

Management of Adult Lateral Condyle Fracture: Unveiling a Complex Elbow Injury: A Case Report

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Learning Point of the Article:

Lateral condyle fracture of humerus in adults should not be treated as a trivial case. This injury can be a tip of the iceberg as seen in complex fracture dislocation of the elbow.

Abstract

Introduction: Lateral condyle fracture with elbow instability is a rare injury. To our knowledge, this is the second case report describing the mechanism of injury and its management.

Case Report: We report the case of 42-year-old gentleman sustained injury to elbow following slip and fall. He presented to us after 2 weeks of injury diagnosed to have lateral condyle fracture of humerus managed conservatively with elbow instability which was missed initially. On further evaluation, he was found to have type 1 coronoid avulsion injury. Intraoperatively, we found that the capsular avulsion injury from coronoid was the primary reason for instability. We have tried to describe the possible mechanism of injury and management in this case report.

Conclusion: Lateral condyle fracture in adults is a rare injury which can disguise the more complex trauma associated with fracture dislocation of elbow. Proper preoperative evaluation with intraoperative assessment of elbow instability is crucial for obtaining good outcome.

Keywords: Lateral condyle fracture, complex elbow dislocation, elbow instability, terrible triad.

Introduction

Elbow dislocation is the second most common major joint dislocation encountered in the casualty [1]. Complex elbow dislocation is associated with bony injury along with capsuloligamentous structures. Lateral ulnar collateral ligament (LUCL) complex is commonly injured ligamentous structure along with radial head and coronoid and proximal ulna fracture depending on the mechanism of injury [2]. Fracture of the lateral condyle of the humerus with elbow dislocation is commonly seen in children but is rare injury in adults [3]. Complex elbow dislocation involving the lateral condyle and coronoid tip avulsion fracture is uncommon injury pattern not frequently encountered with few case studies describing this injury. We describe a case report of this rare injury pattern, possible

explanation of mechanism of injury and its surgical management.

Case Report

We report a case of 42-year-old gentleman with a history of slip and fall who sustained injury to left elbow. He was diagnosed to have lateral condyle fracture and was treated elsewhere with above elbow pop slab. After 2 weeks, slab was removed, and the elbow was mobilized. There was posterior subluxation of the elbow when extended beyond 70 degrees of flexion. He presented to us after 2 weeks of injury with lateral condyle fracture with elbow instability. There was no contusion/ecchymosis over the medial aspect of the elbow. Neurovascular examination was normal. Computed tomography

Author's Photo Gallery



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Access this article online

Website:
www.jocr.co.in

DOI:
<https://doi.org/10.13107/jocr.2025.v15.i03.5332>

Submitted: 30/12/2024; Review: 29/01/2025; Accepted: February 2025; Published: March 2025

DOI: <https://doi.org/10.13107/jocr.2025.v15.i03.5332>

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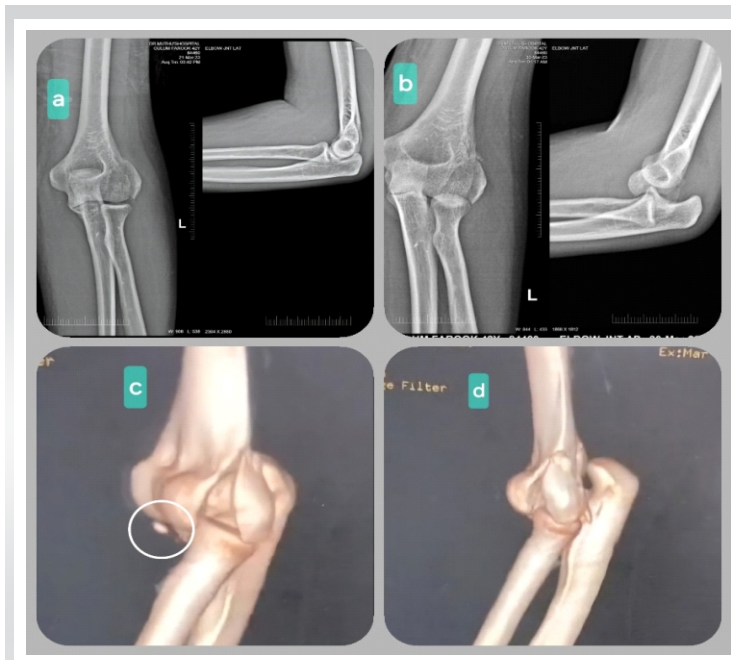


Figure 1: Pre-operative images. (a) no subluxation. (b) posterior subluxation. (c) type 1 coronoid avulsion. (d) lateral condyle fracture involving posterior part of capitellum.

(CT) scan with 3D reconstruction of the elbow was done which revealed minute bone fragments in front of the distal humerus anterior to coronoid which indicated type 1 (O'Driscoll) avulsion fracture of the coronoid. Lateral condyle fracture was seen involving the posterior half of the condyle (Fig. 1). No other bony injuries were seen.

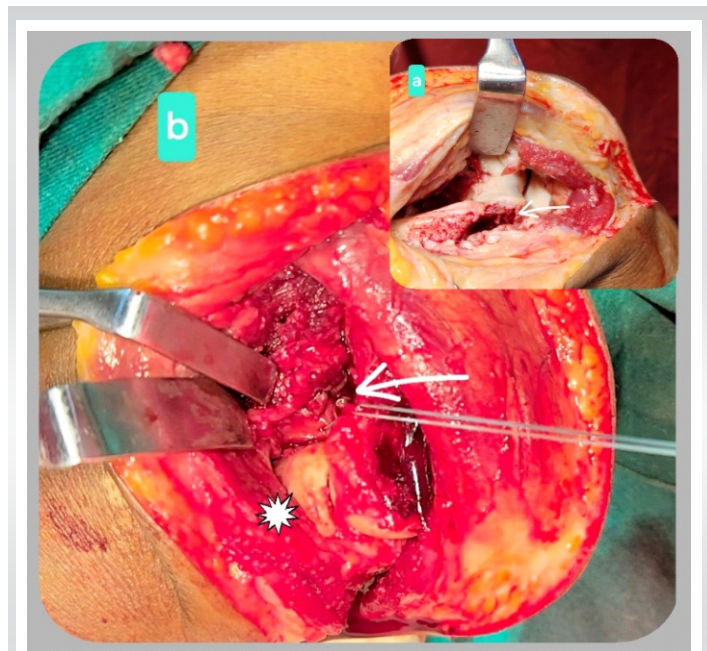


Figure 2: Intraoperative images. (a) posterior approach white arrow showing lateral condyle fracture. (b) star indicates lateral condyle retracted laterally; radial head medial to it. White arrow showing fiber wire stitch taken in the anterior capsule.

Planning

In the absence of radial head/neck fracture with intact trochlea and sigmoid notch, we presumed that the elbow instability was due to the LUCL insufficiency caused by the lateral condyle fracture. The coronoid avulsion injury is inconsequential to the elbow stability. We planned for open reduction and internal fixation of the lateral condyle fracture. The lateral condyle fracture was extending in a coronal plane; hence, we decided to expose the lateral condyle through lateral paratricipital approach and fixation with posterolateral distal humerus plate.

Technique

Under regional block lateral position, midline skin incision is given. Lateral paratricipital approach posterior aspect of lateral condyle exposed. Lateral condyle fracture site exposed and debrided. LUCL was found to be attached with the lateral condyle. Lateral condyle fragment was anatomically reduced and provisionally held with multiple k wires. Elbow range of motion and stability was checked to our surprise still posterior subluxation was present when elbow was extended beyond 70° to further extension. As all other structures were intact, we went ahead with the anterior capsule repair (Fig. 2). The lateral condyle fracture site was used to expose the anterior capsule. Number 2 fiber wire was used to anchor the anterior capsule which was passed through the coronoid exiting dorsally. The anterior capsule fixed through suture lasso pull out technique through two drill hole tunnels and tied over the dorsal surface of ulna. The lateral condyle was fixed with k wires, stability was checked, and the elbow was found to be stable through the range of motion. Lateral condyle was fixed with 4 mm cancellous screw and posterolateral distal humerus plate (Fig. 3).

Postoperatively, above elbow splint was given. After 5 days, elbow range of motion was started with hinged brace allowing full flexion and gradually increasing the extension over 4 weeks. At 5 weeks, full range of motion was achieved, and brace was discarded. At 1-year follow-up, patient had full range of motion (Fig. 4).

Discussion

Mechanism of simple and complex fracture dislocation is determined by the direction of force, rate of application, and quality of bone. Simple dislocation of which posterolateral dislocation is the most common is supported by the valgus hyperextension theory. In which medial collateral ligament (MCL) fails first followed by LUCL. If the deforming force progresses, injury to the common flexor origin is followed by

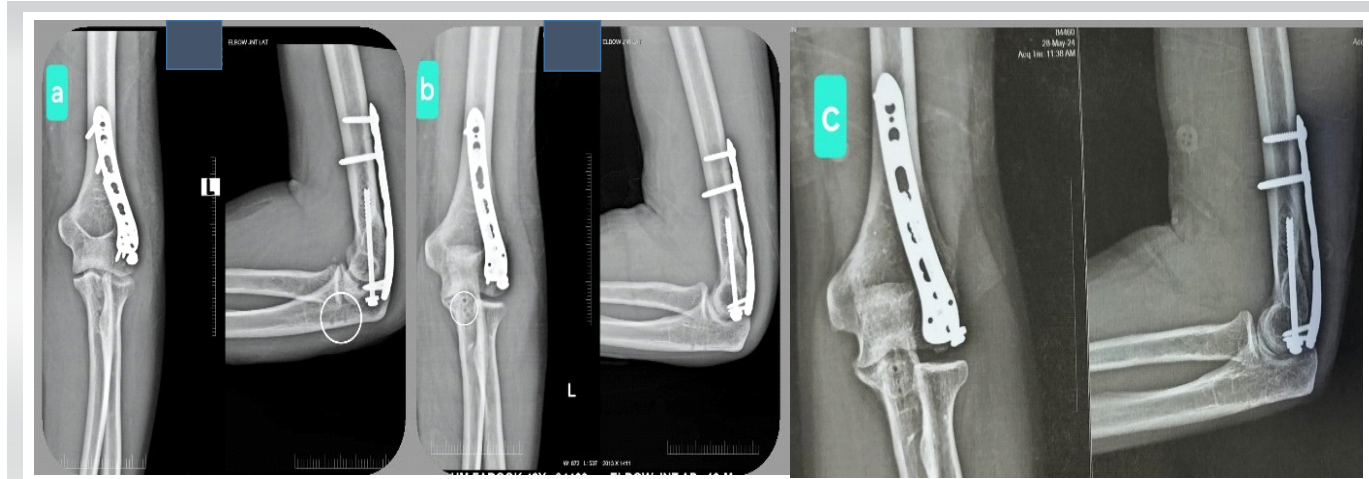


Figure 3: Post-operative X-rays. (a) immediate post-operative X-ray. (b) 4-week post-operative X-ray. (c) 1-year post-operative X-rays. White circle in (a and b) image shows drill holes for lasso stitch for the anterior capsule.

the disruption of common extensor origin [4]. Simple posteromedial dislocation accounts for 10% of all elbow dislocation follows a valgus external rotation mechanism. O'Driscoll [5] described it as a sequential injury of the soft tissues from lateral to medial as “Horii circle.” This can also result in fracture dislocation.

Complex fracture dislocation with osseous injuries is associated with characteristic soft tissue injuries which contributes to instability. Based on the mechanism of injury, they are broadly classified into three types.

- Type 1: Posterolateral rotatory injury (PLRI) caused by valgus external rotation mechanism. Structures injured are LUCL, radial head, and anterolateral facet of coronoid also called terrible triad injury.

- Type 2: Posteromedial rotatory injury (PMRI) caused by varus internal rotation mechanism. Structures injured are LUCL, anteromedial facet of the coronoid and posterior band of MCL.

- Type 3: Monteggia type or trans-olecranon type fracture dislocation due to axial loading mechanism [6].

Fracture dislocation of the humeral condyle is a very rare injury in adults (1). Very few studies have mentioned this combination of injury. Aksu et al. mentioned eight cases of elbow dislocation with coronoid fracture of which one patient has lateral epicondyle fracture [7]. Lee et al. in his radiological study of CT and magnetic resonance imaging (MRI) scans of posterolateral elbow dislocation, in 54 complex elbow dislocation cases, eight patients had lateral epicondyle fractures; however, the study does not mention the combination of lateral epicondyle and coronoid fracture [8]. Fallah et al. (2022) described a case report of adult male patient with rare combination of this injury where lateral condyle was fixed with screws following which there was persistent instability of the elbow like our case. They went ahead with the extensor digitorum communis split approach to fix the anterior capsule to the coronoid restoring stability to the elbow resulting in an excellent outcome [9]. The mechanism of injury postulated in this paper is a combination of PLRI with some elements of PMRI.

Due to the paucity of literature describing this type of complex fracture dislocation, the exact mechanism of injury and treatment protocol is not available. Al-Ani et al. in 2021 in their review paper described the three column concept of elbow joint stability and the Wrightington elbow fracture dislocation



Figure 4: Range of motion at 1-year follow-up.

classification [10]. In their study terrible triad injury of elbow, which is type C of Wrightington classification, MRI studies revealed posterior capitellum contusion secondary to impaction of radial head or avulsion of the LUCL. Like this in our case, the fracture of the lateral condyle involves the posterior half of capitellum.

As per these findings, we conclude that the mechanism of injury is similar to that of terrible triad injury, PLRI where the lateral column, i.e., the radial head which is the primary valgus restraint impacts the posterior part of capitellum and along with the LUCL avulsion force, lateral condyle is fractured involving the posterior half of capitellum with coronoid tip avulsion injury.

Fixation of the coronoid tip avulsion in terrible triad injury is still debated. Many authors have shown no significant difference in clinical outcome in fixation and non-fixation group in terrible triad injuries of elbow when LUCL and lateral column are fixed [11-13]. Contrary to this in our case with the radial head intact and provisionally fixing the lateral condyle, the elbow was still unstable. After fixing the anterior capsule to the coronoid, the elbow was completely stable.

This being a single case report large series study is needed to confirm these findings in this pattern of complex elbow fracture dislocation.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

Conclusion

Lateral condyle fracture of the distal humerus is a rare injury in adults. This fracture may be associated with elbow instability which can be missed in the initial X-rays. Since the radial head and the medial column of the elbow are intact, injury to the anterior capsular structure can be overlooked. Lateral condyle fracture should be considered as LUCL avulsion injury and should be evaluated to rule out instability and injury to the coronoid and anterior capsule. These injuries should be treated similarly to terrible triad injury of the elbow.

Clinical Message

Lateral condyle fracture with elbow instability is a rare injury where the mechanism of injury and treatment protocol are not well defined. Based on our understanding and review of literature, this injury is caused by PLRI similar to the mechanism seen in terrible triad. In the presence of elbow instability, the lateral condyle fracture site should be used to address the anterior coronoid tip avulsion which is much easier as compared to a lateral approach with intact radial head, followed by fixation of the lateral condyle. Early protected active range of motion should be initiated for excellent outcome.

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Conflict of Interest: Nil

Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

How to Cite this Article

Shetty GR, Sabari M, Dhakshinamurthi Y, Meignanaguru M, Srinivasan D. Management of Adult Lateral Condyle Fracture: Unveiling a Complex Elbow Injury: A Case Report. *Journal of Orthopaedic Case Reports* 2025 March;15(3): 53-57.

