



Fracture of the Humeral Trochlea: A Rare Case

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Abstract

The isolated trochlea fracture is a rare condition that has been previously reported in different settings and times. However, there is still a lack of data regarding the diagnosis and treatment of this condition. Hence, we sought to clarify various aspects of isolated trochlea fracture. The case presented was a young man referred to our hospital following a high-energy motor-car accident. The diagnosis was made via anteroposterior and lateral X-ray and with 3-dimensional computed tomography. Following diagnosis, open reduction and internal fixation with medial approach were selected for the patient. Finally, the patient's follow-up revealed that the range of motion of the affected elbow reached its normal range six months after the operation.

Keywords: Elbow Joint; Humeral Fracture; Internal Fracture Fixation; Bone Screw; Trochlea.

Introduction

The isolated humeral trochlea fracture (also known as Laugier's fracture) is a condition that has been documented for the first time in 1853¹. Although a long time has passed since the first report, this type of fracture has been reported rarely. Our information regarding diagnosis, treatment, and outcome of mentioned fracture is limited to the few previous declarations. Hence, more reports are needed to reveal various aspects of this fracture. In the present study, a patient with an isolated trochlea fracture of the left humerus was reported who treated surgically. The purpose of this study is to discuss the clinical, radiological, and therapeutic features related to this fracture.

Presentation of case

History

A 25-year-old male was referred to our referral hospital due to a motor-car accident. The patient fell to the ground with his outstretched hand. Following the accident, the patient felt a sharp pain in his left elbow and could not flex or extend it. He did not mention any history of other trauma to

the elbows. Through physical examination, swelling, tenderness, and bruising in the medial part of the injured elbow were detected. Neurological and vascular injury was not shown in the affected extremity. Moreover, the passive motion range of the affected elbow was restricted with flexion of 60° and extension of 30°. Active and passive pronation and supination were not limited during the examination.

Diagnosis

Anteroposterior and lateral radiographs showed irregularity of the medial articular surface of the humerus at the elbow and a fracture fragment just anterior and proximal to the medial epicondyle of the left upper limb (Fig. 1). The diagnosis was established using 3-dimensional computed tomography (3-D CT) scan, and the fracture of humeral trochlea with intact capitulum was confirmed (Fig. 2).



Figure 1: Anteroposterior view (a) and lateral view (b) radiographs of 25-year-old patients with isolated humeral trochlea fracture.



Figure 2: 3-dimensional computed tomography (3-D CT) scan of 25-year-old patient with isolated humeral trochlea fracture.

Operative procedure

Following diagnosis, the open reduction and internal fixation using Herbert screw No.2 were planned to treat the patient. For this purpose, the patient was put in the supine position, and general anesthesia was administered for operative procedures. Then, the tourniquet was closed at the proximal part of the humerus, and the entire affected upper limb was draped and scrubbed. The trochlea fracture was approached with a longitudinal 10 cm incision in the medial side of the elbow. With the preservation of the ulnar nerve and biceps tendon, the operation field was dissected to see the cubital fossa. Then, the fracture was reduced using clamps; then, the reduction was fixed using three 1.5 sized pins. Two Herbert screws were embedded following the fixation under fluoroscopy

guidance (Fig. 3). Finally, the above-elbow plaster of Paris (POP) slab in 90° flexion was used for four weeks to immobilize the operated limb postoperatively.



Figure 3: Anteroposterior view (a) and lateral view (b) radiographs of 25-year-old patients with isolated humeral trochlea fracture after insertion of Herbert screws.

Follow-up and rehabilitation

After four weeks, the mentioned slab was removed, and the full range of physical therapy was recommended to the patient. Subsequently, three weeks after physical therapy, the patient was allowed to begin his normal function, as tolerated. The evaluation of the patient revealed that the range of affected elbow had reached 140° inflection and 5° in extension without pain and instability six months after the operation (Fig. 4).



Figure 4: Functional recovery of patient six months after operation; flexion (a) and extension (b).

Discussion

Isolated trochlear fracture is a rare condition that occurs in both high-energy traumas such as car accidents and low-energy traumas such as falls ^{2,3}. This condition was reported in 1853 by Laugier for the first time ¹. The isolated trochlear fracture is also known as Laugier's fracture. Overall, 22 reports (English version) are available regarding isolated trochlear fractures. There are 32 in adults and six cases in children ^{4,5}.

Isolated trochlear fracture is highly associated with elbow dislocations and capitulum fractures due to the soft tissue arrangement around the elbow (including ligament and muscle connections) ⁶. The absence of these connections protects the trochlea from any trauma. These fractures can occur due to bending or stretching of the elbow. Three different mechanisms were previously reported for this fracture, including axial load during flexion, the extension of the elbow, and direct trauma during flexion ⁷.

Moreover, some studies have suggested the critical role of Varus stress in trochlear fractures, which causes compressive forces to be transferred from the radio-humeral to the ulna-humeral compartment of the elbow ⁸. These fractures may not be detectable in radiographic evaluations. Thus, a CT scan to determine the size of the split piece and its displacement condition can be a definitive diagnosis ⁹. In the previous studies, the medial approach has also been used in the current study was done more commonly ^{1,5,10}; however, some studies considered anterior or posterior approaches for the treatment of isolated trochlear fractures ^{9,11}. As the anterior procedure is performed on the entire extended elbow, the surgeon might confront the limited area for reduction and instrumentation. On the other hand, it seems that the accessibility of fracture fragments is more difficult using a posterior approach. Moreover, the posterior approach could lead to avascular necrosis of the trochlea among children ⁸. However, the three mentioned approaches lead to favorable outcomes, and the utilized approach depends on the surgeon's decision. Screw type and fixation technique were different in previously conducted studies; however, Herbert screws were used more commonly in

comparison with other types of materials. In these studies, Herbert screws were inserted into the joint, under the cartilage, and perpendicular to the fracture line to fix the trochlear fragment to the posterior cortex with maximum compression. Then, the joint became immobile for one to two weeks and healed within six weeks after the surgery. Treatment outcomes for this type of fracture are favorable, but in one study in which the fracture was treated with K-wire, the patient developed osteoarthritis after three years.

Conclusion

The mechanism of trochlea fracture is complex; thus, an isolated trochlear fracture is very rare. Our study recommends these fractures to be treated with open reduction and internal fixation through medial approach, along with excision of small osteochondral fragments.

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Conflict of Interest Disclosures

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Authors' Contributions

All authors pass the four criteria for authorship contribution based on the international committee of medical journal editors (ICMJE) recommendations.

Ethical Statement

A consent form was signed by the patient and he was aware the treatment procedure.

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