literature. Intravenous penicillin or cephalosporins have been used with good outcomes. The duration of treatment varied from 7 to 42 days.[8] Surgical debridement should be considered as part of the treatment plan due to the high rate of complications associated meningococcal arthritis where bone and joint destruction has been described. *N. meningitides* also may lead to serious systemic manifestations such as meningitis, pericardial effusion, ventricular enlargement, and acute respiratory distress. This is in contrast to *N. gonorrhea* that has been associated with only small damage to joint surfaces and has less frequent end organ complications.

Our case highlighted the systemic nature of *N. meningitidis* infection, causing disease in a native joint of an immunocompetent patient. The elbow being the infected joint is rare. Obtaining fluid or tissue culture prior to administration of antibiotics is critical for diagnosis. Surgical debridement should be an adjunct to antibiotic therapy. Microbiology support is essential to differentiate from *N. gonorrhea*, as approach and duration of treatment is affected.

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