



Case report

A rare case of extensive *Staphylococcus aureus* sternoclavicular septic arthritis treated without surgical intervention



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ABSTRACT

This is a rare case of a 55 year-old immunocompetent female who developed Methicillin sensitive *Staphylococcus aureus* sternoclavicular septic arthritis. The infection was not limited to the joint space but extended into adjacent bones and superior mediastinum. However the patient was successfully treated without surgical intervention and preservation of joint function was obtained with only intravenous antibiotic therapy.

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Introduction

The sternoclavicular (SC) joint is a mobile joint with significant movement and rotation abilities [1]. This joint functions similar to sacroiliac and pubic symphysis joints [1]. Septic arthritis of the SC joint is a rare form of septic arthritis occurring in less than 1% of all cases [2]. The most common risk factors are intravenous (IV) drug use, diabetes, immunosuppression and rheumatological diseases but approximately one-fifth of patients do not have any risk factors [2,3]. SC septic arthritis can occur from contiguous spread or hematogenous seeding of the joint. The majority of cases are hematogenous in etiology with *Staphylococcus aureus* being the most common pathogen [2,3].

Early diagnosis and treatment is required to prevent spread into the mediastinum, great vessels and thoracic cavity [3]. The most common treatment is surgical irrigation and debridement combined with antibiotic therapy [4,5]. More extensive surgical resection of the joint and clavicle head with reconstructive surgery have been advocated for extensive disease [4–6]. This case presents an unusual case of an immunocompetent female who developed extensive methicillin sensitive *Staphylococcus aureus* (MSSA) SC septic arthritis with extension to the adjacent ribs, clavicle and superior mediastinum. This was successfully treated without surgical intervention but rather with only IV oxacillin therapy and graded physical therapy.

Case

A 55 year-old healthy female with no significant past medical history was in her normal state of health until she started to have pain in her right clavicle. She was evaluated by her primary care physician who prescribed a nonsteroidal anti-inflammatory drug for pain management. However the pain, swelling and erythema intensified. She then presented to her local emergency room where a CT scan of the chest showed SC septic arthritis, osteomyelitis of the clavicle and 2nd rib and a superior mediastinal abscess. The patient was admitted to the local hospital and blood cultures and percutaneous aspiration of the abscess were obtained. She was started on IV vancomycin 1.25 g every 12 h and piperacillin/tazobactam 3.375 g every 6 h. Both blood and aspiration cultures grew MSSA. Antibiotics were subsequently changed to oxacillin 2 g IV every 4 h. After the 3rd dose the patient complained of severe burning in her peripheral vein and oxacillin was changed to cefazolin 2 g IV every 8 h. Unfortunately after 2 days on cefazolin she developed a diffuse rash and cefazolin was changed back to vancomycin 1.25 g IV every 12 h. Repeat blood cultures 2 days after starting intravenous antibiotics did not have any further bacterial growth and transthoracic echocardiogram did not show evidence of endocarditis. A peripheral inserted central catheter (PICC) was inserted and she was discharged home on IV vancomycin 1.25 g every 12 h with plan for 6 weeks of therapy.

For the next 5 days, she continued to have pain, swelling and erythema over her right sternoclavicular joint and therefore presented to the University of Maryland Medical Center for a second opinion. On physical exam, she had limited range of motion of her right upper extremity due to pain. CT scan of the chest with

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IV contrast showed SC septic arthritis, osteomyelitis of the clavicle head, adjacent ribs and inflammatory changes extending into superior mediastinum with a small superior mediastinal abscess (Fig. 1). Given the growth of MSSA on previous cultures, vancomycin was changed to IV oxacillin 2 g every 4 h through the PICC. Repeat transthoracic echocardiogram did not show evidence of endocarditis. Recommendation for surgical intervention with debridement of SC joint and probable resection of right clavicle head were discussed with the patient. However alternative treatment option was discussed which entailed IV oxacillin therapy and graded physical therapy with close clinical monitoring with plan for surgical intervention if improvement did not occur.

The patient elected to forgo surgical intervention and attempt salvage therapy with IV oxacillin and graded physical therapy. She tolerated IV oxacillin therapy with no burning and therefore was discharged home on IV oxacillin 2 g every 4 h via an infusion pump. Over the next 6 weeks she was followed in clinic every 2 weeks. Her swelling, erythema and pain slowly improved as well as her range of motion, which increased from 90 degrees to 150 degrees. Serum inflammatory markers (CRP and ESR) decreased over the course of therapy (Fig. 2). After 6 weeks of IV oxacillin therapy, the patient was changed to oral doxycycline 100 mg twice a day for an additional 4 weeks. During these 4 weeks the patient continued her graded physical therapy and she regained full range of motion of her right arm. She had no further swelling, erythema or pain over the SC joint and therefore antibiotics were stopped. She was followed clinically off antibiotics for 3 months and no clinical recurrence was seen. Workup for underlying immunodeficiency (CD4, complement, IgA, IgG, IgM, IgE, myeloperoxidase level, neutrophil function assay and leukocyte adhesion deficiency panel) did not reveal any underlying abnormalities. One year later the patient is back to her normal activities that include swimming and hiking with no limitations.

Discussion

In this case the patient had no known cause for her MSSA bacteremia. In fact she was a healthy, physically fit 55 year-old female. It is unknown how long she was bacteremic before presenting to the local hospital but after 48 h of intravenous antibiotics her blood cultures showed sterility. The patient was evaluated for underlying immunodeficiency but no deficiency was

found. It is well known that risk factors associated with Staphylococcus bacteremia are IV drug use, long term intravenous access devices, immunodeficiency (especially neutrophil dysfunction), diabetes and chronic kidney disease [7]. However, in approximately 25 % of cases a cause of staphylococcus bacteremia is never found [7]. In this case, it is unknown why she developed MSSA bacteremia but the patient's SC septic arthritis and associated adjacent infection was undoubtedly caused from hematogenous seeding of MSSA to these locations.

Her treatment at the outside hospital was limited given the phlebitis that occurred with IV oxacillin use through a peripheral vein. It is unknown if this patient had mechanical or chemical phlebitis given administration was conducted at a local hospital. Oxacillin can be associated with phlebitis but with larger gauge catheters incidence can be less [8]. At the University of Maryland Medical center, she was challenged with oxacillin through her PICC and this was not associated with phlebitis suggesting that her phlebitis was likely secondary to mechanical inflammation and not chemical phlebitis from oxacillin. This reinforces that phlebitis is not an absolute contraindication to continued use of a medication but rather suggests needing to use alternative mitigation strategies such as diluting medication, slowing the rate of the infusion or using larger gauge catheter to prevent further inflammation of the vein [8]. In this case the local hospital did not try any of those measures, but rather changed her therapy to cefazolin which has similar efficacy to oxacillin in MSSA bacteremia [9]. However cefazolin caused her to have a diffuse rash and therefore the patient was discharged on IV vancomycin which has been shown to potentially be inferior to oxacillin or cefazolin for MSSA bacteremia [10].

Unfortunately, the patient did not improve clinically while on IV vancomycin as seen with continued erythema, pain, swelling and loss of function forcing her to seek a second opinion. Imaging of the chest continued to show extensive SC septic arthritis with extension to adjacent ribs, clavicle head and posteriorly into superior mediastinum (Fig. 1). In this case only diagnostic aspiration of the superior mediastinal abscess was conducted. Given the extensive nature of her infection, surgical intervention was recommended and the need for resection of the clavicle head was discussed. Resection of the clavicle head can be associated with chronic pain and instability if the supporting ligamentous structures are damaged [6]. This patient was an active 55 year old female and she did not want to risk the chance of joint instability and permanent pain. Therefore she elected to attempt to salvage her SC joint with only IV oxacillin therapy and close clinical monitoring every 2 weeks with the plan to undergo surgical intervention if improvements with respect to her range of motion and symptomology did not occur. In SC septic arthritis with limited disease, antimicrobial therapy alone has been shown to be curative in case reports [11]. When extensive disease is present, as seen with extension into mediastinum or clavicular head, surgical intervention is almost universally recommended [4–6].

In this case, this patient had extensive infection beyond the SC joint but antimicrobial therapy alone was able to successfully treat her infection without surgical intervention. This was seen with the resolution of her clinical symptoms, normalization of inflammatory markers (Fig. 2) and the lack of clinical recurrence of her MSSA infection after 1 year of clinical follow up. It is well known that neutrophils play an important role staphylococcal infections [12–14]. Disease states (diabetes, chronic granulomatous disease and others) that inhibit neutrophil function predispose patients to staphylococcal infections (13). The patient in this case did not have an immunodeficiency or underlying medical problem that inhibited her innate immune response from functioning properly. Therefore her innate immune system was able to work in correlation with antibiotic therapy to clear her MSSA infection.

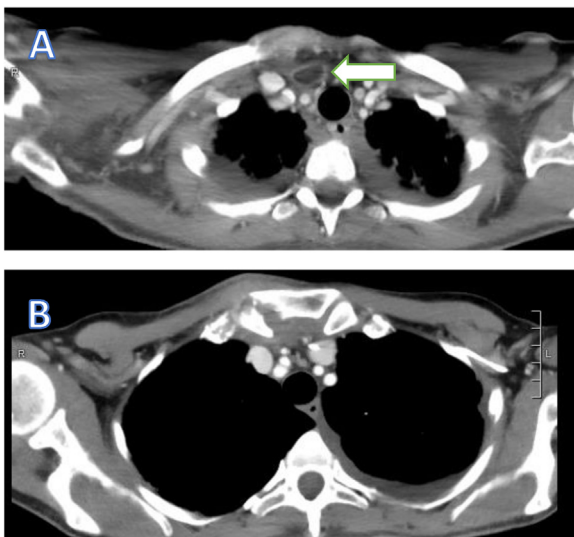


Fig. 1. CT chest with axial images. A) Superior mediastinal abscess and developing anterior phlegmon without discrete abscess B) Right clavicular head osteomyelitis and right sternoclavicular septic arthritis joint.

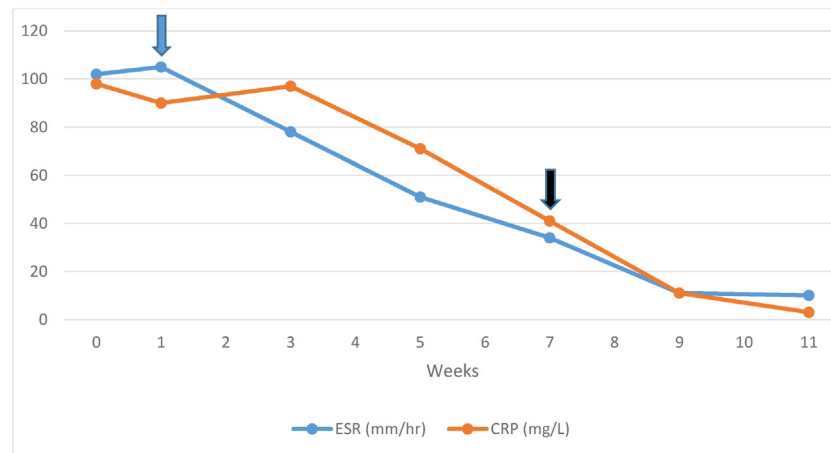


Fig. 2. Trends of ESR and CRP over course of antibiotic therapy. Blue arrow indicates when IV oxacillin was started and Black arrow shows when oral doxycycline therapy was started and was continued until week 11 when all antibiotics were stopped. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article).

However joint damage can occur when inflammatory cytokines, enzymes and bacterial toxins cause erosive damage of bone and cartilage resulting in permanent debility [15]. No such permanent changes occurred in her treatment course but her graded physical therapy regimen potentially allowed her to improve her range of motion and prevent permanent limited mobility. It should be noted that over the course of her therapy slow incremental improvements in range of function occurred. While this encouraged this patient, the lack of more immediate pronounced clinical improvements in range of motion may not be as well received in other patients. Potential prospective studies are warranted to evaluate if intravenous antimicrobial, physical therapy and close clinical follow up may prevent the need for surgical intervention in immunocompetent patients with SC septic arthritis. However given the rarity of this condition, such a study would need to be multicenter with a prolonged accrual period.

In conclusion, this patient was successfully treated for extensive SC joint septic arthritis with only antibiotic therapy. While this is a single case report it does suggest that aggressive intravenous antibiotic therapy in lieu of surgical intervention for SC septic arthritis in immunocompetent patients may be beneficial. Only prospective studies will be able to definitively determine if this approach has efficacy and potential to reduce medical costs, anesthesia risks and reduce potential long term ramifications of surgical interventions.

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None.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request

Author contribution

Dr. James Doub conducted the study design and writing of the manuscript.

Declaration of Competing Interest

The authors report no declarations of interest.

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