Anterior Dislocation of the Sternoclavicular Joint Treated with a Clavicular Hook Plate: A Preliminary Case Report

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ABSTRACT

Sternoclavicular joint dislocation is relatively uncommon. Although there are many surgical techniques to manage this problem, no technique is obviously better than the others. Herein, we report a case of anterior dislocation of the sternoclavicular joint after a traffic accident in a 40-year-old man. This dislocation was successfully treated by fixation of a DePuySynthes clavicular hook plate fixation. The patient’s pain clearly subsided after the operation. He was immobilized with a sling for four weeks. At four months, the results remained good. As we discuss this case, we present this new technique for treating sternoclavicular joint dislocation, using the traditional acromioclavicular hook plate. Compared to other surgical approaches, this technique had some advantages, including an easily accessible implantation and a relatively simple and safe technique.

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Key words: Acromioclavicular hook plate, Sternoclavicular joint dislocation

Introduction

Sternoclavicular (SC) joint dislocations are rare, constituting fewer than 5% of all dislocations of the scapular belt.[1-3] Although anterior dislocations are two to three times more common than posterior dislocations, they are less dangerous.

They are treated using various surgical techniques, including intramedullary suturing, fixation with a plate, medial resection of the clavicle, and reinforcement using different kinds of tendons.[4-6] The treatment results are controversial and there is a lacking of high-level evidence that can guide treatment.

A clavicular hook plate is traditionally used for treating acromioclavicular (AC) joint dislocation or distal clavicle fractures. To date, only a few studies of plate fixation for the treatment of SC joint dislocation have been reported.[7,8] Herein, we report a case of...
anterior dislocation of the SC joint in 40-year-old man after a traffic accident. This dislocation was successfully treated by using DePuySynthes clavicular hook plate fixation.

**Case Report**

A 40-year-old man was involved in a traffic accident in which a truck had struck the right side of his chest. A chest X-ray and CT scan showed anterior dislocation of the right SC joint and right 1st -10th rib fracture with hemopneumothorax (Fig. 1, Fig. 2). He was admitted to the surgical intensive care unit after chest tube insertion for emergency management and received open reduction internal fixation (ORIF) on the 7th day after the accident.

**Surgical Technique**

General anesthesia was induced with the patient in the supine position. A transverse incision of approximately 7cm was made at the level of the sternoclavicular joint. The anterior dislocated SC joint could be easily exposed after separating the platysma muscle. We checked the anterior/posterior SC and the costoclavicular (CC) ligaments. All had been torn. After the scar tissue and hematoma were removed, the proximal clavicle could be reduced easily with towel clips.

The intra-operative choice of the DePuySynthes hook plate size was an interesting issue. We were able to choose from different depths (12/15/18mm), different lengths, and right or left versions. We found a depth of 18mm to be more suitable than that of 15mm. We chose the right version of the hook plate so that the hook could be located under the clavicle, which would better prevent the proximal clavicle from popping out of the joint. The plate with the shortest length was chosen because there was involvement of all distal four cortices. However, because the proximal clavicle was much wider than the distal clavicle and so the plate only covered half of the bone. Thus, we added one more small titanium cannulated screw (TCS) over the upper proximal clavicle. All the torn ligaments had been repaired after the ORIF (Fig. 3).

**Postoperative Period**

The patient’s pain clearly subsided after the operation. The patient was immobilized postoperatively with a sling for four weeks. At four months follow up, surgical results remained good (Fig. 4).

**Discussion**

In this report, we discuss a case of a 40-year-old traffic accident victim with anterior dislocation of the SC joint, which we successfully treated using DePuySynthes clavicular hook plate fixation. The clavicle epiphysis is the last one to fuse in the human body, fusion not taking place usually until the early third decade of life in both men and women. Thus, SC joint injuries, particularly those in relatively young patients, should be kept in mind in cases of physeal (growth plate)fractures, which are also called pseudo-dislocations.

The SC joint is the only true articulation of the upper extremity with the axial skeleton. It is a well-supported joint that includes the anterior/posterior sternoclavicular ligaments, the CC ligament, the interavoid the risks of infection and to facilitate tissue integration, with the aim of obtaining a positive result clavicular ligament, and a joint capsule. The joint notably
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Figure 1. Right proximal sternoclavicular joint dislocation (arrow) on chest X-ray (AP view).

Figure 2A. Right sternoclavicular joint anterior dislocation (arrow) on chest CT image (axial view).

Figure 2B. Right sternoclavicular joint anterior dislocation (arrow) on chest CT image (coronal view).

Figure 3. Right sternoclavicular joint anterior dislocation after open reduction internal fixation with an acromioclavicular hook plate, on the post-operation chest X-ray.

Figure 4. Follow-up chest X-ray 4 months after surgery.
closely overlies the esophagus, trachea, and retrosternal neurovascular structures of the mediastinum.\textsuperscript{[9]} It is therefore critically important to recognize the neurovascular and thoracic structures and the potential for life-threatening complications, particularly after surgery for a posterior SC dislocation. All surgical interventions for a posterior SC joint injury should involve consultation with a cardiothoracic or vascular surgeon, and the patient should be informed of the potential for rare but life-threatening complications.

In adults, anterior dislocations are more common and most of them are treated nonoperatively. Closed reduction can also be attempted, but it is associated with a high recurrence rate, from 21% to 100%.\textsuperscript{[9]}

According to Savastano et al., closed reduction should not be performed during the acute phase because the stability of the SC joint is not necessary to ensure normal function of the involved limb.\textsuperscript{[10]} However, Bicos et al. have argued that anterior SC joint instability should primarily be treated conservatively.\textsuperscript{[11]}

The patients should be informed of the high risk of persistent instability with nonoperative treatment, and that this persistent instability is well tolerated and has little functional impact in the vast majority.\textsuperscript{[12]} Moreover, surgery can also usually rectify the cosmetic defect.

There are many other surgical techniques used to treat SC joint dislocations, but which of the procedures is the best remains controversial. Using autologous grafts or suture anchors for reconstruction of the SC joint has also been reported. The autologous grafts commonly used in reconstructions of the SC joint are the gracilis, semitendinosus, long palmar, and plantar tendons.\textsuperscript{[13-15]} Autologous grafts are used in order to over the long term. According to some authors, among the autologous grafts, the gracilis tendon and the long palmar tendon are the ideal grafts, since their diameter results in lower morbidity. However, these procedures require relatively complex operative manipulation, greater soft tissue dissection, and an extended time of postoperative immobilization.

To date, only a few studies of plate fixation for the treatment of SC joint dislocation have been reported. Franck et al. utilized the Balser plates for treating posterior SC joint dislocation.\textsuperscript{[7]} Shuler and Pappas used dual perpendicular locking plates to fix them\textsuperscript{[8]} The Balser plate requires a hook to be inserted into the sternum, which appears to pose a risk for vital structures. Dual locking plates can achieve rigid fixation for the SC joint, but the medical cost is very high.

Clavicular hook plates are known to be an effective implant option for the surgical treatment of AC dislocation or distal clavicle fractures and have been widely used all over the world. However, no prior study has discussed their use for SC joint fixation. Herein, we presented a new technique for treating SC joint dislocation for which we used the traditional acromioclavicular hook plate. Compared with other surgeries, fixation with the traditional hook plate had the following benefits: (1) it involved an easily accessible implant and (2) it was a relatively safer and simpler surgical technique to perform. Because there is no need to drill the sternal cortex and because the hook is smaller, the procedure is much safer. Compared with autologous graft reconstruction, this surgical technique was relatively simple. While there are no contraindication for this method, we also noted possible limitation. Although the clavicular hook plate would prevent SC joint anterior-posterior
dislocation, vertical stability was lacking. The problem had been solved with the insertion of one titanium cannulated screw.

In conclusion, the technique we introduce here offer a simple and safe viable alternative surgical treatment for SC joint dislocation. It provides good results. However, because use of the AC hook plate to treat SC joint dislocation is considered off-label, informed consent should be obtained from the patients before surgery.

**Conflicts of Interest Statement**

All authors declare that they have no conflicts of interest in this work.

**References**

肩峰鎖骨關節勾狀骨板治療胸鎖關節前脫位：
—初報案例

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摘 要

胸鎖骨關節脫位並不罕見，雖然有許多治療胸鎖骨關節脫位的手術方法，截至目前為止
並無最佳治療方式。我們提供一個全新的手術治療方式：應用肩鎖骨脫位鐘型骨板來治療
胸鎖骨關節脫位。相較於其他手術方式，本方法有：容易取得、手術難度較低、手術相對
安全等優點。

關鍵詞：胸鎖骨關節脫位、肩鎖骨鈦型骨板