



# Surgical Management of a Sternoclavicular Septic Arthritis with Infraclavicular Abscess: A Case Report

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## Abstract

**Introduction:** Septic arthritis of the sternoclavicular (SC) joint is an uncommon disease with some risk factors. Because of being rare and insidious, a diagnosis could probably be difficult, delayed, or even missed until complications occur, resulting in severe and life-threatening outcomes. It should be noted that early recognition and diagnosis, followed by immediate treatment, play an essential role in the patient's prognosis. Septic arthritis of the SC joint is a relatively infrequent infection. Clinical symptoms are mostly sudden, and from days to months, the patients may have pain in the chest, shoulder, or neck, limited movement in the upper extremities, and fever.

**Case Presentation:** We report a patient without predisposing factors who developed septic SC arthritis with infraclavicular abscess and was rapidly treated with partial clavicular resection

**Conclusions:** Diagnosis of septic arthritis in the SC region is often deferred. Early diagnosis allows more accessible medical or surgical treatment and a significant prognosis.

**Keywords:** Clavicular Abscess, Claviclectomy, Septic Arthritis, Sternoclavicular

## 1. Introduction

Septic arthritis of the sternoclavicular (SC) joint is a relatively infrequent infection (1-7). Clinical symptoms are mostly sudden, and from days to months, the patients may have pain in the chest, shoulder, or neck, limited movement in the upper extremities, and fever (8). In addition, joint inflammation and erythema may be observed. Bacterial infections should be considered the cause of SC joint arthritis, for example, *Staphylococcus aureus* and *Pseudomonas aeruginosa* (5, 6, 8, 9). Septic SC arthritis is commonly unilateral and affects the right side in about 60% of subjects (4). Wohlgethan et al. found that 20% of SC arthritis cases could lead to an abscess as a predisposing factor, regardless of IV-drug abuse or compromised immune system (10). Because of serious complications, including generalized sepsis and mediastinitis, SC arthritis should be diagnosed and treated as rapidly as possible (1, 2, 6, 7, 9). Early diagnosis of SC septic arthritis provides a better outcome in surgical or medical treatment, as well as a significant prognosis (3). However, SC septic arthritis is an unusual event in healthy patients requiring a high index of suspicion for the diagnostic assessment. The risk factors entail diabetes, intravenous drug use, end-stage renal and liver

diseases, immuno-compromising diseases, clavicular fracture, subclavian vein catheterization, rheumatoid arthritis, malignant lesions, trauma, distant infection, infected central venous line, and hemodialysis (1-5, 7-9). Because of being a rarity, the insidious onset, with minimal symptoms, SC arthritis diagnosis could probably be difficult, delayed, or even missed until complications occur, resulting in severe and life-threatening outcomes (2, 3, 5, 7). Substantial complications were common, including osteomyelitis, chest wall abscess or phlegmon, and mediastinitis. Thrombosis of the subclavian vein or superior vena cava and septic shock are critical but rare complications. Usually, it is challenging to interpret conventional radiography of the SC region due to overprojecting structures. The chest computerized tomography (CT) scan should be carried out as the preliminary imaging investigation, recognizing bone damage and specifying the retrosternal expansion of infection (8). Moreover, magnetic resonance imaging (MRI) could be conducted to investigate the presence of chest wall phlegmon, abscesses, or mediastinitis, which are the most potential and severe complications (7, 8). The ultimate diagnosis is based on the culture of joint fluid attained by needle aspiration or open biopsy. A frequent

cause of sensitivity to pain and SCJ region inflammation, which should be differentiated from septic arthritis, is degenerative osteoarthritis with osteophyte formation (i.e., Tietze's syndrome). However, this condition is benign and occurs automatically, often without any particular remedy. The therapeutic approaches for SC septic arthritis have a spectrum from administering parenteral antistaphylococcal and aminoglycoside antibiotics to extended surgery, such as reconstructive procedures, especially in cases of osseous degeneration, mediastinitis, abscess formation, and non-fulfillment of medical therapy (1-3, 5, 6, 9). In the early stages of the disease, limited incision of the joint, drainage, and debridement could be successful. Patients with chest wall or/and neck abscesses were frequently more eager to experience limited operation than patients with such conditions. Aggressive operation en bloc joint resection is suitable for infrequent SC septic arthritis (2, 3, 5, 8, 9). Therapy must include infected joint and bone resection in addition to complications, such as mediastinitis. Following the successful treatment of swelling, chest wall malfunction required a secondary reconstructive operation using a muscle flap (1, 8, 9). Here, we report a patient who developed septic SC arthritis with infraclavicular abscess, which was rapidly treated with partial clavicular resection.

## 2. Case Presentation

A 56-year-old male was referred to the Emergency Department of Medizinische Hochschule Hannover (MHH) with progressive, painful inflammation of the right clavicle, subjective fever for three weeks, and poor general condition. He had no history of diabetes, intravenous drug abuse, rheumatoid arthritis, or liver or kidney diseases. However, he had a history of falling one month ago on his right shoulder without any fractures and treatments. He was admitted to the Internal Medicine Intensive Care Unit for further evaluation. His oral temperature was 38°C. A 5 cm warm and smooth erythematous fluctuating mass was found at the right proximal clavicle, precisely next to the SC joint. White blood cell count was 16800/ $\mu$ L with 80% neutrophils, hemoglobin 10.6 g/dL, procalcitonin 108.3 ng/mL, C-reactive protein 33.1 mg/dL, and erythrocyte sedimentation rate (ESR) 86 mm/h. Internal Medicine specialists treated the patient with piperacillin/tazobactam.

The chest CT scan revealed partial destruction and bubbling in the medial part of the clavicle with distended SC joint capsule, right infraclavicular abscess, and right shoulder effusion without any pleural and pericardial effusion, which could speak most for a phlegmonous process and clavicular osteomyelitis. The results of blood culture and aspirated joint fluid were positive for *Streptococcus pyogenes* and *Staphylococcus epidermidis*. Following no clinical and paraclinical improvement by antibiotic treatment, it

was decided to perform surgical evacuation of the abscess and partial claviclectomy.

A right-angle incision was made, starting horizontally over the proximal 1/3 of the clavicle. Afterwards, a curved incision was made vertically along the left border of the sternum, and the diagnosis was upheld after finding purulent fluid when the joint was cut. Infraclavicular abscess with necrotic and purulent material extended into the clavicle was found. The proximal 1/3 of the clavicle was cut off after a complete debridement. The remaining gap from the excision of the proximal part of the clavicle was covered by V.A.C.® GRANUFOAM™ dressing, which was changed three times in 6 days in the operation room. Moreover, right-side video-assisted thoracoscopy was conducted. There was no evidence of pleural or mediastinal empyema, and a chest tube was finally inserted.

After the surgery, the patient received tazobactam/clindamycin considering the culture report, for a whole week and was supported by an elbow sling. The wound healed well, and the patient underwent physiotherapy starting 4 weeks after surgery. After 48 h, his general conditions ameliorated significantly, and his fever descended in 4 days. After a week of intravenous antibiotic therapy, the blood culture of the patient was negative. We observed that 12 days after treatment, laboratory results were normal (WBC: 9800 and ESR: 12). Antibiotic therapy was continued for a week. The patient was discharged with laboratory and clinical improvement and had to continue treatment with oral sulfamonomethoxazole for 10 days. Four months post-op, no sign of infection was found, while the patient had full-range shoulder movements and excellent arm function.

## 3. Discussion

Septic arthritis of SCJ is uncommon, accounting for about 0.5% -1% of all joint infections (1, 5-8). Its causes entail immuno-compromising diseases, including renal disease, diabetes, intravenous drug abuse, human immunodeficiency virus, clavicle fractures, or subclavian vein catheterization (2, 5). However, the patients might be affected with no known risk factors (6, 8). Ross and Shamsuddin showed that the most frequent risk factor was intravenous drug use (21%), followed by infection at a distant site (15%), diabetes mellitus (13%), trauma (12%), and infected central venous access (9%) (8). Considering severe complications, such as mediastinitis and generalized sepsis, it is vital to attain early diagnosis and rapid onset of treatment (1, 3). Septic SCJ arthritis in previously healthy patients is very rare and needs a high suspicion index to be rapidly diagnosed (4). Differential diagnoses that should be ruled out include rheumatoid arthritis, Tietze syndrome, osteoarthritis, rheumatic fever, gout, tumor lesions, and less prevalent etiologies, namely Brucella, Prevotella, and Mycobac-

terium tuberculosis. The earlier diagnosis and treatment would result in a better response from the patients (6).

Wohlgethan et al., in a systematic review on septic arthritis, demonstrated that 20% of the SCJ infections result in an abscess (10). This is in contrast to the findings of Bodker et al., who explained this difference by technical development since 1988, which caused more diagnostic accuracy (7). However, small abscesses could be omitted. Due to overprojecting structures, it is hard to interpret the conventional radiography of the SC region. Ultrasound can reveal soft tissue alterations, such as the extension of the joint capsule. However, it can be problematic to make a difference between synovial hypertrophy because of rheumatic inflammation and infection. Therefore, additional MRI or CT was recommended for all patients. The MRI and bone scan are more sensitive for the earlier diagnosis of SCJ involvement than CT scan and plain radiography. Since MRI is more accurate than CT, it is of greater diagnostic value (7) and has been suggested as the selected method to diagnose septic arthritis in the SC region (7, 8).

The therapeutic approaches for SC septic arthritis vary from parenteral antibiotics to extended surgery, namely reconstructive procedures, especially in cases of abscess, osseous destruction, mediastinitis, and the failure of medical therapy (1). In the early stages of the disease, the patient could be treated conservatively when no abscesses are found, and the infection has no extension into the adjacent soft tissues and mediastinum. In osteomyelitis and soft tissue abscess, it is proposed to excise the proximal 1/3 of the clavicle, a part of the manubrium, and the sternal part of the first rib. The remaining chest wall defect can be eliminated either by the progression of a pectoralis major flap based on the thoracoacromial artery or by a split pectoralis major rotational muscle flap (5). In the present study, we selected the first one as it has a more aesthetic appearance and brings about a sufficiently good shoulder function.

In our case, the diagnosis was established based on the clinical findings, blood culture, bone, and joint radiography, as well as bone and joint CT scan. Our case was operated on the earliest time from admission in another ward with simultaneous antibiotic therapy due to multidisciplinary teamwork and rapid diagnosis and treatment, which resulted in a dramatic response to the treatment.

To conclude, the diagnosis of septic arthritis in the SC region was often delayed. Early diagnosis of SC septic arthritis, as in our patient, provides easier control by medical or surgical therapy, with a significant prognosis.

#### Footnotes

**Authors' Contribution:** Concept and design: Ali Biharas Monfared and P. Zardo; Analysis and interpretation of data: S. A. Mousavian and Ali Biharas Monfared; Drafting of the

manuscript: Ali Biharas Monfared; Critical revision of the manuscript for important intellectual content: S. A. Mousavian; Statistical analysis: Ali Biharas Monfared

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**Ethical Approval:** The data collected in this research project will be confidential. Information about patients collected during the research will be put away, and no one but the researchers will be able to see it. Any information about the patient will have a number instead of their names. Only the researchers will know the number of participants, and we will lock that information up with a lock and key. The data will not be shared with or given to anyone.

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