Title:
A challenging case of severe bilateral septic arthritis with osteomyelitis of the sternoclavicular joint in a patient with end-stage renal disease.

Authors:
1. Chun Yuet, Khoo
2. Cynthia Ming Li, Chia

Affiliations:
1Department of Cardiothoracic Surgery, National Heart Centre Singapore, Singapore

Correspondence:
Khoo Chun Yuet
Department of Cardiothoracic Surgery, National Heart Centre Singapore, Singapore
5 Hospital Dr, Singapore 169609
Tel: +65-67048000
Email: khoochunyuet@gmail.com

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Abstract

Septic arthritis of the sternoclavicular joint (SCJ) is a rare condition that comprise less than 1% of all joint infections. We report a case of severe bilateral septic arthritis of the SCJ in a patient with end-stage renal disease on peritoneal dialysis. A 44 year-old female presented with right SCJ infection one month after recovering from a tenckhoff catheter exit-site infection. She completed six weeks of antibiotics however this progressed to bilateral SCJ septic arthritis with osteomyelitis necessitating multiple surgical debridement and excision of bilateral clavicular heads. Further imaging showed signs of renal osteodystrophy and degenerative joint changes resembling calcium pyrophosphate deposition. Patients with end-stage renal disease have multiple risk factors including immune system dysfunction, renal osteodystrophy and dialysis access sites that increase susceptibility to bacteraemia and seeding. Therefore in such patients, prompt assessment is necessary to ensure expeditious diagnosis and treatment of this potentially debilitating condition. A multidisciplinary team involving various specialties is crucial for the holistic care for such patients and to reduce risk of recurrence.

Key words: sternoclavicular joint, septic arthritis, end-stage renal disease, renal osteodystrophy
Introduction

Septic arthritis of the sternoclavicular joint (SCJ) is a rare condition that comprise less than 1% of all joint infections.\(^1\) Due to its low incidence, there is no consensus guideline for treatment. Management options include parenteral antibiotics, incision and drainage, and surgical debridement with resection of the SCJ depending on the severity.\(^1\) In this article, we report a peculiar case of severe bilateral SCJ arthritis by Staphylococcus capitis in a patient with end-stage renal disease with underlying joint degeneration by renal osteodystrophy.

Case report

A 44 year-old female with end-stage renal disease from chronic glomerulonephritis on peritoneal dialysis complicated by tertiary hyperparathyroidism presented with acute onset right SCJ pain and fever. Ultrasound showed a multi-loculated fluid collection and aspiration yielded mucoid cloudy fluid with no bacterial growth. She completed 6 weeks of intravenous cefazolin for presumptive Staphylococcus aureus SCJ seeding from a previously treated tenckhoff catheter exit site infection. However, she developed recurrence of pain and fever after cessation of antibiotics with new onset left SCJ swelling with pus discharge. The patient underwent initial saucerisation of the right SCJ abscess with partial excision of the right clavicle and drainage of left SCJ abscess, as intraoperatively there was complete destruction of the right SCJ and the clavicular head. Intraoperative cultures grew minimal Staphylococcus capitis with no organism seen on gram stain. Histology of the intraoperative tissue and bone specimen showed significant amount of granular calcifications and foreign body type giant reaction with no crystal isolated. Further tests for acid fast bacilli, fungi, mycoplasma, Bartonella were all negative. Another swab of the tenckhoff catheter exit site also isolated Staphylococcus capitis.
Blood cultures were negative. A postoperative CT chest showed no intrathoracic extension or mediastinitis. (Figure 1a and 1b)

Antibiotics was switched to vancomycin and she underwent six further surgeries for repeated debridement and application of negative pressure wound therapy to the bilateral sternal wounds. The left clavicular head was involved and eventually excised. Each time, the tissue cultures returned as no bacterial growth on three occasions and Staphylococcus capitis, equivocal for contaminant, on three occasions. A PET/CT performed was negative for distant site of infection. (Figure 2a and 2b) However, it showed dystrophic calcification and heterotopic ossification around the remnant bone at bilateral surgical sites suggestive of renal osteodystrophy. There was also bilateral symmetrical degenerative joint changes resembling calcium pyrophosphate deposition disease (CPPD) about the major joints such as acromioclavicular, hip and sacroiliac joints.

After clinical improvement, the patient underwent bilateral pectoralis major rotation flap coverage of the sternal wounds and subsequent total parathyroidectomy with deltoid implantation for definitive treatment of tertiary hyperparathyroidism. On consultation with rheumatology, she did not require further treatment for the calcium pyrophosphate joint deposits as these were not significant enough to cause significant crystal deposition and resultant tissue inflammation. Written informed consent was obtained from the patient.

Discussion

Septic arthritis of the SCJ most commonly occurs due to hematogenous seeding from a distant source of infection in up to 65% of patients, such as in intravenous drug abusers, and can progress to joint osteomyelitis. In view of the close proximity of the SCJ to crucial structures such as the subclavian vessels with potential for intrathoracic extension, it is imperative to recognise and start treatment early. In early infection, it is sealed by the indistensible joint capsule and can present subclinically. The most
common bacteria is Staphylococcus aureus although others such as Streptococcus pyogenes, Escherichia Coli, and Myobacterium tuberculosis have also been reported. This case is however the first report to our awareness of Staphylococcus capitis, a skin commensal, causing severe bilateral SCJ septic arthritis which is highly unusual due to its low virulence nature.

We hypothesise that this could be multifactorial. Firstly, metabolic dysregulation in renal osteodystrophy from tertiary hyperparathyroidism can weaken bones and alter their joint integrity, which can predispose joints to hematogenous seeding of bacteria. It is also unclear whether the incidental CPPD deposits can play a role in exacerbating the patient’s condition given that CPPD involvement of the SCJ is an even rarer entity that is poorly understood. As our patient has a peritoneal dialysis catheter, it is also susceptible to colonisation by Staphylococcus capitis that can produce biofilms and form a physical barrier that is difficult to eradicate by the host immune response. Moreover, patients with renal diseases have altered immune function and it is theorized that they are less able to clear transient bacteraemia from such infections. Despite this, the isolation of Staphylococcus capitis may arguably still represent a contaminant given that there was no bacteria isolated from the peritoneal fluid and objectively there was minimal Staphylococcus capitis growth in the intraoperative cultures.

The management of SCJ septic arthritis generally involves medical therapy with intravenous antibiotics as first line, adjusted depending on culture and susceptibility results based on severity. Indications for surgery include abscess formation, bony involvement or failure of antibiotic therapy. For our patient with bilateral clavicular osteomyelitis involvement, enbloc resection of the clavicular head was necessary for infection control compared to just drainage or debridement, and repeated debridement procedures were required for adequate source control. In addition, negative pressure therapy was initiated early to optimise the wound for reconstruction. For a large defect after SCJ infections, options for reconstruction described include the pectoralis major and latissimus dorsi flaps depending on
whether the thoracoacromial vessels are intact. Our patient was fortunate to have undergone a bilateral pectoralis major rotation flap uneventfully and retain good shoulder motion.

Conclusion

Septic arthritis of the sternoclavicular joint is a rare condition that is seldom described in the literature and can be challenging to manage. In patients with end-stage renal disease and renal osteodystrophy, they have higher risks of hematogenous bacterial seeding to the SCJ resulting in severe bilateral septic arthritis with joint destruction. Prompt assessment is necessary to ensure expeditious diagnosis. A multidisciplinary team involving various specialties such as thoracic surgery and infectious disease, along with plastic surgery for reconstruction and endocrine surgery for parathyroidectomy is crucial for the holistic care for such patients.

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Authors’ contribution: Both authors contributed significantly to the study conception, manuscript writing and approval of the submitted version.
Figure legends

Figure 1a and 1b - CT chest showing erosive changes with multiple bony fragments and debris noted at the bilateral sternoclavicular joints. Amorphous soft tissue with stranding of the adjacent subcutaneous fat from surrounding inflammatory changes is also seen. There is no evidence of intrathoracic extension.

Figure 2a and 2b - PET/CT showing increased FDG uptake at the bilateral sacroiliac joints and acromioclavicular joints with secondary degenerative changes corresponding to heterotopic ossification as well as secondary degenerative changes suggestive of underlying crystal deposition inflammatory arthropathy such as calcium pyrophosphate deposition disease.
References


