

Case Report

Navigating Isolated Post-Traumatic Radial Head Dislocation in Adolescents: A Case Report from Bangladesh Emphasizing Management Strategies

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Abstract

Background: Isolated anterior dislocation of the radial head is a rare orthopedic injury, often presenting with distinct clinical features and requiring specialized management. We report the case of an 18-year-old female who presented to our hospital 5 months post-injury, complaining of restricted left elbow joint movement and pain following a fall from a low chair at home. Clinical examination revealed tenderness and anterior dislocation of the radial head, confirmed by radiographs showing isolated anterior dislocation without associated fractures. Closed reduction attempts failed, leading to an open reduction of radial head in combination with correction of malalignment with ulnar osteotomy and reconstruction of annular ligament and radio-ulnar Kirschner wire placement for stabilization. An upper arm cast was applied with the forearm in neutral rotation for six weeks. At the 12-month follow-up, the patient exhibited a satisfactory range of motion within reference values, comprising 0-140 degrees of flexion-extension arc, 70 degrees of pronation, and 85 degrees of supination. This range aligned with standards set by the American Society for Surgery of the Hand. The patient reported no impediments in daily activities and returned to her pre-injury level of sports activity based on the Tegner scale. This case underscores the complexity of managing isolated anterior radial head dislocation, highlighting the significance of prompt diagnosis, appropriate reduction techniques, and meticulous postoperative care to achieve optimal functional outcomes.

Keywords: Isolated, Radial Head, Dislocation, Orthopedic, Bangladesh.

Introduction: Isolated post-traumatic radial head dislocation remains an infrequent yet intriguing orthopedic phenomenon predominantly observed in the pediatric population following traumatic incidents involving the elbow joint¹. Despite its rarity, understanding and accurate diagnosis of this condition are crucial due to the potential long-term functional implications if left untreated².

Radial head dislocation without associated fractures or ligamentous injuries represents a unique challenge in orthopedic practice³. The literature predominantly focuses on cases involving concomitant fractures or ligamentous disruptions, making the isolated nature of radial head dislocation a subject of limited documentation and clinical discussion⁴. Moreover, the complexities in diagnosing and managing this injury stem from its subtle clinical presentation, often

mistaken for simple elbow sprains or overlooked amidst multi-trauma scenarios⁵.

In adolescent patients, such as the case presented herein, the unique growth patterns and skeletal immaturity may add complexity to the management protocol, warranting a tailored approach for optimal functional outcomes and preventing long-term complications⁶. Additionally, the specific mechanisms and factors contributing to isolated radial head dislocations in this age group remain an area of ongoing investigation, highlighting the need for comprehensive reporting and analysis of such cases⁷.

This case report aims to delineate the clinical presentation, diagnostic challenges, treatment modalities, and successful outcomes in managing isolated post-traumatic radial head dislocation in an

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18-year-old female, providing valuable insights into the nuances of this rare orthopedic injury in adolescents. We report an unusual case of isolated anterior dislocation of the radial head with atypical presentation in an adult, with maintained supination-pronation movements but restricted flexion-extension at the elbow joint, in which open reduction had to be performed, since closed reduction failed due to the presence of intra-capsular button-holing of the radial head.

Case Presentation:

An 18-year-old female was brought to our hospital 5 months after sustaining an injury, reporting pain and limited movement in her left elbow joint. The incident occurred when she fell from a low chair at home, landing on her outstretched hand. Though her grandmother had placed her hand in a sling, she had not received any other medical attention.

Upon examination, tenderness over the radial head was noted, suggesting an anterior dislocation. The patient experienced elbow pain and was unable to perform active movements, holding the elbow in a flexed and partially pronated position. Tenderness was observed on the front side of the left elbow where the radial head was palpable. No swelling or tenderness was found on the ulna, forearm, or the distal radio-ulnar joint. While the patient displayed restricted flexion-extension movement (30 to 100 degrees), there were no limitations in forearm supination and pronation. The neurovascular status of the left upper limb appeared normal. X-rays confirmed isolated anterior dislocation of the radial head without any fractures (Fig:1).



Figure 1 Fig:1 X-Ray of the left elbow, performed in the emergency department, showing an anterior

isolated radial head dislocation and bowing of ulna, no evidence of fractures or other concomitant injuries. Attempts at closed reduction in the Emergency Room utilizing supination and pronation methods were unsuccessful.

The patient was provided with an arm pouch sling, ice pack, and analgesics, with instructions for an open reduction. Subsequently, leading to an open reduction of radial head in combination with correction of malignment with ulnar osteotomy and reconstruction of annular ligament and radio-ulnar Kirschner wire placement for stabilization by posterior approach. A 7-hole 3.5 mm low contact dynamic compression plate was used to stabilize the ulna after performing correcting osteotomy on dorsal aspect of ulna (Fig:2). Intra-capsular button-holing of the radial head was found intra-operatively, and was released. The radial head was reduced with 90 degrees of flexion at the elbow joint and forearm in complete supination. However, the reduction was unstable due to rupture of the annular ligament. Hence, a repair of the annular ligament was performed. A radio-ulnar Kirschner wire was passed to maintain the reduction of the proximal radio-ulnar joint (Fig:3).

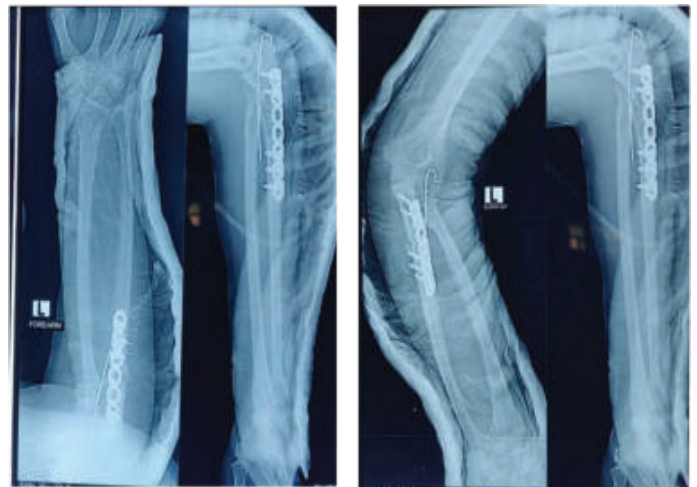


Figure 2 post operative xray showing a 7-hole 3.5 mm low contact dynamic compression plate was used to stabilize the ulna after performing correcting osteotomy on dorsal aspect of ulna. A radio-ulnar Kirschner wire was passed to maintain the reduction of the proximal radio-ulnar joint



Figure 3 peroperatively showing a 7-hole 3.5 mm low contact dynamic compression plate was used to stabilize the ulna after performing correcting osteotomy on dorsal aspect of ulna. A radio-ular Kirschner wire was passed to maintain the reduction of the proximal radio-ular joint. Annular ligamentoplasty by anconeus muscle.

thus, keeping the annular ligament stress-free, facilitating its healing. A Plaster-of-Paris (POP) back-slab was placed. The postoperative distal neurovascular status was normal. The wire was removed after 3 weeks and elbow mobilization started. The patient under went a supervised physiotherapy program. At 12 months of follow-up, the range of motion of the patient was: 0-140 degrees of flexion-extension arc, 70 degrees of pronation, and 85 degrees of supination (Fig4),

which is consistent with the reference values of the American Society for Surgery of the Hand. The patient had no limitations regarding the performance of daily activities, and returned to the pre-injury Tegner level of sports activity.



Figure 4 At 4 months of follow-up, the range of motion of the patient was: 0-140 degrees of flexion-extension arc, 70 degrees of pronation, and 85 degrees of supination

After 4 months a follow up xray was done to see the radial head placement (Fig 5).



Figure 5 After 4 months a follow up xray was done to see the radial head placement

Discussion:

Reported instances of isolated anterior dislocation of the radial head are infrequent in global literature, often characterized by maintained flexion-extension but restricted supination-pronation movements at the elbow joint in affected patients⁸. However, in the current case, an unconventional presentation was observed, marked by restricted elbow flexion-extension but retained supination-pronation movements of the forearm.

The etiology of isolated radial head dislocation has been theorized to involve various mechanisms, such as hyperpronating forces acting on a pronated forearm during a backward fall with an extended elbow, or a forward fall on an extended elbow with the forearm in pronation leading to further hyperpronation⁹. In this specific case, the likely mechanism of injury aligns with the former scenario. Additionally, Takami et al.¹⁰ delineated a direct injury mechanism involving direct trauma to a partially flexed elbow resulting in anterior radial head dislocation.

Bonatus et al.⁹ speculated that the injury occurs in a position of hyperextension and supination, suggesting that the reduction maneuver for dislocation depended on the initial forearm position at presentation. Patients presenting with pronated forearms necessitated a supination force for reduction and vice versa. This principle was upheld in the current case, where the patient's presentation in pronation required reduction through supination.

While closed reduction proves successful in most cases¹¹, open reduction becomes necessary in a minority. In this instance, closed reduction attempts failed, leading to an open reduction of radial head in combination with correction of malignment with ulnar osteotomy and reconstruction of annular ligament and radio-ulnar Kirschner wire placement for stabilization..

The annular ligament serves as a crucial stabilizing structure for the proximal radio-ulnar joint, making radial head dislocation impossible without its damage¹². In this case, a disrupted annular ligament necessitated repair alongside the placement of a superior radio-ulnar Kirschner wire. An upper arm cast was applied with the forearm in neutral rotation for six weeks. A stable elbow with restored function at the 12-month follow-up indicates annular ligament healing.

Timely diagnosis and reduction are missed, considering associated complications such as elbow stiffness, recurrent radial head instability, and issues linked with Kirschner wire fixation. Recurrent radial head instability is managed based on the congruence of reduction. Congruous reduction warrants annular ligament reconstruction, while incongruity necessitates radial head excision¹³.

In conclusion, isolated anterior dislocation of the radial head is a rare occurrence. The approach to reduction hinges upon the initial forearm position, with closed reduction not universally successful. Post-reduction stability assessment is crucial. Prompt management is vital to prevent elbow stiffness and recurrent instability, facilitating restoration of normal range of motion and function through supervised physiotherapy.

Conclusion:

Isolated anterior dislocation of the radial head, while a rare occurrence, presents with atypical clinical manifestations, such as restricted elbow flexion-extension but maintained forearm supination-pronation. Various injury mechanisms, including hyperpronation forces and direct trauma, contribute to this unique orthopedic condition, necessitating a tailored reduction approach depending on the initial forearm positioning. Closed reduction remains the primary mode of treatment; however, in select cases, open reduction becomes imperative, especially when complications like intra-capsular button-holing of the radial head obstruct the closed reduction attempt.

The pivotal role of the annular ligament in maintaining the stability of the radio-ulnar joint is underscored, as its disruption accompanies radial head dislocation. Timely diagnosis, coupled with a vigilant reduction approach and subsequent stability assessment, holds paramount importance in preventing complications like recurrent instability and elbow stiffness. Prompt management, including repair of the annular ligament and regular, supervised physiotherapy, is crucial for restoring normal elbow function and range of motion.

Declarations

Author Contributions

Kawser Hamid analyzed the patient's data regarding the medical management of the case. He also interpreted and analyzed the patient's data regarding the medical management of the case and Mainul Hasan Sohel helped to write the manuscript of the paper. All authors participated in the management of the patient at the hospital. All authors read and approved the final manuscript.

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Conflict of Interest

The authors state that they have no known conflicting financial interests or personal relationships that may be seen as having influenced the work described in this study.

Consent

The patient's written approval was received prior to the publishing of this case report and its related photographs.

Ethics statement

The Institutional Review Board of Central Medical College in Cumilla, Bangladesh, approved this study. A formal letter was provided as clarification for conducting this case review. For publishing of the clinical details and photographs in this article, signed informed consent from the patient was acquired.

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