

Septic Arthritis Associated With Chickenpox

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Acute arthritis associated with varicella infection in childhood is a well-documented, though apparently uncommon, entity. Fewer than 25 cases have been reported in the English language medical literature. Of these, the majority have been cases of aseptic arthritis. This article is a report of a case of septic arthritis occurring in a 13-year-old child in association with chickenpox and a review of the other four such cases previously reported.

Case Report

A 13-year-old girl was seen in the emergency department with a 4-day history of fever and pruritic vesicular rash after exposure to chickenpox. About 1 day after onset of the rash, she developed pain and swelling of the right knee. She reported having had some intermittent pain and giving-way of the right knee several years before this episode, but there were no recent problems with the knee. Her medical history was otherwise unremarkable. There was no family history of arthritis noted. On examination in the emergency department, her temperature was 39.7°C (103.5°F); she had a vesicular rash entirely consistent with varicella, and the right knee was noted to be tender but not swollen, red, or warm. Findings were normal on a radiograph of the knee. The patient was prescribed fenoprofen calcium, acetaminophen with codeine as needed for pain, and hydroxyzine as needed for itching.

Over the next 3 days, her knee became more painful and swollen, and she returned for reevaluation. At examination, her temperature was 39°C (102°F). She was an obese girl in no distress. The vesicular rash of chickenpox was present; there appeared to be no secondary infection of any of the skin lesions. The right knee had a moderate effusion, was slightly warm and very tender to touch, and was very painful with any movement.

Findings on the rest of the examination were unremarkable.

Arthrocentesis of the knee yielded 10 mL of cloudy, straw-colored fluid. Analysis of the fluid showed her red cell count was $44 \times 10^6/L$ ($44/mm^3$) and white cell count was $2042 \times 10^6/L$ ($2042/mm^3$) with granulocytes 0.99 (99 percent); a few gram-positive cocci in pairs and chains were evident on Gram stain. At this time, the patient was admitted to the hospital. Laboratory studies obtained at admission displayed the following: hemoglobin, 136 g/L (13.6 g/dL); hematocrit, 0.41 (41 percent); peripheral white cell count, $14.8 \times 10^9/L$ ($14,800/mm^3$) with 0.80 granulocytes, 0.03 band cells, 0.14 lymphocytes, and 0.03 monocytes; platelets, $214 \times 10^9/L$ ($214,000/mm^3$). Sedimentation rate was 109 mm/h. Serum electrolyte, glucose, and blood urea nitrogen levels were normal. A radiograph of the right knee at this time showed marked joint effusion without other abnormalities.

At admission, appropriate cultures were obtained, and the patient was given intravenous nafcillin sodium. The following day, a second arthrocentesis yielded approximately 80 mL of cloudy fluid with the following: red cells, $1500 \times 10^6/L$ ($1,500/mm^3$); white cells, $16,300 \times 10^6/L$ ($16,300/mm^3$), with 0.82 granulocytes, 0.13 lymphocytes, and 0.05 monocytes. Later that day she underwent arthroscopic incision and drainage of the knee. Cultures from the joint fluid obtained on the first arthrocentesis subsequently were positive for a light growth of group A streptococcus. All blood cultures were negative. Antibiotics were changed to intravenous penicillin G, 2.5 million units every 4 hours. During the remainder of her hospitalization, her knee showed steady improvement. Seventeen days after admission the antibiotics were changed to penicillin V potassium, 500 mg four times daily; the following day the patient was discharged with a prescription for another 10 days of oral penicillin, plus naproxen, 375 mg twice daily, and she was to continue the physical therapy program initiated in hospital. At follow-up 16 days later, she complained only of occasional soreness of the knee with activity.

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Table 1. Summary of Data from Reported Cases of Septic Arthritis Associated with Chickenpox.

Author	Age	Sex	Joint(s) Involved	Organism	Time from Onset of Rash to Onset of Joint Symptoms	Time from Onset of Joint Symptoms to Diagnosis	Peripheral White Cell Count ($\times 10^9/L$)	Joint Fluid White Cell Count ($\times 10^6/L$)	Sedimentation Rate (mm/h)
Slowick ¹	?	?	Hip	<i>Staphylococcus</i>	?	?	?	?	?
Buck ²¹	4 y	F	Hip	<i>Streptococcus pyogenes</i>	7 d	10 d	14.2	?	?
Sethi & Schloff ²²	18 mo	M	Ankle, acromioclavicular	Group A, beta-hemolytic streptococcus	3 d	6 d	12.1-22.0	?	Elevated
Atkinson, et al. ¹³	3 y	F	Glenohumeral	<i>Staphylococcus aureus</i>	5 d	9 d	9.4	112,000 (0.99 granulocytes)	58
Feierabend	13 y	F	Knee	Group A, beta-hemolytic streptococcus	1 d	4 d	14.8	2,042 (0.99 granulocytes) 16,300 (0.82 granulocytes)	109

There was no effusion or knee tenderness; mild atrophy of the quadriceps muscles was present. Viral cultures obtained on the joint fluid were negative. The patient did not return for further follow-up.

Discussion

Arthritis is a well-recognized manifestation of many viral infections. Although more commonly associated with rubella, rubella vaccination, and erythema infectiosum, acute arthritis also occurs infrequently with hepatitis B, mumps, rubeola, influenza, infectious mononucleosis, varicella, and various other viral illnesses.^{1,2} Arthritis associated with varicella infection has been described since at least 1935.³ Most reported cases have been aseptic in nature.⁴⁻²⁰ In fact, a review of the English language literature shows only four cases of septic arthritis prior to this one.^{3,13,21,22}

Aseptic arthritis associated with chicken pox typically has occurred in young school-aged children; the ages of those reported have ranged from 2 to 16 years; mean, 7 years. Although early reports suggested that cases predominantly involved girls,¹³ to date there has been an almost equal number of cases reported for both sexes (9 girls, 8 boys.) Most commonly, the inflammation is monoarticular, usually affecting the knees; however, other joints can be involved, and polyarticular involvement has been described.^{5,17} The onset of joint symptoms is generally within a few days of the appearance of the varicella rash; in one case the joint involvement preceded the rash.²⁰ When evaluated, the joint fluid usually has had low cell

counts with a predominance of mononuclear cells; however, this finding has not been consistent. In one case, varicella virus was recovered from the synovial fluid.⁹

Bacterial superinfection, especially of the skin, is the most common complication of varicella infection. Bacterial pneumonia occurs infrequently as a complication, and septic arthritis only rarely.²³

Clinical data are available for only three of the four cases of septic arthritis previously reported. Table 1 summarizes the information from these cases in addition to the one described in this brief report.

This case is of particular interest for several reasons. First, the clinical presentation was more like that of patients with aseptic arthritis; the patient was older, the joint involved was the knee, and the joint symptoms began within 1 day of the appearance of the rash. Also, the initial synovial fluid was remarkable for its relatively low white cell count, though the predominance of granulocytes and positive Gram stain were consistent with septic arthritis. The significance of a history of prior symptoms in the affected knee is uncertain.

The pathogenesis of aseptic arthritis associated with viral exanthems is unclear. Live virus has been isolated from the joint fluid in a number of cases of rubella-associated arthritis. Successful isolation of virus from joint fluid has also been reported in cases of herpes simplex and cytomegalic inclusion disease as well as varicella.² These cases would seem to support direct infec-

tion as an underlying mechanism. The failure to culture viruses successfully from the joint fluid in most cases may be due to the limitations of culture techniques; on the other hand, it suggests that another mechanism (perhaps autoimmune) may exist.

The pathogenesis of septic arthritis associated with chickenpox is also uncertain. Does the infection develop in an otherwise normal joint simply as the result of seeding from secondarily infected varicella lesions? Or is there an initial aseptic effusion that then becomes secondarily infected? The similarities of the presentation of this case with those of aseptic arthritis, the early onset of joint symptoms, and the relatively low white cell count in the synovial fluid obtained initially all suggest the possibility that, in this case at least, there was an initial aseptic arthritis that then became secondarily infected with group A streptococcus.

This report serves as a reminder that septic arthritis must be considered in every case of arthritis associated with varicella. Although the process is most often aseptic in nature and has a favorable prognosis without specific therapy, it is not possible to exclude septic arthritis on clinical grounds alone. Arthrocentesis probably should be performed in every case, even though there is the risk of introducing bacteria into an aseptic effusion. If the presence of septic arthritis is confirmed, specific therapy can be initiated in a timely manner. If the clinical presentation and joint fluid results suggest an aseptic process, careful follow-up until complete resolution is essential, because secondary bacterial infection still can be a complicating occurrence.

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