



Case report

Septic arthritis of shoulder joint following a COVID-19 vaccination: A case report



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ABSTRACT

Introduction: Septic arthritis of the shoulder joint is a serious condition which requires early diagnosis and treatment. This condition usually presents with shoulder pain, limited range of motion and/or fever, and is diagnosed by shoulder arthrocentesis with significant synovial fluid leukocytosis or positive synovial fluid gram stain or culture. There are some risk factors for septic arthritis, notably bacteremia, pre-existing joint pathology and an immunocompromised host such as poorly controlled type II diabetes mellitus.

Case presentation: A 45-year-old Thai female developed left shoulder septic arthritis after an Astra-Zeneca COVID-19 vaccine administration. The clinical symptoms were left shoulder pain, limited range of motion and fever. The probable risk factors were underlying diabetes mellitus type II and vaccine administration technique. The joint fluid culture showed *Staphylococcus aureus*. This patient was treated with combined arthroscopic debridement and an intravenous antibiotic for 1 week which was then switched to an oral antibiotic for 5 weeks. Her clinical symptoms gradually improved over the 2 weeks following the initiation of treatment.

Conclusion: Septic arthritis is a rare complication after a vaccination. Doctors should be especially careful with immunocompromised patients, and always use a correct injection technique.

1. Introduction

Septic arthritis of the shoulder joint is a serious condition which requires early diagnosis and treatment. This condition usually presents with shoulder pain, limited range of motion and/or fever, and is diagnosed by shoulder arthrocentesis with significant synovial fluid leukocytosis or positive synovial fluid gram stain or culture [1]. There are some risk factors for septic arthritis, notably bacteremia, pre-existing joint pathology and an immunocompromised host such as poorly controlled type II diabetes mellitus [2]. The most common causes are hematogenous spreading and inoculation of bacteria into the joint such as through joint surgery, intra- or periarticular injections such as an intra-articular steroid injection or intra-deltoid vaccination.

Since the development of COVID-19 vaccines following the Covid-19 outbreak, COVID-19 vaccinations have been recommended to decrease the transmission of COVID-19 and reducing the severity of the disease when infected. Most of the Covid-19 vaccines are injected into the deltoid muscle, with the risk of injecting into the subdeltoid or subacromial space when inserting the needle too deep and/or using an incorrect needle direction. If this occurs in a patient with pre-existing joint disease

or an immunocompromised patient, there is a chance of causing septic arthritis. A literature review finds that COVID-19 vaccinations have occasionally been associated with reactive arthritis of the shoulder joint or SIRVA [3–9], but there is only one case report detailing septic arthritis following a SARS-CoV-2 mRNA Pfizer vaccine administration [10]. In this study, we report a case of septic arthritis of the left shoulder after an Oxford-AstraZeneca vaccination. This case report follows the Surgical Case Report (SCARE) guidelines [11].

2. Case report

A 45-year-old Thai female presented with left shoulder pain for 3 days without prior shoulder pain. She had had type II diabetes mellitus for 2 years for which she was taking oral metformin 500 mg per day, and her blood sugar at presentation was in the normal range. She said she had developed the shoulder pain on day 3 after a second dose of Oxford-AstraZeneca vaccine which was injected by a practitioner nurse. She could not remember the exact injection site or needle direction. A physical examination found no swelling or redness around her left shoulder (Fig. 1A, B), with moderate shoulder pain and limited range of

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Fig. 1. General appearance of the patient's left shoulder in (A) anterior and (B) lateral views.

motion and low-grade fever. The initial diagnosis was likely septic arthritis of the left shoulder. Fluid from the left shoulder joint was aspirated by guided ultrasound guided (Fig. 2), and pus discharge was reported with fluid analysis showing a white blood cell count of 221,550 cells/mm³, monocytes 2 %, polymorphonuclear neutrophils 98 %, red



Fig. 2. Joint fluid of left shoulder showed pus discharge.

blood cell count 35,700 cells/108 mm³, and no crystals. Other fluid was sent for gram stain which showed a few gram-positive cocci pairs and numerous polymorphonuclear neutrophils and a fluid culture showed *Staphylococcus aureus*. Laboratory studies showed a white blood cell (WBC) count of 15,750 cells/ μ L (4500–10,000 cells/ μ L), PMN 77 %, eosinophils 0.5 %, basophils 0.3 %, lymphocytes 15.9 %, monocytes 6.3 %, an erythrocyte sedimentation rate of 96 mm/h (0–15 mm/h), and C-reactive protein of 202.24 mg/dL (0–5 mg/L). Radiographs showed no bony pathology in both anteroposterior and lateral transcapsular views (Fig. 3A, B).

She was diagnosed as septic arthritis of the left shoulder and



Fig. 3. Radiographs of the patient's left shoulder in (A) anteroposterior and (B) lateral transcapsular views showed no bony pathology.

admitted and treated with combined arthroscopic debridement and intravenous ceftriaxone 2 g every 24 h for 7 days. Her clinical symptoms improved a few days after the arthroscopic surgery. Her fever resolved 2 days after the surgery, her other symptoms within a further few days, and she was discharged at 7 days post-surgery with improved pain but still some limitations in range of motion. She had attained full range of motion 4 weeks after the surgery.

3. Discussion

We report a case of septic arthritis following an AstraZeneca vaccination. The risk factor of this patient was underlying type II diabetes mellitus type II. The probable cause was the injection technique of a COVID-19 vaccine.

There are many adverse effects after any vaccination which can be divided into common, less common and rare. The common side effects are pain, redness or swelling over the injection site, temporary decreased range of motion or weakness in the shoulder muscles [12]. Less common complications are axillary nerve palsy, subacromial and/or subdeltoid bursitis or adhesive capsulitis. The main cause of such side effects is inflammation, but septic arthritis is a rare complication caused by a pathogen from improperly cleaned skin into the shoulder joint with a vaccine administration.

There are some studies reporting cases of septic arthritis of the shoulder joint after vaccine administration. DeRogatis and team [13] reported a case of septic arthritis after a pneumococcal polysaccharide vaccine, following which shoulder pain developed in 24 h. The risk factor in this patient was old age (90 years). Damisa et al. [14] reported a case of a 69-year-old woman who developed septic arthritis of the left shoulder joint 4 weeks after an influenza vaccination. She had type II diabetes mellitus and atrial fibrillation which were being treated with oral metformin and oral warfarin, respectively. After a high volume of COVID-19 vaccine administrations, the first case of septic shoulder was reported in July 2021 [10]. A 68-year-old female with a risk factor of pre-existing full thickness supraspinatus tear of shoulder. The symptom of septic arthritis developed 1 week after the vaccination. The injection put her at risk due to an improper technique involving an improper needle length.

Our case was a 45-year-old Thai female with well-controlled type II diabetes mellitus who was diagnosed as septic arthritis of the left shoulder after an Oxford-AstraZeneca vaccine administration. The probable cause of this case was the type II diabetes mellitus. Even through the type II diabetes mellitus was well-controlled, the type II diabetes mellitus still placed her at extra risk. The other possible cause was the improper injection technique of the vaccination, but she could not remember the injection site, depth of needle insertion or the needle direction. If the needle insertion is too high on the arm, the needle depth too deep, and/or the needle direction is cephalad, there is a risk of injection into the subdeltoid or subacromial bursas and/or shoulder joint [4]. If the injection landmark is too low, there is a risk of iatrogenic axillary nerve injury [15]. To prevent or decrease the chance of complications arising from incorrect injection technique, the vaccinators should be trained in using the standardized vaccine administration techniques, namely an injection site 3 fingerbreadths below the acromial process, depth of injection less than 5/8 of an inch [16], and needle direction perpendicular to the skin.

In conclusion, septic arthritis is a rare complication after a vaccination. Doctors should be especially careful with immunocompromised patients, and always use the correct injection technique.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Consent

Written informed consent was obtained from the patient for publication.

Ethical approval

The present study was approved by the Prince of Songkla University Institutional Review Board, Faculty of Medicine, Songklanagarind Hospital, Prince of Songkla University (IRB number REC 65-264-11-1).

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Guarantor

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CRediT authorship contribution statement

Chaiwat Chuaychoosakoon—Preparation of case report, Literature review, Writing the paper.

Prapakorn Klaklay—Preparation of case report, Writing the paper.

Declaration of competing interest

No conflicts of interest.

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