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Combined displaced fracture of the lesser humeral tuberosity and the scapular spine: A case report

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ABSTRACT

Introduction Combined displaced fractures of the lesser humeral tuberosity and the scapular spine are highly uncommon and have not been previously reported in literature.
CASE PRESENTATION: The authors report a novel case of a 24 year-old male who sustained displaced fractures of the lesser humeral tuberosity and the scapular spine. Open reduction and internal fixation (ORIF) was performed with a LCP T-plate for the lesser tuberosity and with a LCP Distal Humerus Plate for the scapular spine. At one year, both fractures healed in anatomical alignment and the patient achieved good range of motion and a Constant score of 94 points.
DISCUSSION: While isolated fractures of the scapular spine and the lesser tuberosity can be treated conservatively, combination fractures as in the present case are highly unstable. While sufficient evidence is lacking to favor surgical treatment over conservative management, ORIF provided sufficient stability for early mobilization and led to good clinical results.
CONCLUSION: Based on the favorable outcome of our case, we provide useful recommendations for surgeons faced with similar injuries.

1. Introduction

Isolated humeral fractures of the lesser tuberosity (LTF) as well as fractures of the scapular spine (SSF) occur rarely and usually result from high-energy trauma [1,2]. SSF are often associated with concomitant neurovascular injuries [3,4], whereas LTF are most commonly accompanied by multi-fragment fractures of the proximal humerus or appear as a result of a posterior dislocation of the glenohumeral joint [5,6].

This report presents a rare case of combined, displaced LTF and SSF. We describe the mechanism of injury, the diagnostic work-up and the surgical treatment for this uncommon fracture type, and provide recommendations for surgeons faced with similar injuries.

2. Case report

A 24-year old male patient fell over the handlebars of his bicycle onto the left side of his body with his left arm extended and elevated. He immediately felt severe pain in his left shoulder. An anteroposterior (AP) radiograph (Fig. 1) and CT scans (Fig. 2) revealed left-sided displaced LTF and SSF, without any signs of posterior dislocation of the glenohumeral joint. The dislocation of the scapular spine was greater than 5 mm. For the lesser tuberosity, the dislocation was over 1.5 cm at the medial border. Additionally, plate osteosynthesis of a fractured left clavicle four years prior to this incident was revealed in the patient's history and on the radiograph.

Prior to presenting at our clinic, the patient was treated at another hospital using a conservative approach with a Gilchrist sling. Three days later, the patient presented to our clinic for a second opinion. As a consequence of our findings, which were based primarily on the position of fragments as clearly shown on the radiograph/CT images as well as the active lifestyle of the patient, we offered surgical treatment to which the patient gave his informed consent. Under general anaesthesia, the patient was placed in a beach chair position. Firstly, the LTF was exposed using a deltopectoral approach and mobilized with the subscapularis tendon being intact; this was possible because the fracture was not comminuted and was similar to a two-part proximal humerus fracture. Intraoperative findings confirmed the involvement of the bicipital groove. Therefore, a biceps tenotomy was performed. Because of sulcus intertubercularis involvement, a biceps tenodesis was also completed. No intra-articular involvement of the fracture was found upon inspection. Stay sutures were used for anatomical reduction of the fragment (Fig. 3a and b). The fragment was temporarily held in position with a 1.6 mm Kirschner wire

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Fig. 1. Preoperative anteroposterior radiograph showing fractures of the lesser tuberosity and scapular spine. Plate fixation of a clavicle fracture sustained four years prior to the current trauma was intact.

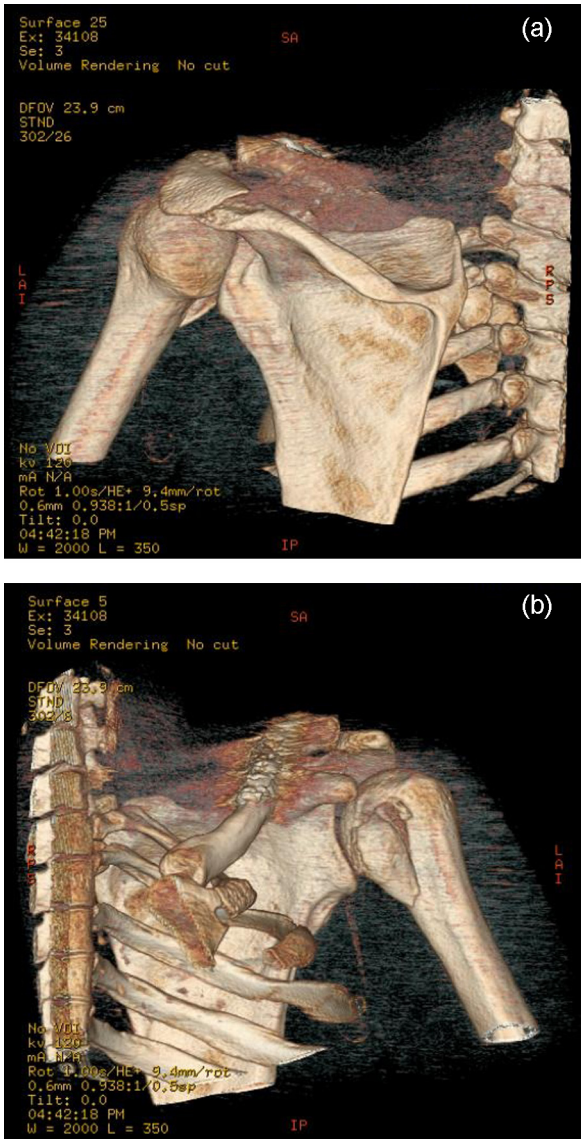

Fig. 2. Three-dimensional computer tomography scans of the (a) scapular spine and (b) lesser tuberosity fractures.

as well as tenaculum forceps. Definitive fixation was performed with a 3.5 mm 5-hole LCP T-plate (Synthes AG, Switzerland), which achieved anatomic reduction and stable fixation (Fig. 3c). After soft tissue tenodesis of the long head of the biceps, the wound was closed over a Redon drain.

For the scapular spine, a transverse incision with subperiostal preparation of the trapezius muscle was made to expose the fracture site. The SSF was reduced in its anatomical position with tenaculum forceps. Internal fixation was then performed with a 3.5 mm 5-hole LCP Distal Humerus Plate dorsolateral right (Synthes AG, Switzerland) (Fig. 3d). A lag screw over the plate was used to gain additional fracture compression. The wound was closed and the patient's arm was placed in a Gilchrist sling. Postoperative radiographs showed anatomically reduced LTF and SSF. Physiotherapy rehabilitation started the day after surgery with pendulum exercises. The patient was released from the hospital three days after surgery. Active assistive mobilization was performed during the first three months. Resistive exercises were then added. Abduction was limited to 90° and external rotation was limited to 25° for six weeks in order to avoid displacement forces on the fracture sites. Three months post-surgery, both fractures healed anatomically with the patient's range of motion already within normal limits, except for restricted internal rotation. The patient successfully returned to sports at that time. The 3-month postoperative Constant score [7] was 65 points out of 100 and improved to 94 points at one year. After one year, abduction strength for the left and right arm was 10 kg and 11.5 kg, respectively. Only internal rotation remained limited at one year (Fig. 4). Both fractures were healed with all implants intact (Fig. 5); the patient did not agree to the proposed implant removal to increase internal rotation as he was satisfied with the result.

3. Discussion

Fractures of the scapula are rare and make up less than 1% of all fractures [1]. Only about one in 20 scapular fractures involves the scapular spine [8], which are usually associated with concomitant injuries [3,4] such as rib or skull fractures, pneumothorax, and injuries to neurovascular structures. Alongside these associated injuries, the diagnosis of SSF can be easily missed and lead to poor results. Ada and Miller, [9] reported that 63% of patients with SSF still had pain and 45% showed decreased range of motion at the 15 months follow-up. Therefore, proper diagnosis and treatment of SSF is crucial. Plain radiographs should include a scapula Y view as well as AP and axillary views [10]. In addition to plain radiographs, CT scans provide detailed information about the fracture type and represent a useful diagnostic asset [11].

While SSF are handled conservatively in most cases, surgical treatment has been recommended for displaced fractures of more than 9–10 mm [1,9]. Jones and Sietsema, [12] reported that surgical treatment should be reserved for displacement of more than 20 mm, however we believe that a lower threshold for internal fixation may be appropriate considering reports of nonunion after