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Treatment of Frozen Shoulder following Pneumococcal Vaccination with Steroid Injections: A Case Report

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Abstract

Case Diagnosis

Adhesive capsulitis status post pneumococcal vaccination

Case Description

A 66-year-old man presented with a 2-month history of new-onset pain and decreased range of motion in his left shoulder that began the day after he received the pneumococcal vaccine. Physical therapy, NSAIDs, lidocaine patches, and oral methylprednisolone provided minimal relief. An MRI of the left shoulder revealed thickening of the axillary pouch with an intermediate signal seen within the rotator interval, which is suggestive of adhesive capsulitis. After discussing possible treatments, the patient elected two intra-articular steroid injections into his left shoulder. The patient noted approximately an 80 percent improvement in his pain and stiffness after the first injection, and a week later returned for his second injection. When the patient returned to the clinic for a follow-up one month and three months later, he reported near complete resolution of his shoulder pain.

Discussions

Adhesive capsulitis has been reported as a side effect of intramuscular injections of pneumococcal vaccines. One proposed mechanism is a lengthy immune response following prolonged exposure of antigens and antibodies in synovial tissue to vaccine antigens. Treatment options range from more conservative nonmedical ones, including physical therapy, range of motion exercises, and progressive activity, to medical interventions such as NSAIDs, diclofenac gel, and steroid injections. Studies have shown that initial conservative management is successful in as many as 90 % of cases, with the remaining 10 % requiring operative treatment.

Conclusions: This case report describes the successful treatment of a patient with adhesive capsulitis induced by pneumococcal vaccine injection with intra-articular corticosteroid injections. The patient had near total pain resolution even three months after the treatment. This suggests that corticosteroid injection in the early freezing phase can effectively treat patients with limited response to physical therapy and NSAIDs.

Keywords: adhesive capsulitis, frozen shoulder, pneumococcal vaccine, steroid injection

Objective

Frozen shoulder, or adhesive capsulitis, is a condition in which shoulder joint movement becomes impaired and painful. Adhesive capsulitis can occur for various reasons, one being a side effect of vaccine administration into the shoulder region. The pneumococcal vaccine is typically injected intramuscularly in the deltoid muscle. According to the Centers for Disease Control and Prevention, the vaccine should be injected into the middle and thickest part of the deltoid muscle, with the needle inserted at a 90-degree angle. A needle length of 1 inch to 1.5 inches is recommended for all adults receiving the vaccine who weigh 152 to 260 pounds. These administration guidelines aim to allow the vaccine's contents to reach the muscle while not invading the other underlying shoulder tissues. This case report describes the successful treatment with steroids of a patient with acute onset adhesive capsulitis following pneumococcal vaccination.

Clinical Features

The patient in this case study was a 66-year-old man with a 2-month history of new-onset pain and decreased range of motion in his left shoulder that began the day after he received the pneumococcal vaccine. He described the pain as dull, deep-seated, sore, and localized to the deltoid muscle, stating that it did not radiate. He noted that the pain increases in severity with the abduction of his arm and

when reaching backward. The pain resolves when he ceases these movements. He also reports weakness in his left arm and decreased ability to use it during daily tasks. He stated that he has been working with physical therapy, which has minimally helped his range of motion, and that he has tried both lidocaine patches and oral NSAIDs to alleviate the pain, which has only relieved him minimally as well.

Upon his presentation to the Pain Clinic, the physical exam revealed no atrophy or scarring to the left shoulder. The shoulder was non-tender to palpation, and internal/external bicep rotation, Hawkin's test, and Empty Can test were all negative. The patient endorsed pain with the lift-off test and abduction to 90 degrees. His rotator cuff strength was 5/5.

Intervention and Outcome

After the patient's history was gathered and the physical examination was completed, adhesive capsulitis was assessed. An MRI of the left shoulder was ordered, and the patient was recommended to continue physical therapy. Diclofenac gel was called for the patient to apply to his left shoulder, and Medrol Dosepak (methylprednisolone) was ordered to decrease the inflammation. Consideration was given to the potential possibility of steroid injections into the shoulder, dependent on the MRI findings and the patient's clinical improvement. The patient was scheduled to return to the clinic 3 weeks later. The MRI report showed mild interstitial tearing of the supraspinatus tendon, generative tearing of the glenoid labrum, and thickening of the axillary pouch with intermediate signal seen within the rotator interval, which can be seen with adhesive capsulitis, mild acromioclavicular joint hypertrophy with effacement of the adjacent fat pad and possible soft impingement of the supraspinatus. Options were discussed with the patient, who elected two intra-articular steroid injections into his left shoulder.

During the first injection, the patient was taken to an exam room and placed supine. A "time-out" was performed, and the patient's left anterior shoulder area was prepped and draped sterilely. A 25-gauge 1.5-inch needle was advanced to the left humeral head. Os was encountered, and aspiration was negative for blood. A 5 mL solution consisting of 1 ml of Kenalog 10 and 4 ml of Lidocaine 1% was slowly injected. There was no estimated blood loss during the procedure, and the patient returned to the post-operative area with no immediate complications. The patient noted approximately an 80 percent improvement in his pain and stiffness after the first injection, and a week later returned for his second injection, which was performed identically to his first. A plan was made for a third steroid injection if needed. When the patient returned to the clinic for a follow-up approximately 1 month later, he reported almost complete resolution of his shoulder pain. He continued to have good pain relief at 3 months post-injection. Unfortunately, at 5 months, the patient injured his left shoulder by falling on it out of bed.

Discussion

Frozen shoulder, or adhesive capsulitis, has been reported as a side-effect of intramuscular injections of pneumococcal vaccines.**[1]** One proposed mechanism is a lengthy immune response following prolonged exposure of antigens and antibodies in synovial tissue to vaccine antigens.**[2]** Vaccine contents are generally cleared from the synovial space with deltoid muscle injections in a few days with proper technique, emphasizing attention to administration guidelines.

Treatment options range from more conservative nonmedical ones, including physical therapy, range of motion exercises, and progressive activity, to medical interventions such as NSAIDs, diclofenac gel, and steroid injections. Studies have shown that initial conservative management is successful in as many as 90 % of cases, with the remaining 10 % requiring operative treatment.**[3]** Pain relief in patients with adhesive capsulitis following corticosteroid injections was documented in a systematic search and review, which included 7 prospective studies, 16 randomized trials, and 2 retrospective studies. However, these injections only offered temporary pain relief in the acute setting (first 6 weeks), with long-term outcomes barely differing from alternative treatments, including placebo.**[4]** As seen with this patient, steroid injections may be beneficial in treating adhesive capsulitis in some patient populations.

A meta-analysis of 18 articles from Embase and Pubmed NCBI revealed that patients with diabetes mellitus were 5 times more likely than controls to have adhesive capsulitis. The analysis also showed an overall prevalence of adhesive capsulitis in type I and II diabetic patients of 13.4 %.**[5,6]** These findings are valuable in assessing the risks and benefits of treating adhesive capsulitis in diabetic patients with corticosteroid injections, given that blood sugar imbalance is a possible side effect.**[7]**

Early diagnosis and clinical staging are crucial for effective treatment. **[8]** Diagnosis is primarily based on clinical examination, but multiple imaging modalities can assist in confirming the diagnosis. It was suggested by a correlative study involving MRI findings and clinical staging of patients with clinical diagnoses of adhesive capsulitis that non-contrast MRI of the shoulder is an accurate and non-invasive method of diagnosing suspected cases. In establishing a diagnosis based on MRI images, the width coracohumeral ligament is used with measurements above 3 mm having 95 % specificity for adhesive capsulitis. The increased signal intensity of the inferior glenohumeral ligament on T2-weighted sequences yields 85.3-88.2 % sensitivity and 88.2 % specificity. **[9]** Axillary pouch/joint capsule and synovium thickening more significant than 4 mm on MRI was an applicable MR criterion for diagnosis with a sensitivity of 70 % and specificity of 95 %. **[10]**

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