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Case Report

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Monteggia fracture-dislocation with radial neck fracture in adult: A new variant

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Abstract

Abstract: **INTRODUCTION:** In the year 1814, Giovanni Battista Monteggia, an Italian surgeon, first described the Monteggia fracture-dislocation as accounting for approximately 1 - 2% of all forearm injuries, but it was Bado who coined 'Monteggia fracture dislocation' and 'Monteggia-like lesions' in a thesis published in 1967. The term 'Monteggia Variant' refers to extra-traumatic elbow injuries such as additional radial head as well as neck fractures or humeroulnar joint dislocation. Likewise, fracture of the radial neck is a rare entity in adults, accounting for only 1.7 - 5.4 % as compared to 5 - 10 % of all pediatric elbow fractures. **CASE REPORT:** We present a previously undescribed case of Monteggia fracture of right midshaft ulna with dislocation of radial head in conjunction with right radial neck fracture occurring in a 38-year-old male patient after an alleged motor vehicle accident on the public motorway. This fracture dislocation has not yet been described in any literature. This case is reported for its rarity and its management. **CONCLUSION:** Complete diagnostic evaluation is imperative to avoid missed injuries and achieve a satisfactory outcome. Based on the reported cases, it is proposed that the Bado classification be expanded to include the Monteggia Variant.

Keywords: Monteggia fracture-dislocation, Monteggia Variant, clinical examination, radiograph, classification, surgery.

INTRODUCTION

Monteggia fractures, as well as Monteggia-like lesions, are relatively uncommon and complicated occurrences, making up for around 2 – 7 percent of every proximal forearm fractures and 0.7 percent of all elbow fractures and dislocations, despite the elbow being the second-most frequently dislocated joint among adults [1]. In the year 1814, Giovanni Battista Monteggia, an Italian surgeon, first described the Monteggia fracture based on two reported occurrences of a traumatic injury differentiated by a proximal third ulna fracture and an anterior dislocation of proximal epiphysis of the radius [2].

In 1967, Bado gave name to Monteggia fracture-dislocation along with Monteggia-like lesions in a thesis published in 1967, where he expounded on the pathomechanics and management of this fracture-dislocation by identifying four different damage patterns, including the radial head dislocation in combination with fractures at various levels of ulna or wrist injuries [3].

The phrase "Monteggia Variant" describes extra traumatic pathologies within the elbow, such as added fracture of the radial head and neck or humeroulnar joint dislocation [4]. In 1991, Jesse Jupiter further characterised the posterior Monteggia lesion (Bado type II) into Bado IIA-D, based on the site, nature, and the type of the ulnar fracture including the severity of the radial head injury [5].

Over recent years, a number of Monteggia-like lesions have been reported along with these initial Monteggia fracture-dislocations based on the similarities of their postulated injury mechanisms, mainly being pediatric fractures as opposed to adult fractures [6]. Likewise, fractures of the radial neck are also more commonly found in the pediatric age group and are considered rare. The lack of proper definitive surgical treatment methods as well as classification for adults presents a challenge for surgeons to approach radial neck fractures in adults, as they have to rely on available pediatric classifications and techniques for management. The available techniques include the Percutaneous Kirschner wire leverage or the more recently proposed modified Metaizeau technique in fixation of adult radial neck fractures by orthopedics surgeons in India [7].

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Despite the fact that numerous comparable variations have been identified in the literature, this report describes a previously undescribed case of a Monteggia fracture of right midshaft ulna fracture with dislocation of radial head in combination with fracture of right neck of radius in an adult male.

CASE REPORT

A 38-year-old male, right hand dominant, was allegedly involved in a motor vehicle accident on a public motorway when his motorcycle collided with a car head-on, whereupon he lost consciousness and was brought to the Emergency Department by ambulance and was subsequently intubated. Clinical examination revealed laceration at the posterior aspect of the proximal one third forearm, measuring approximately 3cm x 1cm. The wound was exposed with minimal bleeding. Swelling and deformity was observed in his right elbow. He had restricted range of active movement of right forearm pronation and supination, as well as right elbow flexion and elbow extension. He had no neurovascular deficit. The initial radiographs taken in anteroposterior and lateral view of the right forearm, including right wrist and elbow, demonstrated comminuted fracture of right proximal ulna with posterolateral dislocation of right radial head and a fracture of right radial neck. He was then further managed as a case of Monteggia Variant, whereby debridement was done for the open fracture and backslab was used to immobilize the injured forearm while surgery was scheduled.

Patient was administered general anaesthesia. Intraoperative, he was appropriately positioned and his right upper limb was placed on the arm board. Closed manipulative reduction was done under image intensifier guidance. The right comminuted midshaft ulna fracture was anatomically reduced and was treated as an open fracture using a unilateral frame external fixator post debridement. Next, the right radial head was relocated and the right radial neck fracture was held with Kirschner wires using the Percutaneous Kirschner wire leverage technique.

The limb was then immobilised with the forearm in full supination with elbow joint in 90 degree flexion in an above elbow backslab, following which he was kept in observation in the ward and was monitored for any neurovascular compromise and compartment syndrome postoperatively. He was then discharged after 5 with zero complications.

He was reviewed after three weeks and repeated X Rays were taken. These showed callus formation. Based on clinical examination and radiograph findings, the K-wires were removed and he was started on exercise. At follow-up two months later, the fracture had united and he was advised to continue physiotherapy to restore full range of movement.



Figure 1: The initial radiographs lateral view (left) and anteroposterior view (right) taken in ED showing fracture of right midshaft ulna and a fracture of right radial neck with posterolateral dislocation of right radial head



Figure 2: Radiograph postoperative anteroposterior view (left) and lateral view (right) showing unilateral frame external fixator with 2 pins above and 2 pins below the right ulna fracture site post closed reduction with Kirschner wires at the right radial neck

DISCUSSION

Monteggia fracture-dislocation is a fracture of the proximal ulna with dislocation of the head of the radius. It is caused by a fall on an out-stretched hand. It may also result from a direct blow on the back of the upper forearm. It was classified by Bado into four types. Type I is dislocation of the radial head in anterior, Type II in posterior, and Type III in lateral direction. Type IV is defined as a fracture of both bones of the forearm with dislocation of the radial head.

The case of the 38-year-old male, subject of this report, does not fit into any of the four known types. It is thus concluded to be a rare Monteggia Variant. Although there have been a few reported cases of Monteggia Variant and Monteggia-like lesions in recent years, they have not been clearly defined [8-10]. Fracture of the radial neck is a rare entity in adults, accounting for only 1.7 - 5.4% as compared to 5 - 10 % of all pediatric elbow fractures. Furthermore, due to its rarity, there is currently a dearth of information on the clinical and radiological results of such fractures in adults. Hence, it is likely to be missed in the absence of thorough history, clinical examination as well as radiograph is taken.

It is therefore no surprise that fractures involving radial head in combination to ulna fracture have poorer outcomes than typical Monteggia lesions [11].

The patient typically presents with pain over the elbow region and restricted range of movement. In open fractures, the wound site is inspected for size, edges, depth and amount of bleeding. Gustilo-Anderson classification is used to further classify the open fracture. The site of injury can also be clinically distinguished from inspection of the affected limb's attitude. The proximal portion of the radius is where the forearm's supinators, the biceps and supinator are attached. The middle and distal thirds of the radius are where the pronators (the pronator teres and pronator quadratus) are attached. As a result, the upper half of the forearm, which only has supinators attached to it, is supinated in fractures of the upper third of the forearm. On the other hand, the lower third portion is pronated. Both the proximal and distal portions of the forearm are in mid-pronation in middle-third fractures. Notwithstanding these indicators, clinical examination can be difficult in acute settings when there is extensive swelling and deformity, especially in open fractures, as in the case of the patient who is the subject of this report.

Moreover, palpation for tenderness, deformity or crepitus at the the distal humerus, both the lateral and medial part of the elbow joint, olecranon, the radial head and shaft, followed by the ulna shaft, as well as the interosseous membrane, the distal radioulnar joint, and radius

and the ulnar styloid can provide further information on the type and site of injury. It is absolutely essential to determine the neurovascular status of the patient's affected limb in light of the possibility of injury to the two major arteries in the forearm — the radial and ulnar arteries. Additionally, after splinting, neurovascular status can provide clues when looking for impending compartment syndrome, which is a known complication of Gustilo Grade IIIa open fracture.

In the case of the 38-year-old male patient, anteroposterior and lateral views of the right forearm, including the right elbow joint and right wrist joint, were obtained for identification of the fracture in right midshaft ulna and a fracture of the right radial neck with posterolateral dislocation of the right radial head and to aid in further classification of the injury. Based on the radiograph findings, the injury was classified as Monteggia Variant, as it did not fit into Bado classification of Monteggia fracture dislocation, not even the Bado Type IV.

As for fracture of the radial neck in adults, there is no specific classification available at this time, unlike in pediatrics where these fractures are categorised in accordance with the O'Brien and Judet classifications, which have both been proposed as useful tools for determining prognosis and course of therapy^[12,13]. This further supports the necessity of having an appropriate classification system for adults presenting with fracture of the radial neck and also Monteggia Variant, to assist in treatment for better patient outcome. However treatment decisions may be driven by classification systems, treatment cannot solely depend on them. The associated injuries must be kept in mind, with treatment determined on a per patient basis, as in this case, where there was also comminuted fracture of proximal ulna with posterolateral dislocation of the radius.

A surgery's success relies on meticulous preoperative preparation. Based on several studies, it is evident that the special Greenspan view, also known as the oblique or radiocapitellar view, can also be taken with the forearm in neutral position and the X-ray beam centered on the radiocapitellar joint to visualise the radial head to exclude any concomitant fracture over the site^[14]. The fracture distribution, as well as the implicated bone and soft tissue components, is taken into consideration when positioning the patient and selecting the best surgical technique. In this case, the technique used for fracture of the radial neck was Percutaneous Kirschner wire leverage reduction. This was done by guiding the K-wire's end through the fracture region. By this technique, the fracture was repositioned to its original location. Initially, as it was Gustilo-Anderson Grade IIIa open fracture of midshaft ulna, the right forearm was put on a unilateral frame external fixator with 2 pins above and 2 pins below the fracture site, after thorough debridement was done.

CONCLUSION

Monteggia fracture coupled with right radial head fracture and midshaft right ulna fracture with dislocation of radial head is a rare variant of Monteggia injury that till now has not been reported. In view of the fact that fractures of the forearm can cause substantial short- as well as long-term impairment, especially if not managed appropriately, a thorough diagnostic evaluation is imperative to avoid missed injuries and achieve a satisfactory outcome, and based on the reported case, the authors recommend that the Bado classification be amended to include the Monteggia Variant.

Conflict of Interest

None declared.

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