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## Case Report

# Surgical treatment for sternoclavicular joint dislocations

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## ARTICLE INFO

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## ABSTRACT

**Introduction:** Sternoclavicular joint dislocations are infrequent among all joint injuries. Conservative management is often described and recommended as a means of closed reduction and immobilization of the affected limb. This study aims to review results of patients affected by this injury who were treated surgically using locking plates.

**Materials and methods:** A descriptive case series study was carried out. Cases of patients affected with sternoclavicular joint dislocation treated with open reduction and fixation with locking plates between 2009 and 2019 were included. The Constant score was applied to each patient to assess functional outcome.

**Results:** According to inclusion criteria, 15 patients were included, 12 males and 3 females. Post-operative assessment showed very positive results since the range of Constant scores was consistently over 90 in all cases.

**Discussion:** Fixation of sternoclavicular joint dislocations using locking plates had a low complication rate and provided good functional results.

Level of evidence

IV.

## Introduction

Sternoclavicular joint dislocations are infrequent among joint injuries. They are produced by direct trauma over this joint or by indirect lateral trauma on the shoulder ipsilateral to the dislocated joint [1–3]. Literature regarding assessment and treatment for this type of injuries is quite scarce and, in some cases, controversial. Prevalence of sternoclavicular joint dislocations remains unknown in Colombia. However, according to literature originated in Latin America, a prevalence of 2% of all joint dislocations is proposed. Despite their low prevalence in comparison with other joint dislocations, an early and accurate diagnose is crucial since they can be easily under diagnosed [4,5].

For many years, treatment of sternoclavicular joint dislocations has been a subject of controversy; however, scientific literature describes and recommends conservative management as means of closed reduction and immobilization of the affected limb [6]. Some cases where surgical treatment is recommended are described as well once closed reduction has failed. Multiple surgical techniques are listed and might be used according to surgeon's preference and level of expertise.

This case series study aims to review the treatment of patients with sternoclavicular joint dislocations submitted to open reduction and internal fixation with locking plates.

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## Materials and methods

A case series study was carried out, including patients with sternoclavicular joint dislocation from 2009 to 2019. The institutional ethics committee approved this study.

The inclusion criteria was diagnosis of sternoclavicular joint dislocation. Exclusion criteria comprised patient unwillingness to participate in the study, different treatments rather than the one presented in this research, and a lack of follow-up.

### *Surgical technique*

The same procedure was performed on each patient. Manubrium of sternum and clavicular diaphysis were used as anatomic references (Figs. 1–5). A 10-cm incision that ran longitudinally from the union of the middle third and distal to clavicle and that extends to the manubrium of sternum was made. Dissection was performed in layered fashion. Fascia was cut, and periosteum and the joint capsule was lifted. If the dislocation was posterior, reduction was performed using a dissector and lifting on the clavicle to an anterior position. Traction of the clavicle using a reduction clamp was also possible. If the dislocation is anterior, reduction was made by fixing the plate to sternum. Fixation was performed using a 3.5 mm or 2,7 mm LCP Plate (Depuy Synthes ®) and three screws placed in the clavicular diaphysis (at least one must be locked) and two screws in the manubrium of sternum (both of which must be locked). Fascia and muscle were closed in a single layer and, then subcutaneous cellular tissue and skin.

### *Postoperative management*

In the postoperative period, all the patients were immobilized with a sling, removal of stitches after 15 days, and started physical therapy, and after 1 month of the surgery the patient can return to all preoperative activities. Implants were removed after 12 months in all the patients.

### *Data collection*

Data collection included the following inclusion criteria: history of injury along with the suspicion of sternoclavicular joint dislocation and later confirmation by means of diagnostic imaging and data collection tools. Diagnostic imaging (x rays and computed tomography) and medical records were reviewed. A designed pro forma tool was used to capture the data relevant to this study.

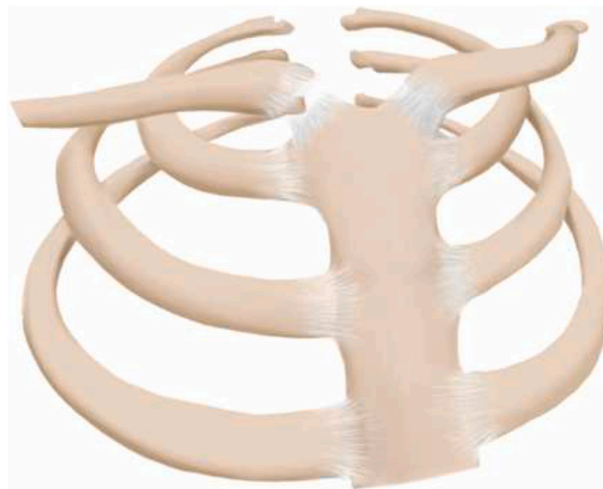
Constant score, which is widely used in other studies, was applied to assess functionality levels. Constant score was applied to each patient, this score was record in the last follow up appointment. Full shoulder range of motion was found; and no pain was present at the end of follow-up.



**Fig. 1.** Skin incision.



**Fig. 2.** Exposure of the joint.



**Fig. 3.** Sternoclavicular dislocation.

### *Statistical analysis*

A univariate analysis of all collected features from each patient was performed. Qualitative variables allowed statistical measures, such as percentage distributions. Measures of central tendency and measures of dispersion, such as standard deviation and range (minimum and maximum values), were applied to quantitative variables.

### **Results**

Fifteen patients were included in this case series. The mean age was 27 years old (17–46). 12 were males and 3 females, and in 11 patients, the right side was involved. The results showed that the mechanism of injury in sternoclavicular joint dislocations were, 46,6% of patients (7) was traffic accidents; 26,7% (4) of cases were work-related injuries, and the remaining 26,7% (4) were caused by another type of accident ([Table 1](#)).

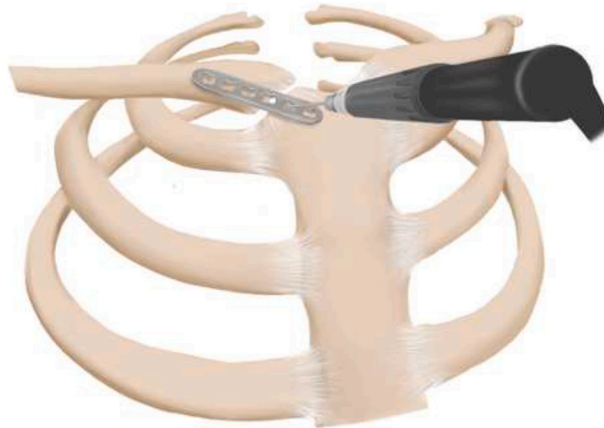


Fig. 4. Reduction and fixation.

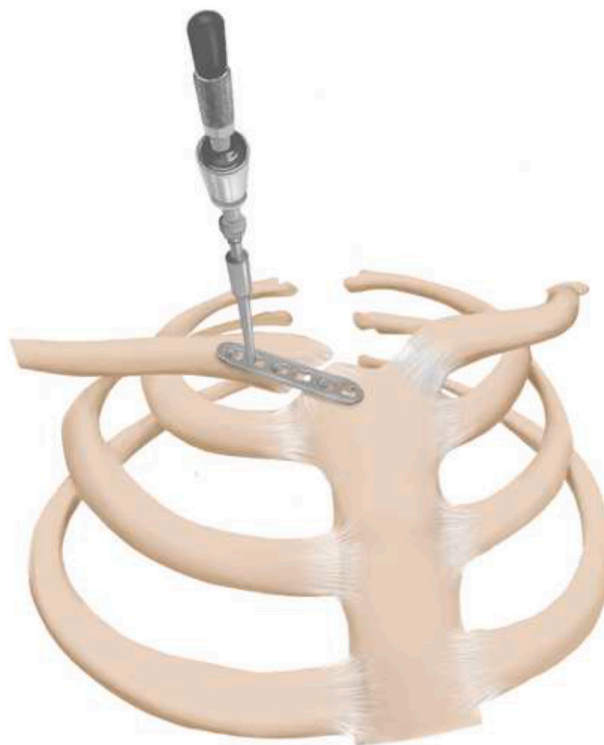


Fig. 5. Final plate position.

**Table 1**

Demographic data.

Age	32 years (17–46)
Female	3
Male	12
Side of the injury	
Right	11
Left	4
Mechanism of trauma	
Car accident	7
Work injury	4
Other type	4

### Complications

Only one patient had a postoperative complication this was a suture dehiscence with infection, that improved with wound care and antibiotics. None of the patients loosened the plate, or had hardware break.

### Constant score

The score showed excellent results, Constant scores result was 90 averages (84–98) (Table 2).

### Clinical cases

#### Patient

37-year-old male, right-handed, with history of traffic accident was remitted to the ER and was diagnosed with blunt chest trauma, three rib fractures and pneumothorax that needed tube thoracostomy. 15 days later, the patient presented dysphagia and dyspnea. A right posterior sternoclavicular joint dislocation was found (Case 1).

#### Patient

46-year-old male, right-handed, with history of a work-related injury (a fall from 3 m high) and a left anterior sternoclavicular joint dislocation, with failure of closed reduction (Case 2).

### Discussion

Sternoclavicular joint dislocations are infrequently encountered due to joint stability which is reliant on the ligamentous attachments [7,8]. Traffic accidents and high-energy sports are main mechanisms of injury, which can cause direct or indirect trauma [9].

Literature review described different options for treatment, and among them, closed reduction is widely chosen. In addition, different surgical techniques such as fixation with anchors and fixation plates osteosynthesis were mentioned [10–12]. Otherwise the fixation with pins is very risky due to the migration of these to other organs that can cause irreparable or even fatal injuries [23].

Since sternoclavicular joint dislocations are infrequent, only 15 patients that were treated with open reduction were included in this study, they had no complication, and only one patient presented complications. These results are comparable to other studies (Table 3) [27,28]. Treatment of sternoclavicular joint dislocations is a surgical challenge; therefore, it must be performed by surgeon with experience in this technique [13,22,24–26].

Although the treatment of choice in sternoclavicular dislocations has been non-surgical, but in our study shows a surgical approach with the use of a locking plate, can achieve a good functional result. Choose the treatment in these injuries requires having knowledge and experience on this matter, if a surgical treatment is decided, the approach is demanding due to the possibility of injury to the great vessels or structures that are in the mediastinum. In our cases, we have decided to fixation with locking plates (Depuy Synthes®), because we consider that these give us enough stability to keep the joint reduced while it stabilizes and heals the soft tissues that help support it, In anyone of the cases did the screws break, or did the plates loosen, and these were removed in an average of one post-operative year. We also consider that anterior locked plate fixation gives an advantage over other techniques in ease of fixation and the possibility of being reproducible by most trauma orthopedists.

Furthermore, fixation of dislocations using 3.5 mm and 2,7 mm LCP Plates (Depuy Synthes®) provides an adequate reduction regardless of the anterior or posterior position of the dislocation, which corresponds to findings reported in literature [14–20].

Since the Constant score is a known method of evaluating the results of medical intervention, Constant score was applied for follow-

**Table 2**  
Constant score.

Patient	Score
1	90
2	93
3	90
4	85
5	82
6	95
7	98
8	97
9	88
10	89
11	87
12	88
13	93
14	91
15	84
Average	90



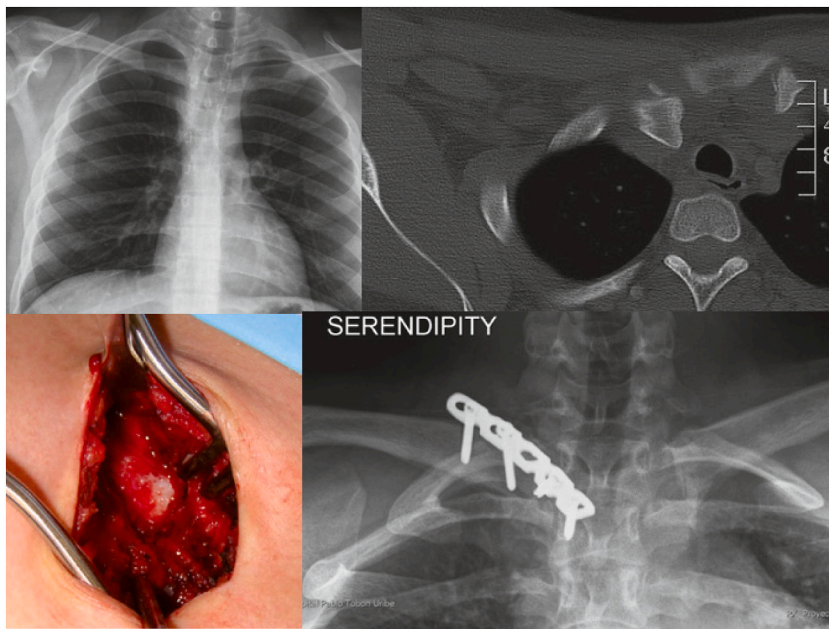
Case 1.

up and functional assessment after surgical interventions and recovery processes, and satisfactory results were obtained. However, due to the small number of patients involved in the study, it is hard to evaluate if its usefulness and its positive and negative predictive values are conclusive.

Execution of multicentric evaluations of this medical condition is recommended in order to conclude the treatment of preference for these injuries.

#### Protection of human beings and animals

The authors declare that in this study no experiments on human beings or animals were performed.



Case 2.

**Table 3**  
Shoulder functional score.

	ASES score	Constant	Complications
Wang et al	86		No reported
Guo-Ping Cal et al.		87	
Wei-Lou Feng et al.		93	1 hematoma, 1 plate migration
Naqira et al.		90	1 suture dehiscence

## Data confidentiality

The authors declare that they followed institutional protocols regarding patient data publication.

## Right to privacy and informed consent

The authors declare that this study does not expose any patient's personal information.

## Declaration of competing interest

The authors declare no conflicts of interest.

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