Isolated Fracture of the Lesser Tuberosity of the Humerus: A Case Report

HIROKI OHZONO, MASAFUMI GOTOH, YASUHIRO MITSUI, KATSUYA KANESAKI*, TAKAHIRO OKAWA, FUJIO HIGUCHI AND KENSEI NAGATA**

Department of Orthopaedic Surgery, Kurume University Medical Center, Kurume 839-0863
*Nagata Orthopaedic Hospital, Omuta 836-0862, **Department of Orthopaedic Surgery, Kurume University School of Medicine, Kurume 830-0011, Japan

Received 3 February 2012, accepted 21 March 2012

Summary: Fracture of the lesser tuberosity of the humerus often occurs concomitant with posterior shoulder dislocation or proximal humeral fracture, while isolated fractures are extremely rare. We report a case in which an isolated fracture of the lesser tuberosity of the humerus occurred due to a distinctive pathogenic mechanism. A 43-year-old male had his right shoulder forced into internal-rotation (i.e. back reach position) when he fell into a ditch approximately 70 cm wide and 1.5 m deep. Subcutaneous bleeding and tenderness were detected anteriorly in the shoulder, with restricted range of motion. Radiographs indicated a fracture of the lesser tuberosity of the humerus. Three-dimensional computed tomography (CT) confirmed an isolated fracture of the lesser tuberosity, which was displaced anteromedially by more than 5 mm from its previous anatomical position. During operation, the fractured fragment of the lesser tuberosity was reduced easily and fixed by a cancellous bone screw. At postoperative 2 years, the patient has recovered full range of motion with sufficient muscle strength, and has returned to work. The pathogenic mechanisms in this case were unique, differing from those that have been previously reported.

Key words lesser tuberosity of the humerus, isolated fracture, three-dimensional computed tomography

INTRODUCTION

Fracture of the lesser tuberosity of the humerus often occurs concurrently with fracture of the proximal humerus or dislocation of the posterior shoulder joint [1,2]. Isolated fractures of the lesser tuberosity of the humerus are extremely rare, occurring in only 0.46 persons per 100,000 [2].

Here we report a case involving isolated fracture of the lesser tuberosity of the humerus, with a distinctive pathogenic mechanism never previously reported.

CASE REPORT

A 43-year-old man injured his left shoulder due to forced internal rotation in the extended position (i.e. the back-reach position) when he fell into a ditch approximately 1.5 m deep and 70 cm wide. He visited our hospital after the accident.

The initial examination revealed subcutaneous hematoma and tenderness around the left shoulder anteriorly. The patient complained of pain on active internal rotation of the shoulder. Active abduction of the shoulder was restricted to 60°. The drop-arm sign was positive, but the lift-off test was invalid because of pain.

Radiographs did not confirm fracture in the anteroposterior view, but an isolated fracture of the lesser tuberosity was identified in the axial view (Fig. 1). A computed tomography (CT) scan substantiated the isolated fracture of the lesser tuberosity with the bone fragment dislocated: the bone fragment was inverted, being pulled internally and inferiorly (Fig. 2).

Using a deltopectoral approach, the fractured site...
was exposed. The bone fragment of the lesser tuberosity was pulled by the subscapularis internally and inferiorly, consistent with the preoperative 3D-CT findings. The fragment was easily repositioned and fixed using a cancellous bone screw with a washer (Fig. 3).

Presently, at two years after surgery, the patient does not experience muscle weakness or limited range of motion: the lift-off test is negative, and medial rotation strength of the left shoulder is similar to that of the uninjured right side. He has returned to his previous work doing heavy labor.

DISCUSSION

The pathogenic mechanics of an isolated fracture of the lesser tuberosity of the humerus can involve traction or direct external force from the subscapularis muscle tendon, or impact on the glenoid cavity [3]. Most cases that have been previously reported were caused by traction of the subscapularis muscle tendon when abduction and excessive external rotation of the shoulder joint occurred [2-5]. The fracture in this report was caused by forced extension and internal rotation of the shoulder joint (i.e. back-reach position) (Fig. 4). Thus, unlike the usual pathogenic mechanisms, the fracture in this case may have occurred when excessive traction caused by contraction of the subscapularis muscle acted on the lesser tuberosity of the humerus when the shoulder joint was locked in the back-reach position. Alternatively, it is conceivable that the lesser tuberosity impacted the glenoid cavity when the shoulder was locked in the back-reach position, which caused the fracture; however, this mechanism appears unlikely because there were no findings suggesting a glenoid fracture in this case.
Careful attention is needed when diagnosing isolated fractures of the lesser tuberosity of the humerus. Large displaced fractures can easily be seen on plain anteroposterior radiographs, but the axillary view is often necessary to detect smaller fragments with minimal displacement [4, 6]. van Laarhoven et al. [7] reported that CT image analysis was useful in evaluating the fracture area. In the present case, 3D-CT image analysis was extremely useful for evaluating the bone fragment, e.g. its shape, size and the degree of dislocation of the fragment.

The most appropriate surgical method for such fractures is open fixation surgery if the dislocation is greater than 5 mm or 45° of angulation [8]. Robinson et al. [2] strongly recommend open surgery because dislocation caused by the subscapularis muscle tendon may lead to aggravation, malunion, impingement of the coracoid process, or dislocation of the tendon of the long head of the biceps muscle. In the present case, open reduction and internal fixation were performed because the bone fragment showed a dislocation greater than 5 mm. This led to favorable results at 2 years follow-up after the surgery.

In this report, we presented a case involving the isolated fracture of the lesser tuberosity of the humerus, caused by a distinctive pathogenic mechanism. To the best of our knowledge, this is the first report describing an isolated fracture of the lesser tuberosity, occurring with the shoulder forced in the internally-rotated and extended position (i.e. the back-reach position).

REFERENCES