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Superior sternoclavicular joint dislocation presented with shoulder motion limitation: A case report and literature review

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ABSTRACT

INTRODUCTION AND IMPORTANCE: Sternoclavicular joint dislocation accounts for 1 percent of the human joint dislocations. Sternoclavicular joint dislocation most commonly occurs in anterior or posterior dislocation. To the best of the authors knowledge, only six cases of superior sternoclavicular joint dislocation are reported in the literature. The injury is commonly missed.

CASE PRESENTATION: We present a 28-year-old athlete with upper chest pain and right shoulder range of motion limitation. On imaging, it was revealed that he had a superior sternoclavicular dislocation. He was managed with arm sling, analgesics and physiotherapy. After 3 months, he was asymptomatic and returned to his sport activity successfully.

CLINICAL DISCUSSION: We searched the published related studies and summarized the signs and symptoms of patients presented with sternoclavicular dislocation. Chest pain is one of the most common symptom while sternoclavicular tenderness and restriction of shoulder movement are among the most common signs of sternoclavicular dislocations. Conservative, close reduction, and open reduction and internal fixation with fiber wire have been applied for cases with superior sternoclavicular dislocation with acceptable results.

CONCLUSION: A high index of suspicion is needed in order not to miss sternoclavicular dislocation. In cases with no evidence of mediastinal structure compression it may be managed conservatively successfully. However, some degree of cosmetic deformity may remain at the sternoclavicular joint in those treated with conservative therapy.

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1. Introduction and importance

Sternoclavicular joint dislocation accounts for 1 percent of the human joint dislocations [1]. It can occur following motor vehicle accident, falling or sport injury. The injury may be missed due to its low incidence. Also, possible associated injuries may distract the physician from examining the sternoclavicular joint [2]. However, its early diagnosis is important as posteriorly dislocated sternoclavicular joint may compress the adjacent mediastinal structures (e.g. Aorta) in 25% of cases [1]. The sternoclavicular joint dislocation most commonly occurs in anterior or posterior dislocation (Table 1). To the best of the authors knowledge, only six cases of superior sternoclavicular joint dislocation are reported in the literature (Table 2) [3–6]. This paper reports a patient with superior sternoclavicular joint dislocation and it further delineates the features of this rare clinical entity, our management and its outcomes. This report is in line with SCARE 2020 guideline detailed in the literature [7].

oclavicular joint dislocation and it further delineates the features of this rare clinical entity, our management and its outcomes. This report is in line with SCARE 2020 guideline detailed in the literature [7].

2. Case presentation

A 28-year-old athlete visited our clinic with upper chest pain and Range of Motion (ROM) limitation of his right shoulder following a fall from a horse during an equestrian sport practice. He had no other illness. He did not take any medication or intervention for treating his chief complaint. His family and social history were insignificant. Upon examination, we noted an ecchymosis on the lateral and posterior side of his right shoulder. Also, there was evidence of swelling and erythema on the medial end of his right clavicle (Fig. 1). He had a right shoulder ROM limitation accompanied with sternoclavicular joint tenderness on palpation. Our differential diagnoses were rib fracture, shoulder subluxation/dislocation, clavicle/proximal humerus fracture, acromioclavicular and sternoclavicular dislocation. His right shoulder X ray views (AP, Y view) and his right Acromioclavicular Joint (ACJ) on

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Table 1
The reported signs and symptoms of the sternoclavicular dislocation mentioned in the literature.

	Anterior SCJ dx	Posterior SCJ dx	Superior SCJ dx
Signs	Pain on shoulder abduction [14]	Depression at SCJ [16–19]	Tenderness over the mid-shaft of the clavicle [4]
	Tenderness/swelling at the SCJ [15]	“Hematoma over the SCJ” [20] SCJ tenderness [18,20]	Decreased shoulder ROM [3,4] Tenderness and swelling over the SCJ [3–5] Crepitus during shoulder ROM [4]
symptoms	Pain over the SCJ [15]	ROM limitation of the ipsilateral shoulder [17,19] Shoulder pain radiating to the patient’s neck [16] Ipsilateral arm weakness [15] Pain/discomfort of the ipsilateral clavicle and shoulder [20,21]	Pain over the ipsilateral clavicle [4] Pain over the SCJ [3–5] Pain over the ipsilateral upper limb [5]
	Anterior chest pain [14]	“Retrosternal chest pain” [18] “Fullness and tickling” sensation in the chest exacerbated by lying on the ipsilateral side [15] Chocking [15] dyspnea Pain on swallowing [16] Dysphagia exacerbated by shoulder motion [22] Throat irritation [17]	Pain over the ipsilateral chest [3]

Abbreviations: Abbreviations: SCJ, sternoclavicular joint; dx, dislocation.

Table 2
The reported cases of superior sternoclavicular dislocation in the literature.

	Age of patient	Mechanism of injury	treatment	Follow up	outcome
Little et. al. [3]	18 Y/O	MVA	Conservatively	12 weeks	Asymptomatic, function restored at 3 months since injury
Maseda et. al. [4]	17 Y/O	American football	Conservatively	2 weeks	Asymptomatic, function restored at 2 weeks post-injury.
Menez et. al. [5]	46 Y/O	MVA	Conservatively	18 months	Full ROM after 6 weeks, satisfied and asymptomatic at the end of 18 months
Kirby et. al. [6]	60 Y/O	MVA	Conservatively	Not reported	Not reported
Kirby et. al. [6]	29 Y/O	Cycling	Close reduction	Not reported	ASES 100, SSV 100
Kirby et. al. [6]	21 Y/O	Skate board	ORIF with Fiber wire	Not reported	ASES 95, SSV 90

Abbreviations: Y/O, years old; MVA, motor vehicle accident; ORIF, open reduction and internal fixation; ASES, American shoulder and elbow society score; SSV; subjective shoulder value.

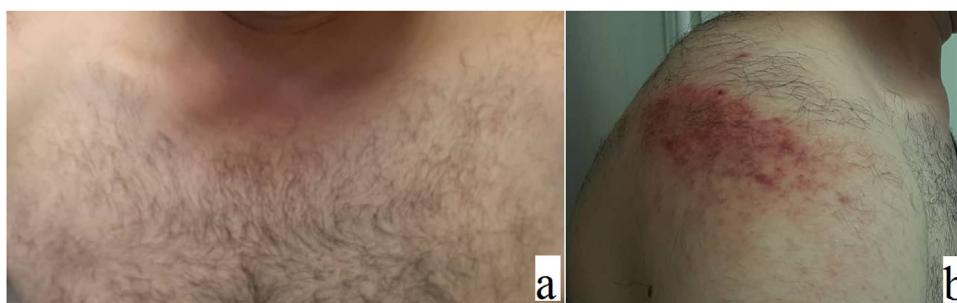


Fig. 1. On initial presentation, our patient had swelling and erythema at the affected sternoclavicular joint (a) and evidence of ecchymosis at the posterolateral side of the affected shoulder (b).

Zanca view were normal. On plain chest X ray, a superior dislocation of the sternoclavicular joint was suspected which was approved by obtaining serendipity view and Computed Tomography (CT) scans (Figs. 2, 3). Fracture (e.g. rib, humerus, etc.) was not detected. The patient’s priority was returning to his sport activity having no concern of aesthetic matters. In addition, there was no evidence of mediastinal compression on the imaging. Therefore, it was decided to manage him conservatively. The functional treatment of our patient was supervised by a trauma orthopedic surgeon performing of at least 50 trauma surgeries per month in the last 2 years. Our patient was treated with pain control and immobilization with arm sling for 2 weeks. In the next step, the passive shoulder ROM was started with pendular

exercises. Then he was treated with physiotherapy for increasing the shoulder active ROM. At 1-month post-injury, he started horse riding and after 3 months since his trauma, he returned to his professional equestrian sport practice. At the 12-month post-injury, a mild deformity remained at his sternoclavicular joint. However, the patient was satisfied. He had no motion limitation of his right shoulder (Fig. 4). He had no sternoclavicular tenderness on the examination. His Constant Murley Score measured to be 100 and he successfully had returned to his previous level of sport activity. Our patient had full compliance for following the recommendations given throughout his course of recovery.

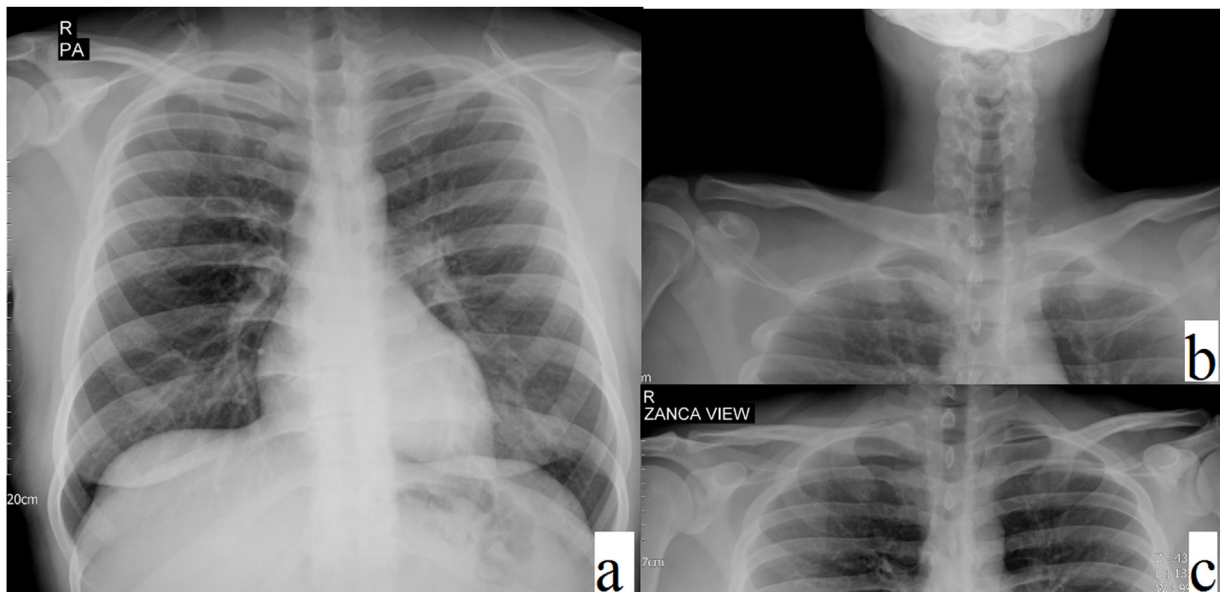


Fig. 2. Initial radiographies including chest X ray (a), Serendipity (b) and Zanca view (c) of our patient demonstrated a superior dislocation of the right sternoclavicular joint.

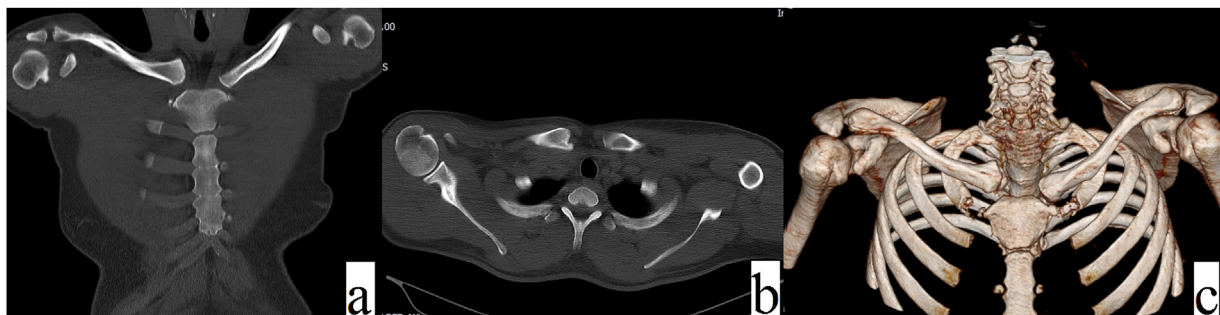


Fig. 3. Chest CT scan of our patient (coronal (a), axial (b) and 3 dimensional views (c)) demonstrates superior dislocation of the right sternoclavicular joint.

3. Clinical discussion

The sternoclavicular joint is the only synovial joint connecting shoulder girdle to the upper trunk [1]. The special shape of the medial clavicle (concave from front to back and convex from top to bottom) gives the sternoclavicular joint its saddle shape and provides the joint with ability to move in three planes (elevation/depression, protraction/retraction, rotation) [2] (Fig. 5). Despite having bony contact of less than 50%, this joint is stabilized by its delicate ligamentous and soft tissue structures including the joint capsule, the costoclavicular ligament, the interclavicular ligament and the intraarticular disc [8]. Bearn et al. found that in the standing posture the joint capsule has the main role in preventing from shoulder and clavicle depression by weight of the upper extremity [9]. The study of Spencer et al. demonstrated that the joint capsule stabilizes the joint against anterior/posterior subluxation [10]. Meanwhile, the costoclavicular ligament and intraarticular disc prevents the medial clavicle from upward and medial displacement respectively [2].

The early diagnosis of the sternoclavicular dislocation is important as any undiagnosed posterior displacement may compress and threaten the vital mediastinal structure (i.e. aorta, trachea, etc.). Also, a systematic review performed by Glass et al. demonstrated that treatment of acute sternoclavicular dislocation is associated with better functional outcome compared to the chronic sternoclavicular dislocation [11]. Whenever suspected by the clinical presentation, the sternoclavicular joint can be further evaluated by

Serendipity view, Heinig's lateral view and Hobbs' oblique view. Cephalad deviation of the tube by 40 degrees in the Serendipity view, moves away the lung shadows from the sternoclavicular joints and helps to better evaluate the possible pathologies at these sites [1]. Nowadays, CT scan has become the imaging method of choice for evaluating sternoclavicular joint [8].

Regarding the case presented, as he had a deformity in the sternoclavicular joint on physical examination, it might be possible to directly obtain right shoulder CT scan (as the modality of choice for evaluating SCJ dislocation) without taking Serendipity view or Zanca view. The CT scan not only evaluates the type of his sternoclavicular deformity, but also can rule out other differential diagnoses (e.g. ACJ/shoulder dislocation). This could eliminate the patient's radiation exposure and diagnostic cost further.

The dislocation mostly occurs toward anterior (9 times more common than the posterior dislocation) [8] and to the best of the authors knowledge, only 6 cases of superior dislocation have been described in the literature [3–6].

The surgical open reduction and augmentation/ reconstruction (with internal bracing or graft) is needed whenever the patient has any evidence of mediastinal element compression in the presentation or imaging and in cases with aesthetic concerns. Otherwise, the patient can be managed either conservatively or by open reduction and augmentation/reconstruction [12]. As superior sternoclavicular dislocation is not associated with mediastinal compression, both conservative and operative treatment have been used to manage the dislocation with acceptable results. Regarding our case, there



Fig. 4. The photos of our patient at the 12 months follow up demonstrates remaining sternoclavicular joint deformity (figure a) with restored right shoulder range of motion. Our patient was able to place his hands on his back (figure b, shoulder adduction and internal rotation), elevate the hands over his head (figure c, shoulder abduction and external rotation) and fully abduct his both shoulders (figure d, e).

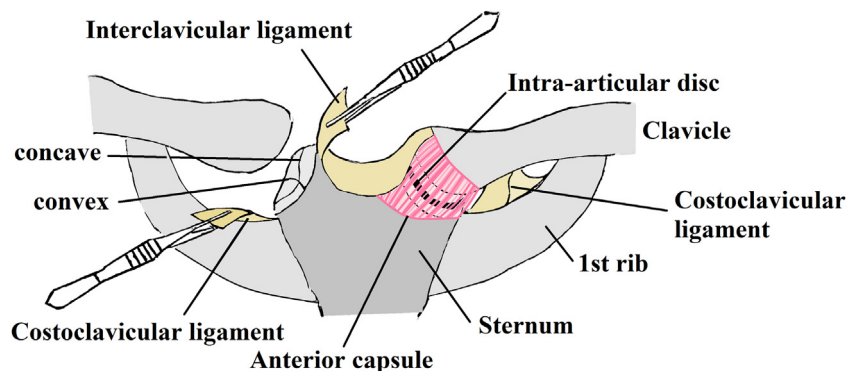


Fig. 5. The anatomy of the sternoclavicular joint. As seen on the left sternoclavicular joint, the joint is stabilized by the intra-articular disc, the joint capsule, interclavicular ligament and costoclavicular ligament. If the joint is exposed and dislocated (seen on the right side of the schematic figure), medial clavicle is noticed to be concave from anterior to posterior and convex from top to bottom.

was no evidence of mediastinal compression and he had no cosmetic concern. Meanwhile, his priority was to return to his sport activity as soon as possible. The advantages and disadvantages of management options (conservative versus operative treatment) was explained to him. The surgery provides the chance to correct the cosmetic deformity. On the other hand, it is accompanied with soft tissue dissection and increased soft tissue morbidity which

in turn, could further delay the rehabilitation and return to sport activity. Finally, we decided to manage him with conservative therapy. Interestingly, at 1-year post injury he was satisfied and had returned to his sport activity.

Different shoulder specific outcome measures have been recommended as an evaluating tool including American Shoulder and Elbow Surgeons score (ASES), Constant Murley Score (CMS),

Shoulder Pain and Disability Index (SPADI), Disabilities of Arm, Shoulder and Hand (DASH). A systematic review by Ashton et al. demonstrated that the CMS is the most common shoulder specific measurement tool used in the literature [13] and in contrast to other measure scales based on patient's rating, it is scored by physician's examination. As a result, we selected it as the outcome measure in our study.

Regarding CMS, our patient got the full score of 100 at 1-year post-injury. Kirby reported three cases of sternoclavicular dislocations retrospectively with different managements (close reduction, conservative therapy and open reduction and internal fixation with Fiber wire). He reported an ASES score of 100 in the case treated with close reduction and 90 in the patient managed operatively. However, the final outcome of the one treated conservatively is not reported. This emphasizes that operative option may not necessarily lead to a better outcome in superior sternoclavicular dislocation. Taking our case into account, we could try to reduce the SCJ dislocation closely before initiating the conservative therapy. This could provide the chance to correct the cosmetic deformity of our patient. However, it might necessitate a longer immobilization and later return to sport activity.

Little et al. managed their case having superior sternoclavicular joint dislocation with 3-weeks immobilization with sling and analgesic therapy followed by physiotherapy [3]. Similarly, Menez used analgesics and arm sling immobilization for 1 months [5]. Maseda et al. reported an athlete with this injury and suggested a more intensive treatment course. He used a 2-weeks period of therapy with arm sling, analgesics and cardiovascular exercise (e.g. jogging) while at the same time, trying to regain the passive shoulder ROM with pendular exercise [4]. In accordance with Maseda study, we limited the period of immobilization to 2 weeks in order to hasten the return to sport in our patient.

A few reports of superior sternoclavicular joint dislocation exist in the literature and both surgical and non-surgical treatment are used as the management options [3–6]. Based on the previous literature and our experience, we think that conservative treatment may be suitable for athletic individual willing to return to their sport activity as soon as possible, while the surgical reconstruction may be preferred for patients having cosmetic concerns.

This paper might be helpful to correctly diagnose and manage sternoclavicular dislocation. However, higher degree evidence may still be needed to portrait a better view regarding the best treatment of the superior sternoclavicular joint dislocation.

4. Conclusions

Sternoclavicular joint dislocation is an uncommonly encountered joint dislocation. In any patient with upper chest trauma complaining of shoulder motion limitation, this diagnosis should be considered. Based on the published literature and our experience, the functionality after superior sternoclavicular dislocation can be restored successfully with conservative and functional treatment.

Declaration of Competing Interest

The authors report no declarations of interest.

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Ethical approval

This case report was exempted from ethical approval from the institution.

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 contribution

S.H.K and N.B supervised the study, conceptualised and revised the manuscript. M.B participated in acquisition of data. F.V participated in drafting the manuscript, reviewed the literature and drew the schematic figures. All authors approved the manuscript to be published, and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Registration of research studies

Not applicable.

Guarantor

Seyed Hadi Kalantar is the guarantor of the study.

Provenance and peer review

Not commissioned, externally peer-reviewed.

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This report was approved by the ethical committee of our institution. Written informed consent was obtained from the patient, and patient anonymity was preserved.

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