

# Pseudoseptic Arthritis of the Shoulder Following Pneumococcal Vaccination

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## abstract

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Pseudoseptic arthritis is primarily described in rheumatoid arthritis and other systemic inflammatory conditions. To our knowledge, only 1 case report of pseudoseptic arthritis associated with intra-articular injection of a pneumococcal polyvalent vaccine (PPV) has been published. Here, a second case is presented in which a patient presented with swelling, pain, and erythema of the affected shoulder.

A 59-year-old woman presented to the emergency department with a 3-day history of severe pain and decreased mobility of her left shoulder after receiving a PPV vaccination. Her clinical and laboratory workup was suspicious for septic arthritis; however, magnetic resonance imaging of the affected shoulder with and without contrast showed only a partial thickness tear of the rotator cuff, fluid in the subacromial/subdeltoid bursa, and subcutaneous edema without evidence of an abscess. Based on the clinical and laboratory data, she underwent arthroscopic debridement. There was inflammatory tissue throughout the shoulder but no obvious purulent material. She did well postoperatively with a supervised range of motion rehabilitation protocol. Her cultures remained negative. At 12 weeks, she was discharged from follow-up. We suspect that the vaccination was inadvertently injected into the glenohumeral joint directly through the rotator cuff given the lack of a full-thickness tear and the patient's thin body habitus, which could explain her aseptic inflammatory arthritis.

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**P**seudoseptic arthritis is primarily described in rheumatoid arthritis and other systemic inflammatory conditions.<sup>1</sup> To our knowledge, 1 case report of pseudoseptic arthritis associated with intra-articular injection of a pneumococcal polyvalent vaccine (PPV) has been previously published.<sup>2</sup> This article presents a second case. In both cases, a tear of the rotator cuff was present and may have played a significant role in these adverse events.

### CASE REPORT

A thin 59-year-old woman presented to the emergency department with a 3-day history of severe pain and decreased mobility of her left shoulder after receiving a PPV (Pneumovax 23, Merck & Co, Inc, Whitehouse Station, New Jersey) injection in the left deltoid approximately 2 hours prior to the onset of symptoms. Just before presenting to the emergency department, she noted swelling and redness of the soft tissue overlying the anterior aspect of her shoulder and an elevated temperature of 99.9°F. Ten years prior, she had received a deltoid PPV with no adverse reaction. Information regarding which arm was injected in the previous vaccination was not available. Her medical history was significant for asthma.

On examination, she had a temperature of 97.7°F, left anterior shoulder swelling, erythema, and warmth to touch, with subcutaneous swelling and erythema extending anteriorly from the shoulder to the antecubital fossa. She had significant pain with minimal shoulder motion in any plane. The orthopedic department was consulted for evaluation of possible septic arthritis of the glenohumeral joint.

Laboratory data showed a peripheral blood white blood cell count of 10 thou/ $\mu$ L ( $N < 11$ ), C-reactive protein of 18.1 mg/L ( $N < 0.8$ ), and erythrocyte sedimentation rate of 51 mm/hr ( $N < 30$ ). The glenohumeral joint was aspirated in the emergency department, producing a small amount of fluid that was bloody with no obvious purulence. The fluid showed a white blood

cell count of 12,125/ $\mu$ L with 84% polymorphonuclear leukocytes; the Gram stain was negative.

Based on the clinical presentation and laboratory data, the orthopedic department admitted the patient for further evaluation of a possible septic arthritis. Multisequence magnetic resonance imaging (MRI) of the left shoulder was performed with and without contrast. The MRI findings were consistent with a full-thickness tear of the anterior supraspinatus tendon with 1.2 cm proximal retraction, fluid in the subacromial/subdeltoid bursa, and a small amount of subcutaneous edema with no evidence of abscess formation. After the results were reviewed, the patient underwent arthroscopic irrigation and debridement of her left shoulder. Antibiotics were held until intraoperative cultures were obtained.

Substantial inflammation was noted throughout the shoulder with no evidence of purulent material. The articular cartilage did not appear damaged. The biceps tendon was intact and appeared normal. A small partial-thickness tear involving the anterior aspect of the rotator cuff was present, with no evidence of a full-thickness tear. Some of the friable inflammatory tissue was collected for culture. Total irrigation amounted to 4.5 L of normal saline. She was prescribed 1 g of cefazolin intravenously every 8 hours. Postoperatively, she improved clinically in regard to her pain level and range of motion (ROM) of the shoulder. She remained afebrile, and all cultures remained negative. After 72 hours, antibiotics were discontinued, and she was discharged. She was seen at 2, 6, and 12 weeks postoperatively, with ROM improving with physical therapy at each visit. She was released from follow-up at 12 weeks, with ROM nearly equal to the contralateral shoulder.

### DISCUSSION

Septic arthritis is a potentially devastating articular erosive process that requires early recognition and aggressive surgical intervention to prevent long-term sequel-

ae, including significant joint morbidity and potential patient mortality. Treatment includes initial empiric antibiotic therapy and either open or arthroscopic debridement.<sup>3,4</sup> Clinical findings typically include warmth, erythema, edema, significant pain, and loss of motion in the affected joint. Laboratory studies usually include elevated peripheral blood white blood cell count, C-reactive protein, and erythrocyte sedimentation rate. However, none of these laboratory tests are specific to infection; they may be elevated in other inflammatory reactions. Joint fluid aspiration is a critical tool in evaluating the potentially septic joint. Joint fluid white blood cell count, Gram stain, and cultures are used for making diagnostic and treatment decisions. Normal synovial fluid usually contains 60 to 180 cells/mL, whereas infectious arthritis typically contains  $> 50,000$  cells/mL, with approximately 90% polymorphonuclear leukocytes. Recently, the sensitivity of 50,000 cells/ $\mu$ L as a diagnostic cutoff for septic arthritis has been called into question.<sup>5</sup> Delaying surgical treatment for definitive culture results could prove harmful to the articular cartilage and to the patient. Clinicians must weigh the risk of operative intervention and empiric antibiotic therapy with the risk of a worsening destructive articular process.

Our patient had a mixed laboratory picture with normal white blood cell and elevated C-reactive protein and erythrocyte sedimentation rate. Her joint fluid cell count and Gram stain were not indicative of septic arthritis, but her clinical presentation was suspicious. Given her clinical presentation, it was felt that the potential risk of articular cartilage damage from possible septic arthritis necessitated an arthroscopic irrigation and debridement. After a discussion with the patient regarding the risks and benefits of surgery, she elected to proceed with surgery.

Trollmo et al<sup>6</sup> has shown that intra-articular immunization with an influenza

vaccination induces an inflammatory response similar to septic arthritis. In reporting their case of pseudoseptic arthritis following PPV injection, McColgan and Borschke<sup>2</sup> hypothesized that, due to its multivalent composition, PPV might be capable of inducing a more prominent inflammatory response. In a report of 2 cases of severe reactions following influenza and pneumococcal vaccine administered high into the deltoid muscle, Bodor and Montalvo<sup>7</sup> recommended against using the upper third of the deltoid muscle for vaccine injections. They based their recommendation on ultrasonic measurements of the subdeltoid bursa in volunteer participants.

The common occurrence of pathologic communication between the subacromial/subdeltoid bursa and glenohumeral joint via rotator cuff tear has long been recognized.<sup>8</sup> We suspect that the rotator cuff tear in the patient with pseudoseptic ar-

thritis reported previously may have permitted vaccine intended for the deltoid muscle, but inadvertently injected through that muscle into the subacromial/subdeltoid bursa, to flow directly into the joint.<sup>2</sup> In our case, we suspect that the vaccination was inadvertently injected into the glenohumeral joint directly through the rotator cuff, given the lack of a full-thickness tear and the patient's thin body habitus. This could account for severe aseptic inflammation of the joint space with onset of symptoms soon after vaccine administration, as observed in both cases. This case further illustrates the fact that caution should be taken when injecting a vaccination in the area of the upper deltoid. 

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