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## Case Report

## Adult Bado type I Monteggia fracture dislocation: A case report

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## ABSTRACT

**Introduction:** Fractures of the proximal ulnar shaft accompanied by dislocation of the radial head have been described as “Monteggia fracture-dislocations,” since the early nineteenth century. In 1967 Bado further classified these Monteggia fractures into four subtypes, based largely on the direction of the radial head dislocation (Bado, 1967). Despite being frequently discussed in the literature, Monteggia fracture dislocations are rare and represent only 0.7% of elbow fracture-dislocations in adults (Papaioannou et al., 2018). In adults, Bado type I lesions, where the radial head is displaced anteriorly are rarer still, and few cases have been reported in the literature (Papaioannou et al., 2018; Suarez et al., 2016; Egol et al., 2005; Saidi et al., 2018; Wong et al., 2015).

**Case presentation:** We present here the case of a 55-year-old male presenting with a Bado type I Monteggia fracture dislocation, resulting from direct trauma to the posterior ulnar surface of his arm. He was treated with ORIF five days after the injury, and by hospital discharge had had 75% active range of motion of his elbow to flexion and extension.

**Conclusion:** We present this case of a rare adult fracture subtype with a unique mechanism to add to a paucity of existing literature on such cases and the approach to their care. These fracture-dislocations can be easy to miss because the radial dislocation can be subtle and overshadowed by the more obvious ulnar fracture. This case report hopes to contribute to the expedient recognition of this fracture dislocation syndrome, which is crucial to the preservation of range of motion and arm function for these patients.

## Introduction

Fractures of the proximal ulnar shaft accompanied by dislocation of the radial head have been described as “Monteggia fracture-dislocations,” since the early nineteenth century. In 1967 Bado further classified these Monteggia fracture-dislocations into four subtypes now deemed “Bado types,” based largely on the direction of the radial head dislocation [1]. Despite being frequently discussed in the literature, Monteggia fracture-dislocations are rare and represent only 0.7% of elbow fracture-dislocations in adults [2]. In adults, Bado type I lesions, where the radial head is displaced anteriorly, are rarer still, and few cases have been reported in the

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literature [2–6]. We present here the case of a rare adult Bado type I Monteggia fracture-dislocation which resulted from direct trauma to the posterior ulnar surface. In presenting this case we aim to contribute to the limited body of existing literature describing such cases and their management in adults.

### Case presentation

A 55-year-old undomiciled man presented to the emergency department (ED) with right forearm, right elbow, and left flank pain. While attempting to intervene in a crime 24 h prior to arrival, the patient was attacked. He was struck repeatedly by an assailant with a piece of wood and attempted to shield himself using his right forearm. He denied any head injury, neck pain, loss of consciousness, or the use of blood thinners. Vital signs at arrival included a temperature of 36.6 degrees Celsius, heart rate 104, respiratory rate 18, blood pressure 179/97, and a room air oxygen saturation of 97%. Physical exam revealed an overt deformity of the right arm, just distal to the elbow. The limb remained neurovascularly intact with palpable pulses and maintained range of motion at the hand and wrist. The remainder of the physical exam was non-contributory. Due to the patient's pain with moving the arm only AP X-rays were obtained of the right arm which revealed an oblique, comminuted, displaced, and angulated fracture of the proximal ulna with an anteriorly and medially subluxed radial head [Fig. 1]. Orthopedic surgery was consulted and through closed manipulation of the arm by reducing the length of the ulna and radial head in comparison to the capitellum, the fracture dislocation was successfully reduced in the ED and a sugar tong splint was placed. Repeated x-rays showed a reduced radial head and improved alignment of the ulnar fracture [Fig. 2]. Five days after the injury, the patient underwent open reduction and internal fixation (ORIF) of the right ulna. Soft tissue dissection proceeded through the skin and then between the interval between the extensor carpi ulnaris and flexor carpi ulnaris tendons and muscle bellies. Subperiosteal elevation revealed the fracture site. Two primary fracture fragments were lagged together with a 2.7 mm lag screw for compression. A Stryker 3.5 mm compression plate was placed along the dorsum of the ulna and 3 bicortical screws were placed both distally and proximally [Fig. 3]. The patient received physical and occupational therapy while admitted and at discharge had full functional use of elbow supination and pronation as well as wrist flexion and extension. He had 75% active range of motion of his elbow to flexion and extension. The patient was discharged to a congregate living space for the remainder of his recovery, and was lost to follow up.

### Discussion

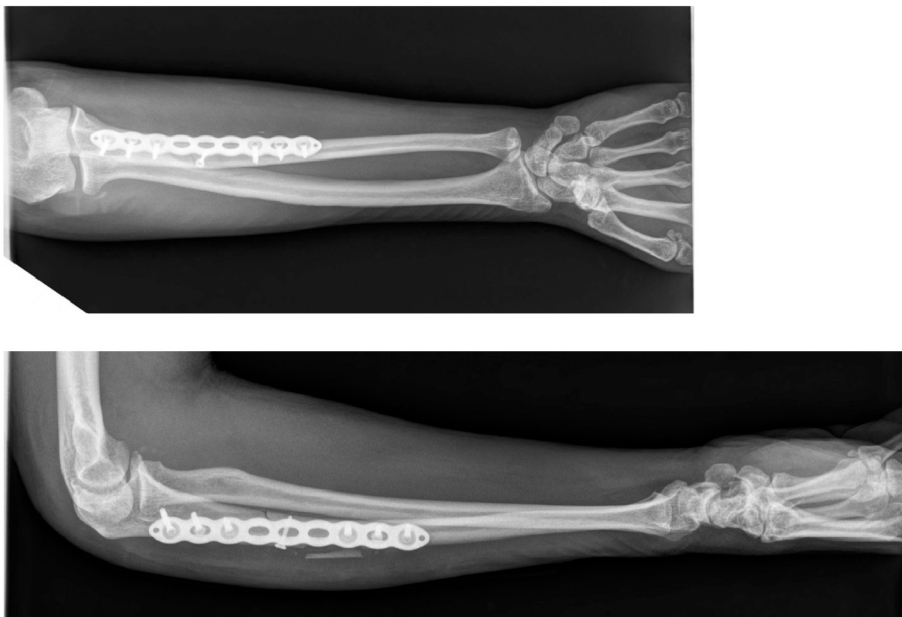
The case reported here represents a rare subtype of a rare fracture dislocation syndrome. Monteggia fracture dislocations are rare and represent only 0.7% of elbow fracture-dislocations overall. In adults the Bado I subtype are rarer still, with posterior displacement or Bado II being most common [2–6]. Literature review revealed a paucity of case reports focused specifically on adults with isolated Bado type I Monteggia fractures [2,3]. In adults these fractures often result from high-energy mechanisms and studies have demonstrated they can be easily missed at initial presentation and if left untreated they can result in debilitating losses of range of motion [3,4,6,7]. There are three identified mechanisms for these injuries which include: (i) direct traumatic force to the posterior aspect of the forearm with direct strike(s) to the ulna which then forces the radial head to displace anteriorly until dislocated; (ii) fall on an outstretched arm resulting in forearm hyperpronation dislocating the radial head followed by fracture of the ulna; (iii) hyperextension of the elbow with contraction of the biceps resulting in dislocation of the radial head followed by fracture of the ulna [1,6,8–9]. Although there appears to be agreement in the literature that all three mechanisms are possible, there has been disagreement for over fifty years about which occurs most frequently. In our literature review however, it would appear that the “fall on an outstretched arm” mechanism occurs most frequently [1–9]. In adult patients, anterior radial head dislocations appear to more commonly occur in



**Fig. 1.** Adult Monteggia Fracture Dislocation, Bado Type I. Right arm at presentation and prior to manual reduction, forearm x-ray (portable, anterior-posterior view).



**Fig. 2.** Adult Monteggia Fracture Dislocation, Bado Type I. Right arm post-reduction and pre-operative forearm x-ray (lateral view).



**Fig. 3.** Adult Monteggia Fracture Dislocation, Bado Type I. Right arm post-operative from open reduction internal fixation forearm x-rays (Anterior-posterior and lateral views).

younger patients with high-energy mechanisms. In older adults, posterior radial head dislocations are more common, hypothesized to result from reduced bone density leading to the bone failing before the ligaments of the elbow [3,8].

These fractures commonly have poor outcomes in adult patients, with risk factors including neglected or missed injury, open fractures, nerve injury, and associated fractures, like those of the radial head or coronoid process [2,7]. Compared to posterior dislocation, cases in which the radius is dislocated anteriorly have been observed to have more favorable outcomes, as they have a

lower incidence of associated radial head fractures and no coronoid process involvement [6]. However, there has been some disagreement regarding prognosis of Bado type I versus other Bado subtypes in the literature [3,6]. Regardless of the directionality, adult patients with Monteggia fracture-dislocations should always be treated surgically, as nonsurgical treatment is associated with universally poorer outcomes [2,8]. Early identification of these injuries is key to maximizing a patient's prognosis. The radial head dislocation is a subtle and often-missed finding that can be overshadowed by the more obvious ulnar fracture. Patients presenting with an ulnar fracture should be carefully assessed for associated radial head dislocation, which can be assessed radiographically by drawing a line through the long axis of the radius at the elbow. Radial head dislocation should be strongly suspected if this line does not bisect the capitellum [6,10]. If this subtle finding is missed at initial presentation, complications increase significantly if not identified and operated on within 2–3 weeks [8].

The surgical repair of Monteggia fractures is usually performed with closed reduction of the radius and ORIF of the ulna. In the majority of cases (93%), the radial head is spontaneously reduced after anatomic reduction of the ulna. In the other 7% of cases, the annular ligament prevents spontaneous reduction of the radial head and open reduction must be performed [3,5–6]. When treated surgically, these patients should be placed in a hinged elbow brace and begin early motion of the elbow on postoperative day 1 or 2 to prevent the development of stiffness. A physical therapy regimen should be started within the first two weeks for optimal outcomes, with varus forces and axial load avoided until 3 months postop [8].

## Conclusion

Bado type I Monteggia fracture dislocations in adults are rare and there are few published cases describing them. They may however be underrecognized, as the radial head dislocation can be overshadowed in imaging by the ulnar fracture. Poor outcomes are common and make it crucial that this syndrome is promptly identified and surgically repaired in order to preserve range of motion [2,7]. In describing this case we aim to contribute to the literature describing these cases and their management to aid in their expedient recognition in future cases. While we could not assess long-term outcomes in this case, prompt identification and repair placed this patient in a favorable position for recovery.

## CRedit authorship contribution statement

**Ashley Cohen:** Writing, original draft; Writing, review & edits. **Camille Talwar:** Writing, original draft; Writing, review & edits. **Jason Magnani:** Writing, review & edits. **John Wahhab:** Writing, original draft; Conceptualization; Supervision.

## Declaration of competing interest

The authors declare that they have no conflicts of interest (personal, financial, professional, or otherwise) to disclose.

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