

[ CASE REPORT ]

## Early Detection of Inflammation and Joint Destruction Revealed by Ultrasound in a Patient with Sternoclavicular Septic Arthritis

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### Abstract:

A 53-year-old Japanese man experienced fever/neck pain, and neck magnetic resonance imaging revealed a spinal epidural abscess. The following day, he developed a palpable mass with evident inflammatory signs in the right sternoclavicular joint (SCJ) with severe pain. Ultrasound revealed synovitis with remarkable power Doppler signals in the right SCJ. Blood cultures yielded *Streptococcus agalactiae* growth. After 12 days, ultrasound showed right distal clavicle bone erosion. His symptoms improved with long-term parenteral antibiotic treatment, but the right SCJ joint destruction progressed for several months. We diagnosed him with sternoclavicular septic arthritis complicated with a spinal epidural abscess and bacteremia.

**Key words:** sternoclavicular septic arthritis, ultrasound, computed tomography, magnetic resonance imaging, synovitis, joint destruction

(Intern Med 58: 865-869, 2019)

(DOI: 10.2169/internalmedicine.1782-18)

### Introduction

Septic arthritis is a medical emergency associated with high rates of morbidity and mortality, especially when the diagnosis is delayed or the treatment is suboptimal (1). The large joints of the hip and the knee are most commonly affected (in more than half of the cases), but any joint can be involved (2). The sternoclavicular joint (SCJ) is a common site of septic arthritis, involved in 0.5-1.0% of all joint infections (3, 4).

Radiographic examinations of the SCJ help to delineate the underlying pathology. Plain radiography may show osteolysis and osteosclerosis in the distal clavicle, but the findings may seem normal initially (3). Because of the limited information that plain radiography provides, the use of magnetic resonance imaging (MRI), computed tomography (CT), and ultrasound may aid in the arrival at a precise diagnosis (3-7). Ultrasound has increasing utility in the diagnosis of musculoskeletal conditions when used by an experienced clinician (6).

We herein report the case of a man with sternoclavicular septic arthritis whose inflammation and joint destruction of the SCJ were detected early by ultrasound.

### Case Report

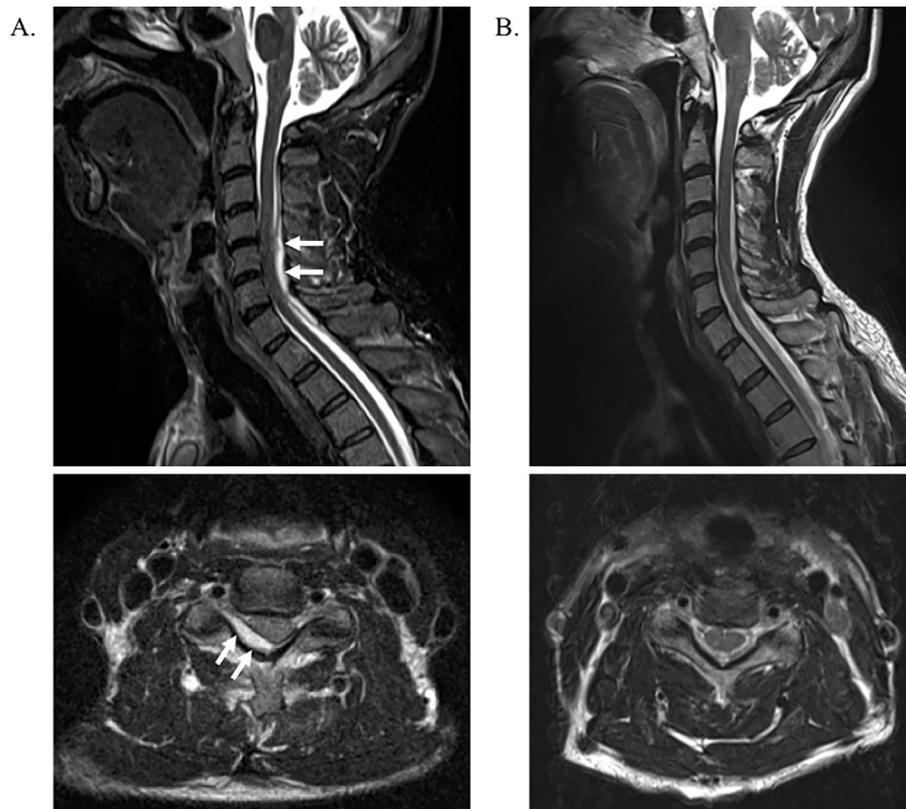
A 53-year-old Japanese man visited a hospital because of a fever of 38-39°C and neck pain. He was treated with an oral antibiotic for one week, but his symptoms did not improve. Neck MRI revealed a spinal epidural abscess (Fig. 1A), and he was then admitted to our hospital. He had a history of alcoholic liver cirrhosis (Child-Pugh score, C) and rupture of an esophageal varix.

On admission, it was noted that he had developed a palpable mass with evident inflammatory signs in the right SCJ with severe pain. He had a spider angioma in the anterior chest and pretibial pitting edema. Blood tests revealed a white blood cell count of  $4.4 \times 10^3/\mu\text{L}$  (normal value  $4-10 \times 10^3/\mu\text{L}$ ; neutrophils 80%, lymphocytes 10%) and a platelet count of  $50 \times 10^3/\mu\text{L}$  (normal value  $150-400 \times 10^3/\mu\text{L}$ ). The level of acute phase reactants (APRs) was elevated, with a

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Received: July 4, 2018; Accepted: September 4, 2018; Advance Publication by J-STAGE: November 19, 2018

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**Figure 1.** Spinal epidural abscess detected by neck MRI. Neck MRI (T2IW) revealed a spinal epidural abscess (arrow) at admission (A). It had disappeared by two months post-discharge (B). Upper figure: axial plane, lower figure: sagittal plane

C-reactive protein (CRP) level of 14.1 mg/dL (normal value <0.5 mg/dL) and an erythrocyte sedimentation rate (ESR) of 23 mm/h. Tests for antinuclear antibodies, rheumatoid factor, and anti-cyclic citrullinated peptide antibodies were all negative.

Plain radiography and chest CT did not show bone abnormality in the right SCJ at admission (Fig. 2A and C). However, ultrasound revealed capsular distension and intra-articular synovial hypertrophy with remarkable power Doppler (PD) signals suggestive of active synovitis (Fig. 3A). Because no intra-articular liquid was obtained, needle aspiration of the joint was unsuccessful. Intravenous tazobactam/piperacillin (4.5 g four times a day) was started from the day of admission. At day 7 of hospitalization, the antibiotic was changed to intravenous sulbactam/ampicillin (3.0 g four times a day) because blood cultures yielded growth of *Streptococcus agalactiae* (Group B Streptococci: GBS). At day 12 of hospitalization, the APR level had decreased, with a CRP of 1.97 mg/dL and an ESR of 18 mm/h. The patient's symptoms had improved, but mild pain of the right SCJ remained. In addition, not only had the PD-positive synovitis persisted, but bone erosion had also appeared (Fig. 3B).

The patient was discharged on day 16 of hospitalization and then treated with intravenous ceftriaxone (2.0 g/day) for 2 weeks followed by oral clindamycin (900 mg/day) for 2 months. At one month post-discharge, CT showed osteolysis with osteosclerosis of the right SCJ and the right 1st sterno-

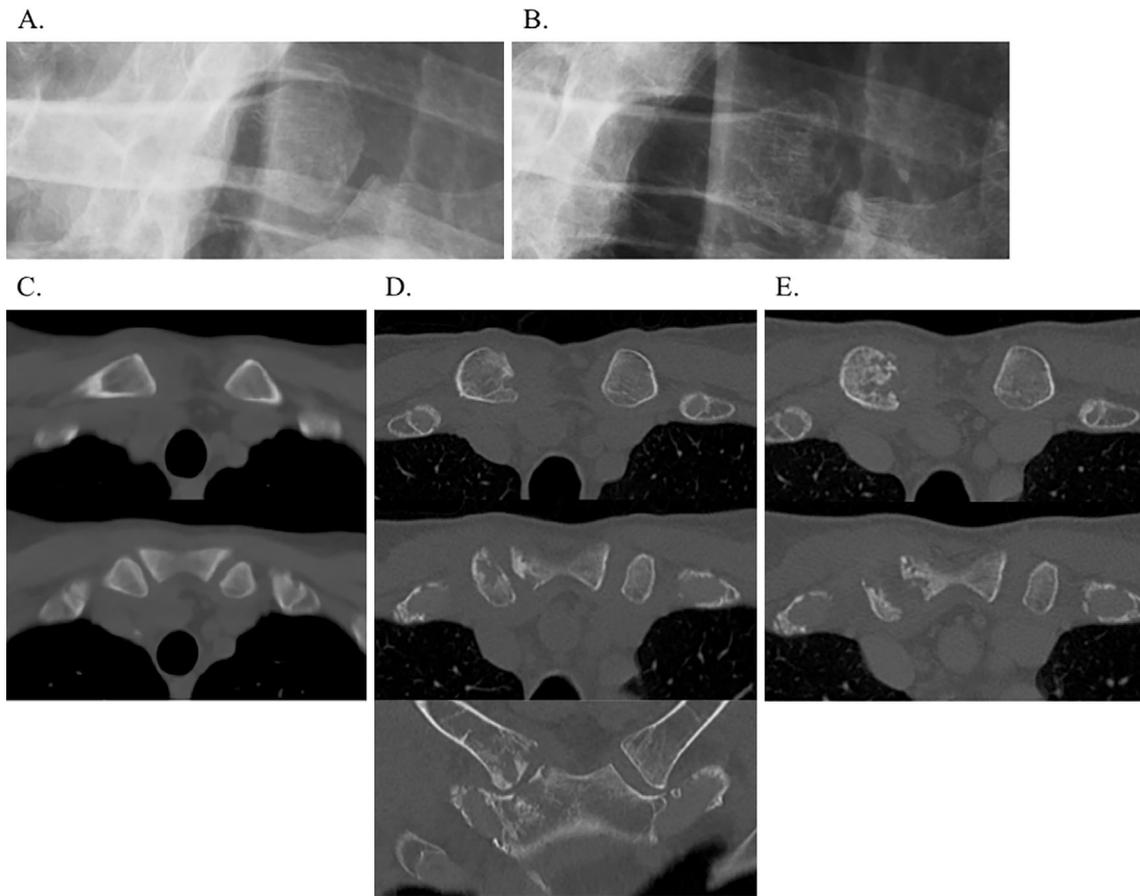
costal joint (Fig. 2D). At two months post-discharge, the patient's symptoms had disappeared, and his APR level had normalized. Neck MRI showed that the spinal epidural abscess had disappeared (Fig. 1B). However, plain radiography revealed osteolysis in the right distal clavicle (Fig. 2B), and MRI showed abnormal inhomogeneous intensities representing osteomyelitis and osteosclerosis in the sternum and clavicle near the right SCJ (Fig. 4).

At three months post-discharge, joint destruction shown by CT had further progressed (Fig. 2E) but did not progress thereafter. He had no complications or sequelae. We diagnosed him with sternoclavicular septic arthritis complicated with a spinal epidural abscess and bacteremia based on our observations that antibiotics were effective and that the joint destruction progressed in the early period.

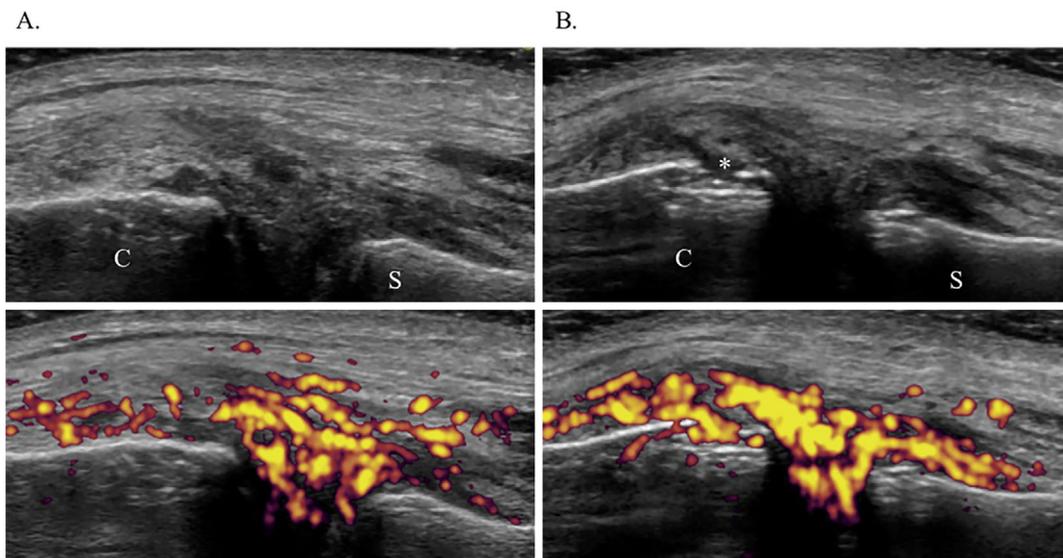
## Discussion

Sternoclavicular septic arthritis, although rare, should be considered in the differential diagnosis of chest and shoulder pain (8). The sternoclavicular joint capsule is reinforced by strong anterior and posterior sternoclavicular ligaments and is not freely distensible (3). The absence of prominent joint effusions may contribute to the delay in presentation. Infection is usually well established at the time of the diagnosis, probably explaining the high likelihood of osteomyelitis (3).

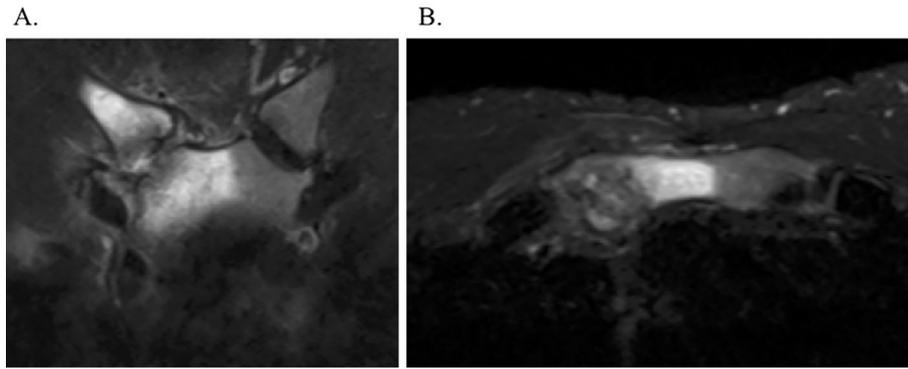
Imaging supports the diagnosis of sternoclavicular septic



**Figure 2.** Bone changes in the right SCJ by plain radiography and CT. Although the results of plain radiography were normal at admission (A), at 2.5 months post-admission, plain radiography showed osteolysis in the right distal clavicle (B). Similarly, although the CT findings were normal at admission (C), the gradual progression of joint destruction was observed by CT at 1.5 (D) and 3.5 months (E).



**Figure 3.** Synovitis and bone changes in the right SCJ by ultrasound. A: At admission, ultrasound revealed intra-articular synovial hypertrophy with remarkable power Doppler (PD) signals suggestive of active synovitis in the right SCJ. B: At day 12 of hospitalization, PD-positive synovitis persisted, and bone erosion (\*) appeared. C: clavicle, S: sternum



**Figure 4.** Abnormalities in the right SCJ by MRI at 2.5 months post-admission. MRI-short inversion time inversion recovery (STIR) showed abnormal inhomogeneous intensities representing osteomyelitis and osteosclerosis in the sternum and clavicle near the right SCJ.

arthritis, but the initial plain radiographs are normal in most such patients (3, 6). CT or MRI should be routinely performed in all cases of sternoclavicular joint arthritis (3-7). If life-threatening complications (such as chest wall phlegmon or abscess, retrosternal abscess, mediastinitis, or pleural extension) are observed, joint resection is indicated. Ultrasound can detect early changes and be used to guide joint aspiration and draining procedures (6). A 2015 case report noted that the use of ultrasound enabled the early detection of PD-positive synovitis of the SCJ (no image is provided in the report) (6). In the SCJ, findings such as effusion, synovitis, and irregularity of the bony margins may support the clinical suspicion of infection (5, 9). In our patient's case, ultrasound detected not only inflammation but also the very early appearance of bone erosion of the SCJ, which suggested that arthritis was suppurative. Because ultrasound can be performed noninvasively and repeatedly, it may be useful for the short-term monitoring of sternoclavicular joint arthritis. If antibiotic therapy had been insufficient and the progression of joint destruction had gone unrecognized, then he might have developed life-threatening complications. Although the joint destruction progressed even after the infection was resolved, there might have been a temporary discrepancy between the ongoing inflammation and the destruction of bone, mainly bone cortex, detected by the imaging findings.

Although aspiration of fluid from the affected joint is useful for the diagnosis of septic arthritis and the establishment of the microbial etiology, needle aspiration of the joint is often unsuccessful due to the paucity of joint fluid in the small SCJ and the presence of an intra-articular disk (4, 5). Bacteremia is more common in patients with sternoclavicular septic arthritis (62%) than in patients with septic arthritis in general (24%) (3). A peripheral blood culture may isolate a particular microbe. The most common isolate found in sternoclavicular septic arthritis is *Staphylococcus aureus*, followed by *Pseudomonas aeruginosa*, *Brucella melitensis*, *Escherichia coli*, *GBS*, and *Mycobacterium tuberculosis* (3). Common predisposing risk factors for sternoclavicular septic arthritis include intravenous drug use, infection at a distant

site, diabetes mellitus, trauma, an infected central line, chronic renal failure, alcoholism, liver cirrhosis, corticosteroid treatment, HIV infection, and malignancy (3, 4). Our patient was an immunocompromised host with a history of alcoholism and liver cirrhosis, and he had an infection at a distant site (spinal epidural abscess). The pathogenic bacteria were found to be *GBS*, which was sensitive to antibiotics.

This case highlights the benefit of ultrasound for detecting early changes (including inflammation and joint destruction) in cases of sternoclavicular septic arthritis. Ultrasound is useful for the early diagnosis and short-term monitoring of patients with sternoclavicular septic arthritis.

**The authors state that they have no Conflict of Interest (COI).**

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*Intern Med 58: 865-869, 2019*