Monteggia Fractures

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KEYWORDS

• Monteggia fractures • Proximal ulna • Anterior dislocation • Radial head • Radioulnar • Radiocapitellar

KEY POINTS

- Monteggia described a fracture of the proximal third of the ulna with anterior dislocation of the radial head from both the proximal radioulnar and radiocapitellar joints.
- Application of this eponym to all injuries with radiocapitellar subluxation or dislocation has lead to some confusion.
- In addition, there are substantial differences between Monteggia injuries in children and adults.

INTRODUCTION

Monteggia described a fracture of the proximal third of the ulna with anterior dislocation of the radial head from both the proximal radioulnar and radiocapitellar joints.[1] Application of this eponym to all injuries with radiocapitellar subluxation or dislocation has led to some confusion. In addition, there are substantial differences between Monteggia injuries in children and adults.[2] With careful definition, specific subsets of patients may benefit from consideration as a separate type of Monteggia injury.

DEFINITION/CLASSIFICATION

Attempts to apply the eponym, Monteggia, to a variety of injury patterns has made the term less precise and, therefore, less useful. Monteggia injuries can be defined in 2 ways, both of which are imperfect: (1) a type of fracture-dislocation of the diaphyseal forearm with dislocation of the proximal radioulnar joint, or (2) fracture of the ulna with subluxation or dislocation of the radiocapitellar joint. The former excludes fractures at the metaphyseal or even elbow joint level that have limited proximal radioulnar joint malalignment.[3] The latter includes injuries that are types of elbow fracture-dislocations and do not involve the forearm, such as anterior olecranon fracture-dislocations.[4]

I have found it useful to consider Monteggia fractures in one of several subsets.[2,5–7] The first subset comprises diaphyseal fractures of the ulna (with or without diaphyseal fracture of the radius) and anterolateral dislocation of the radial head from the proximal radioulnar and radiocapitellar joints (**Fig. 1**). The second subset is made up of metaphyseal buckle fractures with anterolateral subluxation of the radiocapitellar joint, fractures that are unique to the immature skeleton (**Fig. 2**). The third and final group consists of the apex posterior fractures of the ulna (at the level of the diaphysis, metaphysis, or olecranon/elbow joint) with posterior dislocation of the radiocapitellar joint, with or without dislocation of the proximal radioulnar joint, and fracture of the radial head in most patients (**Figs. 3** and **4**).[8–10]

The traditional classification of Monteggia fractures according to direction (anterior, lateral, or posterior) was made numeric by Bado[1]: type 1, anterior; type 2, posterior; type 3, lateral; and type 4 with a concomitant radial diaphyseal fracture. It is not clear how to distinguish types 1 and 3, and type 4 seems like a subset of type 1 and 3. Therefore, I have not found Bado's classification particularly useful. The idea of Monteggia equivalents is particularly confusing and I do not recommend the use of this term or classification scheme.

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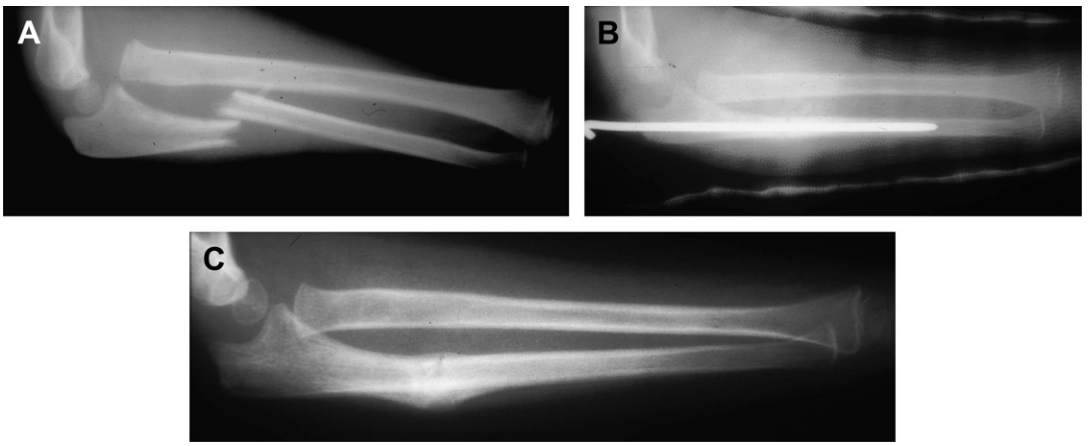

Fig. 1. A skeletally immature patient fell off playground equipment and sustained an anterolateral Monteggia injury. (*A*) Lateral radiograph shows a transverse ulna fracture in bayonet apposition and dislocation of the proximal radioulnar and radiocapitellar joints. (*B*) Open reduction and intramedullary wire fixation was performed, with ancillary cast immobilization. (*C*) The fracture healed in good alignment and excellent function was obtained.

The classification of posterior Monteggia fractures proposed by Jupiter and colleagues[8] is useful primarily as way to conceptualize fracture variations that might otherwise seem disparate into a spectrum of injuries with similar management considerations. They point out that posterior Monteggia injuries are not merely forearm fracture dislocations but are really transitional lesions involving aspects of traumatic instability of both the elbow and the forearm. The diaphyseal posterior Monteggia fracture (type C) most resembles the classic anterolateral Monteggia fracture originally described; however, most posterior Monteggia injuries occur at the level of the metaphysis (type B) or the olecranon (type A). The final group consists of patients with complex fractures involving several levels (type D). The more proximal the fracture of the ulna lies, the greater the relative sparing of the proximal radioulnar relationship. What these fractures have in common is (1) an apex posterior fracture of the proximal ulna, (2) fracture of the radial head in most patients, and (3) avulsion of the lateral collateral ligament from the lateral epicondyle in most patients. Fractures at the level of the olecranon often include associated fracture of the coronoid.[6] All of these elements can contribute to ulnohumeral instability: apex posterior angulation of the ulna results in posterior radiocapitellar subluxation with loss of radiocapitellar contact as well as relative diminution in the effective anterior buttress of the coronoid, and fractures of the radial head and coronoid and avulsion of the LCL directly destabilize the elbow.[11,12]

Fig. 2. Buckle fracture of the proximal ulna with anterolateral radiocapitellar subluxation in a skeletally immature patient.

EPIDEMIOLOGY

The predominant Monteggia injury in children is the anterolateral diaphyseal forearm fracture-dislocation.[7] The predominant lesion in adults is the posterior Monteggia fracture, which has been associated with osteoporosis.[2] Anterolateral diaphyseal proximal radioulnar joint fracture-dislocations are uncommonly seen in adults. The

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