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# *Cutibacterium acnes* sternoclavicular joint osteomyelitis in an otherwise healthy 55-year-old man

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## SUMMARY

Sternoclavicular joint osteomyelitis is extremely rare, with only 225 reported cases in the last 45 years. We present an unusual case in an otherwise healthy 55-year-old man with a history of well-controlled type 2 diabetes mellitus and hypertension. He presented to the emergency department after a week of left knee pain that worsened to full-body joint pain with left sternoclavicular swelling. He was started on antibiotics with multiple washouts of the left knee and treated for septic arthritis. By MRI and CT, he was found to have left sternoclavicular joint osteomyelitis and abscess and underwent debridement and resection. We believe that the initial joint injection resulted in haematogenous spread to the left sternoclavicular joint, stressing the importance of a sterile field for joint procedures.

## BACKGROUND

Sternoclavicular joint osteomyelitis is extremely rare with only 225 reported cases in the last 45 years.<sup>1</sup> This is most commonly seen in patients who inject drugs or patients who have uncontrolled diabetes mellitus, trauma or rheumatoid arthritis.<sup>2</sup> Here, we present a patient with well-controlled type 2 diabetes mellitus and hypertension without predisposing conditions for sternoclavicular joint osteomyelitis.

## CASE PRESENTATION

A 55-year-old man presented to the emergency department with full body pain. He has a history of well-controlled type 2 diabetes, with a recent of A1c of 6.3% taking metformin 1000 mg two times a day, and hypertension, taking amlodipine 5 mg and lisinopril 40 mg per day at home. His pain started in his left knee 1 week prior, and about 4 days ago, he was seen in the orthopaedics clinic for a joint aspiration. He received a steroid injection at that time. The joint aspiration showed white cell count of  $29.883 \times 10^9/L$  without any crystals. After the joint aspiration and steroid injection, the pain progressed to his entire body with inability to move his joints. He had localised swelling of the left clavicle with significant pain on palpation, which prompted further investigation of the left sternoclavicular region. He works as an engineer and denies recent trauma, falls or sexually transmitted infections. He reported that he went on a trip to Northern Michigan in the summer.

## INVESTIGATIONS

In the emergency department, he had elevated white cell count to  $19.9 \times 10^9/uL$ , erythrocyte

sedimentation rate 130 mm/hour and C reactive protein 13.2 mg/L. A CT scan of the left clavicle showed cellulitis. Orthopaedic surgery was consulted, and they performed arthrocentesis of the left knee, with a white cell count of  $177 \times 10^9/L$  and few uric acid crystals. Uric acid blood test result was 4.7 mg/dL, which was unremarkable. An infectious workup was started, which included Lyme disease, herpes simplex virus, gonorrhoea, chlamydia, HIV, cytomegalovirus and Epstein-Barr virus. All these results were negative. Blood cultures were also obtained, and these were negative. Both a transthoracic and transthoracic echocardiogram were performed to rule out endocarditis. These were also negative.

Because of worsening pain and swelling in his left clavicle, an initial left clavicle X-ray was obtained. This showed joint space narrowing at the acromioclavicular joint; however, no evidence of fracture. MRI of the chest was completed, showing enhancing oedema in the bone marrow concerning for sternoclavicular joint osteomyelitis (figure 1) as well as multiple abscesses that were too small to drain (figure 2). A CT scan of the soft tissue of the neck showed diffuse swelling superior to the proximal clavicle with a central area of hypodensity representing a known abscess. There was involvement of the sternocleidomastoid muscle with adjacent fat stranding without evidence of bony destruction (figure 3).

## DIFFERENTIAL DIAGNOSIS

Given the presence of uric acid crystals on arthrocentesis investigation, it was thought that the knee pain could be a gout flare and the patient was started on naproxen. Rheumatology was consulted at the request of the orthopaedic surgery team, who believed that the extent of joint pain was not related to a gout flare. The remaining laboratory and imaging results strongly depicted a septic joint picture in the left knee.

In terms of the left clavicular pain, it was similarly thought to be related to a gout flare with possible underlying autoimmune disease given involvement of multiple joints. Imaging results quickly ruled out other differentials in favour of sternoclavicular joint abscess and osteomyelitis.

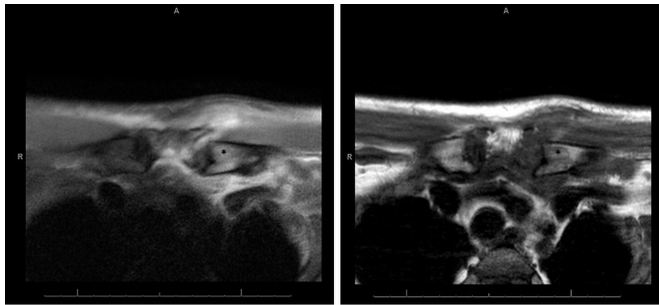
## TREATMENT

On arrival to the family medicine inpatient unit, antibiotics were continued as well as naproxen for gout flare. Orthopaedic surgery, infectious disease



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**Figure 1** MRI of the chest. T2-weighted and T1-weighted MRI, respectively, showing enhancing oedema within the bone suggestive of osteomyelitis of the sternoclavicular joint. The asterisk shows the areas of enhancement.

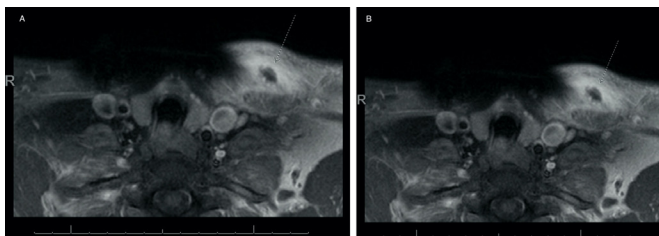
and rheumatology all weighed on managing this patient, and, ultimately, washout of the left knee was planned for initial source control of the infection. First, vancomycin and ceftriaxone were started, and once the wound culture results grew *Streptococcus pneumoniae*, vancomycin was discontinued.

During this time, the left clavicle continued to worsen in pain and range of motion. While the initial CT scan of the left clavicle showed cellulitis, an MRI of the chest was obtained revealing sternoclavicular joint osteomyelitis and abscess. After obtaining a CT scan of the soft tissue of the neck, thoracic surgery performed debridement and resection of the left sternoclavicular joint. Plastic surgery then created a pectoralis flap for closure. *Cutibacterium acnes* grew from the sternoclavicular wound culture, and he was treated with 6 weeks of intravenous ceftriaxone.

#### OUTCOME AND FOLLOW-UP

The pain in his left clavicle rapidly subsided as he continued to work on mobility of the left shoulder. He remained in the hospital for a total of 34 days due pain and stiffness in his left knee while continuing antibiotics. Due to his prolonged stay in the hospital, and limited mobility, inpatient rehabilitation was recommended; however, he stayed there for 4 days. He noted that symptoms were not improving, and he participated minimally in physical therapy activities.

He returned to the hospital, where he was febrile to 102.0°F. At this time, he was started on cefepime and vancomycin. MRI of the left knee showed a small complex effusion with significant synovitis with borderline erosive changes within the far medial aspect of the weightbearing portion of the medial femoral condyle suggesting osteomyelitis. He was started on intravenous ceftaroline for a total of 6 weeks. After thorough discussion, it was decided to continue antibiotic therapy and pain management, as opposed to surgical treatment of the left knee. It was



**Figure 2** MRI of the chest. (A) and (B): T2-weighted MRI showing extensive fluid collection in the left sternoclavicular joint. The arrows point to the fluid collection area.



**Figure 3** CT of the soft tissue of the chest. CT of the soft tissue of the chest. Measurements show the size of the sternoclavicular abscess measuring 28.6 mm by 45.0 mm.

recommended to return to inpatient rehabilitation for further intense physical therapy; however, at this time, the patient decided to return home with home physical therapy.

At home, the patient continued physical therapy. Mobility in his left knee has shown mild improvement. Pain has improved significantly. There has been great improvement in the left clavicle. He has been following with orthopaedic surgery on an outpatient basis with the potential plan to perform left knee replacement surgery. It is recommended that this occurs at least 1 year after infection has cleared, and some increased mobility in his knee is present.

#### DISCUSSION

This is an interesting case of sternoclavicular joint osteomyelitis in an otherwise healthy man with well-controlled diabetes mellitus and hypertension. In this case, we believe that this infection occurred due to hematogenous spread of bacteria after initial arthrocentesis and steroid injection. While blood culture results were negative for evidence of bacteremia to suggest haematogenous spread, it is highly possible that spread had already occurred, and minimal bacteria was present at the time of drawing the blood. Initial sets of blood cultures were not obtained when the patient had a fever and subsequent sets were obtained while the patient was already on antibiotic therapy.<sup>3</sup> Recent studies have shown that only 13% of blood cultures are positive in sternoclavicular joint osteomyelitis.<sup>4</sup>

Only 225 cases of sternoclavicular joint osteomyelitis have been reported in the last 45 years.<sup>1</sup> This patient did not present with typical risk factors; individuals who inject drugs, uncontrolled diabetes mellitus and rheumatoid arthritis being the three most common. A recent review of 170 cases showed that 23% presented without risk factors.<sup>4</sup> *Staphylococcus aureus* was responsible for 49% of cases and *Pseudomonas aeruginosa* for 10%, more commonly in patients with a history of drug use. Abscess and mediastinitis are serious complications and have been reported in about 20%–25% and 13%, respectively. This patient underwent standard of care for treatment of sternoclavicular joint osteomyelitis, which is resection and flap creation.<sup>5</sup> The resulting surgery, obtaining source control, allowed for quicker recovery in terms of pain and return to normal range of motion.

The sternoclavicular joint abuts many important structures, which include the subclavian vessels, vagus and phrenic nerves, superior mediastinum, trachea and oesophagus. The blood supply comes from the internal thoracic artery and the

suprascapular artery. For this reason, sternoclavicular joint infections can present with a variety of symptoms, ranging from a rash to chest pain with numbness down the arm. These symptoms result in a broad differential diagnosis, thus, accurately diagnosing sternoclavicular joint infections can be a challenge. Delays in diagnosis can result in spread to these nearby structures and further complicate management.<sup>6</sup>

Previous studies have investigated the incidence of septic joint arthritis following arthrocentesis or steroid injection. One study from Denmark investigated a total of 22 370 procedures (14 118 glucocorticoid injections and 8252 arthrocenteses) and found only 11 patients diagnosed with septic arthritis.<sup>7</sup> Another study showed an incidence of 2 cases per 100 000 people per year. Thus, septic arthritis following joint injection or aspiration is rare. This is most likely due to the rigorous sterile field that is created when performing such a procedure. A sterile injection/aspiration procedure consists of an area typically cleaned with povidone-iodine wipes and using sterile gloves and a sterile drape.

For this reason, we believe that this osteomyelitis occurred via haematogenous spread from the left knee. *C. acnes* is increasingly recognised as a cause of infection following shoulder arthroplasty and arthrotomy and has also been seen recently in native joints. A recent case series described three cases of *C. acnes* joint infection: two in a native knee joint and one in a

sternoclavicular joint. Fifteen other cases were found in the literature. Six of these cases were reported to be secondary to recent arthrocentesis. As a cause of bacterial joint infection, *C. acnes* is often considered a contaminant and can remain present for longer periods of time. It shows few signs of acute infection. *C. acnes* also forms biofilms on the articular joint, which can cause a delay in clearing the infection or require multiple debridement procedures.<sup>8</sup>

This case stresses the importance of a sterile field and monitoring for any signs of infection, even if they are minor. When cultures are drawn, it is necessary to consider the nature of the infection before dismissing a contaminant.

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#### Learning points

- ▶ Sternoclavicular joint infections can present with a variety of symptoms given its proximity to important structures, which includes vessels, nerves, the superior mediastinum, the trachea and the oesophagus.
- ▶ When performing arthrocentesis or joint injections, it is imperative that a sterile field be maintained.
- ▶ Septic joint arthritis and haematogenous spread to distant joints is a rare complication of arthrocentesis or joint injection.
- ▶ Before dismissing bacteria as a contaminant, consider the nature of the infection.

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