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A Rare Case of Isolated Intra-articular Fracture of Humeral Trochlea: Surgical Management by Posterior Approach

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Abstract

Isolated fracture of the trochlea is rare and is only recorded approximately 15 times in literature and the surgical management by posterior approach is never described. The rare incidence may be attributed to its position deep inside the elbow joint without any tendinous or ligamentous attachment, thus protected from any injury. We report a rare case of fracture of the trochlea and its surgical management by posterior approach with Chevron's olecranon osteotomy and also describe the advantages and disadvantages of the approach. Functional outcome at two-year follow-up was satisfactory.

Keyword: Isolated humeral trochlea; Intra-articular fracture; Posterior approach.

Introduction

Isolated trochlear fracture of the humerus also called Laugier's fracture [1] is generally difficult to diagnose on x-ray and is prone to be missed on preliminary examination [2, 3]. As many as 15 cases are recorded in the literature to this day [4]. This case report highlights the rare occurrence of isolated trochlear fracture of the humerus and discusses a novel posterior approach for such a fracture with Chevron's olecranon osteotomy, including its advantages and drawbacks. This surgical procedure was unique for an isolated trochlear fracture [4] and provided good accessibility and easy reducibility of the humeral trochlea with satisfactory functional results.

Case report

A 20-year-old male presented to the casualty with pain and swelling over the anteromedial part of his left elbow, two hours after a fall over an outstretched hand in a road traffic accident. On examination, tenderness was elicited just medial to the biceps tendon in the cubital fossa. Diffuse swelling without any abrasions or lacerations was noted, range of motion was restricted with flexion of 70°, extension 30°, but pronation and supination were not restricted. There was no neurological deficit with a palpable radial pulse.

On X-ray, the antero-posterior view was not suggestive of any apparent fracture (Figure 1a). But on the lateral view, a semilunar shaped fragment was displaced anteriorly, suggestive of either a trochlear or a capitellar fracture (Figure 1a). A computed tomography (CT) scan confirmed an isolated coronal fracture of the trochlea with an intact capitellum (Figure 1b, c).

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Operative procedure steps: The patient was planned for open reduction and internal fixation with Herbert screw fixation. The patient was put in right lateral decubitus position with his arm on an elbow support. Tourniquet was placed over the proximal humerus and the entire upper limb was scrubbed, painted and draped. (1) Incision: an approximately 15 cm longitudinal skin incision was made on the posterior aspect of the elbow in the midline (Figure 2). (2) Soft-tissue dissection: Triceps was exposed and the ulnar nerve was isolated and freed from cubital tunnel medially. Intraarticular Chevron's olecranon osteotomy was performed 3-4 cm distal to the tip of the olecranon by multiple drill holes and osteotome. Olecranon with the insertion of triceps was flipped proximally to expose the posterior surface of the trochlea. The Posterior band of the medial collateral ligament was incised 0.5 cm from its attachment to widen the surgical field because the intact posterior wall blocked the visualization of the anterior fracture fragment (Figure 2). (3) Reduction: The fracture was reduced using clamps and Hohmann retractor and two titanium Herbert screws were used to fix the fracture (Figure 3). The medial collateral ligament was anchored to its place using absorbable sutures (Figure 3e). Olecranon osteotomy was repaired by tension band wiring. Postoperatively, the elbow was immobilised with an above elbow plaster of Paris (POP) slab with the elbow in 90° flexion for 4 weeks.

After removal of the POP slab, the patient was allowed to begin active physiotherapy with free range of motion and muscle strengthening. After 3 weeks, the patient was allowed to increase weight lifting progressively within the limits of comfort. At six months follow up the patient was able to flex 130°, extend 10°, pronate 70° and supinate 85°. At two years follow up, the functional outcome was satisfactory with a Mayo Elbow Performance Score of 95. And radiological union with adequate congruity of the joint surface was seen (Figure 4a, b). The range of motion (ROM) of the elbow joint was 5° of extension, 140° of flexion, 70° of pronation and 85° of supination (Figure 4c, d). Valgus stress showed slight laxity without much deficit in the overall joint stability.

Discussion

Isolated fracture of the trochlea is rare because it is positioned deep within the elbow joint and has no tendinous or ligamentous attachment [5, 6]. Further, the forces traversing the elbow joint passes through the radio-humeral joint and hence the ulno-humeral joint, of which the trochlea is a component, sustains light compressive and shearing force [7]. Therefore, capitellum fracture is more common than trochlear fracture.

A review of the literature shows that the medial approach was used more frequently than the anterior approach [4]. In our case, the posterior approach with dissection of the posterior band of the medial collateral ligament was used following Chevron's olecranon osteotomy of the olecranon.

The advantage is that the exposure of the fracture site is better since the trochlea is deeply seated in the elbow joint and simple Chevron's olecranon osteotomy provides ample space for instrumentation and can also be easily repaired [8]. On the other hand, the medial approach provides limited and narrow exposure with the trochlear fossa obstructing from behind, which makes it difficult to hold the fracture fragments with a reduction clamp. Reduction of the coronal fracture by mobilizing the free fracture fragment upwards when in a lateral position on elbow support, using a bone lever against the distal end of humerus is easy. The Herbert screw fixation is from posterior to anterior, therefore, securing the fragment towards the posterior wall with maximum compression.

Further, damage to the ulnar nerve can be prevented by the isolation of the ulnar nerve easily by the posterior approach [9]. The anterior cortex of the trochlea, which is mostly involved in movements is left intact without any drill holes or screws, thereby resulting in a full range of motion without any resistance.

The limitation of the procedure includes the need for an additional Chevron's olecranon osteotomy of the elbow and the incision of the posterior band of the medial collateral ligament which seems to further damage the normal anatomy, but on follow-up, at two years it showed satisfactory functional outcome with a Mayo Elbow Performance Score of 95. Hence, surgical management of isolated humeral trochlear fracture by posterior approach gives satisfactory functional outcome.

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