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Sternoclavicular joint osteomyelitis; delayed bone resection with muscle flap: A case report

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ABSTRACT

INTRODUCTION: Sternoclavicular joint (SCJ) osteomyelitis is a very rare condition. Here, we report an uncommon case of a complicated SCJ osteomyelitis in a patient with an anterior chest wall trauma.**PRESENTATION OF CASE:** A 61-year-old male known case of dyslipidemia, hypertension (HTN), and type II diabetes mellitus (T2DM). The patient presented with pain and erythema over the right SCJ following trauma to the same location. Two weeks later, the patient presented with erythematous swelling with a sinus discharging pus, although he was discharged on oral antibiotics, analgesics, and had undergone an incisional drainage. Computerized Tomography (CT) of the chest showed fluid collection surrounding the right SCJ together with joint effusion suggestive of SCJ osteomyelitis. The patient underwent initial debridement and a definitive bone resection with pectoralis muscle flap two weeks following. Five months later, the patient was seen in the outpatient clinic, the wound was completely healed, and he has a normal function of the right arm.**DISCUSSION:** The management of SCJ osteomyelitis is not well established, yet it can be approached medically, surgically, or both.**CONCLUSION:** Surgical intervention is indicated in cases of SCJ osteomyelitis after the failure of antibiotic therapy trial. This is especially the case in the presence of abscess and bone destruction. SCJ debridement followed by delayed resection and pectoralis muscle flap might offer better results than merely debridement alone or with resection of the joint.© 2020 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Sternoclavicular joint (SCJ) osteomyelitis is a challenging and a rare condition due to many reasons. Firstly, it lacks consistency in clinical presentation, however, the most common presentations include; chest pain, fever, shoulder pain, and neck pain, respectively [1]. Secondly, most patients present with common predisposing factors, yet it can occur in a healthy population. Delayed diagnosis can lead to serious complications such as chest wall abscess, empyema, Superior Vena Cava Syndrome and mediastinitis, which is the most life-threatening complication [2].

Here, we report a case of complicated SCJ osteomyelitis in a patient with a history of long-standing type II Diabetes Mellitus

Abbreviations: SCJ, sternoclavicular joint; T2DM, type II diabetes mellitus; HTN, hypertension; CT, computerized tomography; NPWT, negative pressure wound therapy; (V.A.C.[®]), vacuum-assisted closure; PMF, pectoralis major muscle flap; MRI, magnetic resonance imaging.

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(T2DM), dyslipidemia, and hypertension (HTN) with an anterior chest wall trauma. In this report, we will discuss the challenging clinical presentation, the consequences of delayed diagnosis, and the possible treatment options, including their success rate. The work has been reported in line with the SCARE criteria [3].

2. Case report

The patient, a 61-year-old male known case of dyslipidemia, HTN, and T2DM. The patient presented to the emergency department at a local hospital with a one-week history of pain and erythema over the right SCJ following an accidental blunt trauma to the same location without any rib involvement. The shoulder X-ray was unremarkable, and the patient was discharged on oral antibiotics and analgesics. Three days later, he returned to the emergency department complaining of fever (38.5 °C) tachycardia (110 beats/Minute) and worsening erythema and swelling over the right SCJ. The patient underwent incisional drainage accompanied by an oral antibiotic, and he was discharged again. After two weeks, the patient was referred to our hospital with erythema and swelling over the right SCJ with sinus discharging pus (Fig. 1). Computerized



Fig. 1. Erythema and swelling over the right SCJ with sinus discharging pus.

Tomography (CT) of the chest showed fluid collection surrounding the right SCJ together with joint effusion. There were also erosive changes of the clavicle's medial end and upper sternum suggestive of SCJ osteomyelitis (Fig. 2).

On examination, there was a scar at the site of the previous drainage. The laboratory findings showed white blood cells count of 10.3 K/uL (4.0–11.0), erythrocyte sedimentation rate of 35 mm/hour (0–20), normal creatine phosphokinase level with a phosphate level 20 mg/dL (7–18) and HbA1c was 7% (4–6%).

The patient underwent initial debridement of the infected and necrotic materials at the right SCJ (Fig. 3). The wound was irrigated with hydrogen peroxide and dilute Betadine lavage and packed with a GranuFoam™ Vacuum-assisted closure (V.A.C.®) Dressing (KCI, Sydney, NSW, Australia). Oral antibiotics and neg-



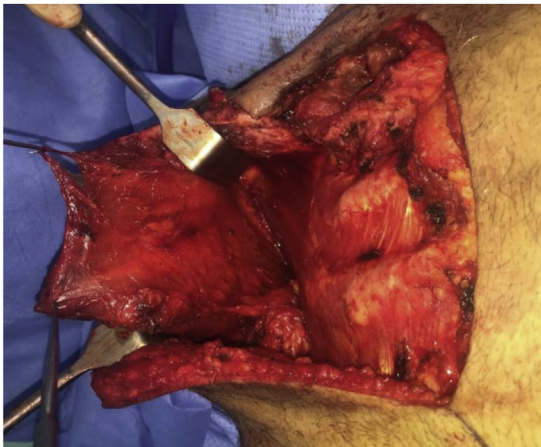
Fig. 3. The initial debridement of the infected and necrotic materials at the right SCJ.

ative pressure wound therapy (NPWT) were continued for two weeks.

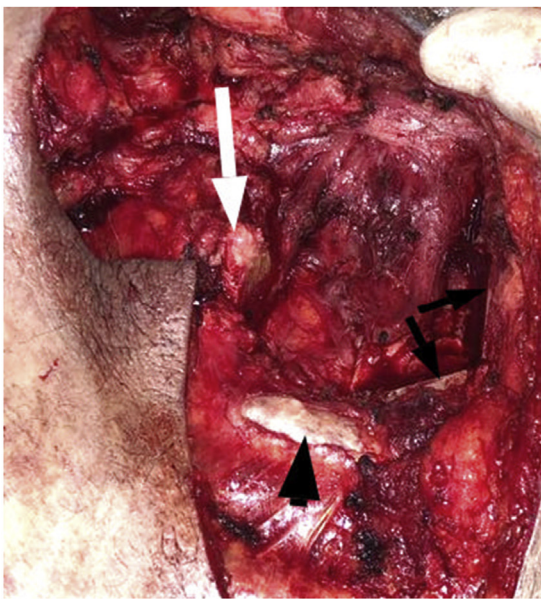
After two weeks, the patient was admitted to the operating room for definitive surgery by a thoracic surgery consultant. A hockey-stick type of incision was made over the clavicle and sternal midline from the midclavicular level to the approximate level of the third intercostal space. Pectoralis major Muscle Flap (PMF) was performed to cover the expected gap after resection (Fig. 4a). The medial one-third of the clavicle was divided using a gigli saw. The manubrium sterni was divided using a standard sternal saw preserving more than 50% of the manubrium. Then, the first costal cartilage was transected. Dissection of the posterior part of the SCJ from the mediastinal structure was performed with special attention to the right subclavian vein (Fig. 4b). The right SCJ and the attached bony freed bony structures were removed en-block (Fig. 4c). Eventually, the PMF was advanced to cover the gap of the resected right SCJ. Two drains were inserted, one between the pectoralis muscle and chest wall, and the other underneath the skin.



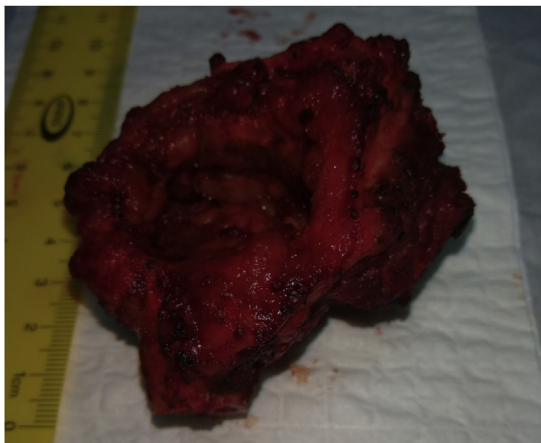
Fig. 2. Computerized Tomography (CT) of the chest showed fluid collection surrounding the right sternoclavicular joint together with joint effusion. Erosive changes of the medial end of the clavicle and upper sternum suggestive of SCJ osteomyelitis.



(a)



(b)



(c)

Fig. 4. (a) PMF was performed to cover the expected gap after resection. (b) Dissection of the posterior part of the SCJ from the mediastinal structure was performed with special attention to the right subclavian vein. The resultant defect was bounded by the cut end of the clavicle (white arrow), the manubrium (black arrow), and the 2nd rib (arrowhead). (c) The right SCJ and the attached bony freed bony structures were removed en-block.

Five months later, the patient was seen in the outpatient clinic, the wound was completely healed and he has a normal function of the right arm. The patient was satisfied with the overall provided information level during the entire care pathway, the empathy of all personnel involved, the postoperative care period, and the provided information level at the discharge time. The overall outcome of the procedure has met his expectations.

3. Discussion

Osteomyelitis of the SCJ mainly occurs in patients with risk factors such as intravenous drug abuse, diabetes mellitus, chronic renal failure, or use of steroids [1]. Regardless, 23% of the cases were found to be medically-free. The clinical presentation of SCJ osteomyelitis lacks homogeneity. However, the most common presentations include chest pain, fever, shoulder, and neck pain. SCJ osteomyelitis can give rise to multiple complications, including chest wall and mediastinal involvement and a possible chronic pain with a reduced range of movement in case of prolonged untreated infection [4]. Our patient presented to us with sinus tract following incision and drainage SCJ abscess 10 days before admission.

Patients with suspected SCJ osteomyelitis should be evaluated with chest CT. CT imaging is a valuable modality for early diagnosis of sternoclavicular joint osteomyelitis. Changes that can be seen on CT include the destruction of the articular surface, widening of the joint space, stranding of mediastinal soft tissue, gas, and fluid collections in the chest wall and mediastinum [5]. Magnetic resonance imaging (MRI) scan has proven to be of equal importance to CT scan in diagnosing SCJ osteomyelitis. If there is no evidence of bone destruction nor an abscess and SCJ osteomyelitis is suspected, conservative measures in the form of parenteral antibiotics, incision, drainage, and debridement are the management of choice [6]. However, in the case of bone destruction or an abscess, we advocate aggressive management in the form of resection of the SCJ. CT of the chest was performed to our patient that showed erosive changes of the medial end of the clavicle and upper sternum suggestive of osteomyelitis.

Sternoclavicular joint osteomyelitis is rare, and its incidence is unknown. As a result, current practice depends mainly on experts' opinions. Song et al. [7] reported the failure of conservative measures in 83% of patients with SCJ osteomyelitis. Therefore, most studies suggested an aggressive joint resection for all cases except in minor SCJ osteomyelitis [8–10]. Moreover, the added benefit of joint resection is to permit and facilitate the local tissue's debridement, which may harbor an extensive infected tissue that may remain hidden if limited debridement is pursued [9].

The timing of the bone resection and muscle flap following debridement showed variable outcomes. The immediate bone resection with muscle flap showed a 50% rate of complications, such as hematoma, seroma, and dehiscence. On the other hand, the success rate of delayed muscle flap was 100% [11]. Furthermore, the perceived advantages of delayed bone resection with muscle flap include enhancement of bone viability assessment as a result of the decreased inflammation. Another advantage is providing more time for culture results, thus, better targeted antibiotic therapy [12]. Our approach in the currently presented patient was to perform a two-staged procedure. The first stage was to debride the SCJ abscess and a V.A.C. was applied to reduce edema and bacterial load, promote the growth of granulation tissue, and enhance the healing rate. The second stage was performed a week later, wide resection was performed, including SCJ, medial end of the clavicle, right half of the manubrium sterni, and medial end of the first rib. This stage was accompanied by the advancement of PMF to cover the defect in the same setting.

The benefits of PMF in the management of infected sternal wound after median sternotomy were extensively discussed in the literature. The pectoralis major muscle has a dominant blood supply based on the thoracoacromial artery. An arc of rotation reaching all the anterior chest wall except the lower sternum can be produced by the mobilization of this muscle [13]. However, the benefits of PMF advancement after wide resection of SCJ was argued by some investigators. Puri et al. [6] evaluated 20 patients with SCJ osteomyelitis retrospectively and compared outcomes in patients treated with joint resection and open wound therapy as opposed to PMF coverage and primary closure. They noted a shorter length of stay, fewer unplanned procedures, and fewer wound complications in the open wound group. Kachala et al. [8] concluded that PMF and primary closure could achieve similar outcomes to open wound closure by secondary intention in selected patients. Furthermore, they reported a minimal functional impairment of the ipsilateral upper extremity function in the long-term follow-up. On the other hand, Muesse et al. [14] achieved 100% cure rate in patients with SCJ osteomyelitis by performing debridement with delayed bone resection and muscle flap coverage.

4. Conclusion

In conclusion, surgical intervention is indicated in SCJ osteomyelitis cases after the failure of antibiotic therapy trial. This is especially the case in the presence of abscess and bone destruction. SCJ debridement followed by delayed resection and pectoralis muscle flap may offer better results than merely debridement alone or debridement with resection of the joint.

Declaration of Competing Interest

The authors report no declarations of interest.

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Ethical approval

The institutional review board approved the publication of this case report with a reference number: IRB-2020-01-288.

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's contribution

Hatem Elbawab: Treating consultant, main author, writing the manuscript.

Yasser Aljehani: Writing the manuscript, reviewing the literature, preparing the images.

Farouk T. AlReshaid: Data collection, reviewing the literature.
Hamza Ali Almusabeh: Data collection and writing the manuscript.

Turki Muslih Al-Harbi: Data collection and writing the manuscript.

Rizam Alghamdi: Data collection and writing the manuscript.

Registration of research studies

N/A.

Guarantor

None.

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