

Fractures in Brief

Radial Head Fractures

Nick Pappas MD, Joseph Bernstein MD

Published online: 5 December 2009
© The Association of Bone and Joint Surgeons® 2009

Introduction

Fractures of the radial head are common [4], constituting approximately one-third of all elbow fractures. These fractures typically occur when an axial load is applied to the forearm, causing the radial head to hit the capitellum of the humerus. The severity of these injuries runs the gamut from minimally displaced fractures needing minimal treatment to those with major displacement or comminution, requiring surgical fixation, excision, or replacement.

Structure and Function

At the elbow, the radius articulates with the humeral capitellum and the proximal ulna. These articulations allow flexion-extension of the elbow and pronation-supination of the forearm.

The most proximal aspect of the radial head is the fovea, a cup-like depression lined with articular cartilage forming the distal half of the radiocapitellar joint. Smooth gliding

here is essential; thus, articular fractures with posttraumatic arthrosis can cause mechanical and symptomatic impediment to motion.

The radial head is an important secondary stabilizer of the elbow against valgus loading. Valgus forces at the elbow apply tension to the medial collateral ligament, of course, but also compress the radial head. Collapse of the radial head may lead to loss of radial length and accompanying valgus instability.

The anterolateral aspect of the radial head contains an arc of bone that does not articulate with either the humerus or the ulna. Plates or screws can be placed in that location that will not interfere with forearm motion.

Diagnosis and Classification

Standard radiographic evaluation of radial head fractures includes AP and lateral views of the elbow. Because of the typical mechanism of injury (a load applied from distal to proximal), wrist views usually are advisable and, of course mandatory, if there are symptoms at the wrist.

Often a nondisplaced radial head fracture cannot be seen directly on plain radiographs. In those instances, the only clue may be an enlarged posterior fat pad visible on the lateral view. Because the posterior fat pad is intracapsular but extrasynovial, a visible posterior fat pad indicates fluid (eg, blood) with the joint. In the setting of trauma, the presumption is an occult radial head fracture is present. Although additional views (eg, radiocapitellar view, shot with the forearm in neutral rotation and the beam angled 45° cephalad) might be useful if initial films are negative, it is reasonable simply to diagnose empirically a nondisplaced fracture on the basis of history and the presence of a posterior fat pad sign.

Each author certifies that he or she has no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

N. Pappas
Department of Orthopaedic Surgery, University of Pennsylvania,
Philadelphia, PA, USA

J. Bernstein (✉)
Philadelphia Veterans Hospital, Department of Orthopedic
Surgery, University of Pennsylvania, Philadelphia, PA 19104,
USA
e-mail: orthodoc@uphs.upenn.edu

Historically, radial head fractures have been classified according to the Mason classification [3], of which there are three types: nondisplaced; displaced but without comminution, and comminuted. (A fourth type has been added to denote a radial head fracture with concomitant elbow dislocation.)

Injuries associated with radial head fractures include the Essex-Lopresti lesion (tear of the interosseous membrane, distal radioulnar joint disruption) and the so-called terrible triad of the elbow (elbow dislocation, coronoid fracture, and radial head fracture).

The physical examination of elbow injuries always must include the wrist, because injury to the radial head also may involve the distal radioulnar joint. If the wrist is unstable, this instability may not only need direct treatment, but also affect the choice of treatment at the elbow; when there is a risk of proximal migration in association with a distal radioulnar joint injury, excision of the radial head (without replacement) may be contraindicated.

Treatment

Nondisplaced and minimally displaced radial head fractures can be treated with a sling or splint for a few days followed by early ROM [6]. Treatment of displaced fractures is predicated on the extent of displacement and the size of fragments. If the fracture is reasonably aligned, immobilization may suffice. Surgical options include open reduction and internal fixation [5] (Fig. 1), fragment excision, or radial head replacement. The management of comminuted radial head fractures is broadly similar, although nonoperative treatment rarely is chosen and radial head resection or replacement is recommended more commonly because the comminuted fragments are not amenable to fixation [1, 2].

Operative fixation or replacement of radial head fractures typically is performed through the posterolateral (Kocher) approach to the elbow, between the extensor carpi ulnaris and anconeus muscles. Pronation of the forearm

Fig. 1A–D (A) Anteroposterior and (B) lateral radiographs show a displaced radial head fracture. (C) Anteroposterior and (D) lateral radiographs show the fracture after treatment with open reduction and internal fixation.



will place the posterior interosseous nerve away from the wound and protect it.

Outcomes

As is the case with many fractures, the outcome is inversely proportional to the amount of energy absorbed. Nondisplaced radial head fractures typically do very well overall as long as mobilization is timely. Displaced fractures also can do well provided anatomic reduction with stable fixation is attained, both necessary conditions for early motion. Some patients treated with radial head excision do not do well; these patients report valgus instability and pain. Nonetheless, this may be a function of the severity of the injury and not the choice of treatment, and thus excision remains an option for most surgeons.

If radial head replacement is chosen, metallic implants offer better biomechanical properties and biologic compatibility than alternatives such as silicone.

Five Pearls

1. **A visible posterior fat pad on the lateral view of the elbow is a sign of occult intraarticular pathology.**
2. **Early elbow ROM is needed to prevent stiffness. If you fixed the fracture, but not well enough to move the elbow, you did not fix it.**
3. **The “safe zone” for placing hardware on the radial head lies in the interval between the radial styloid and Lister’s tubercle.**
4. **Examine the wrist when examining all elbow injuries; a radial head fracture may be accompanied by a tear of the interosseous membrane and disruption of the distal radioulnar joint.**
5. **The posterior interosseous nerve (controlling finger and wrist extension) can be damaged by a radial head injury or by the surgery performed to treat the fracture. Therefore, document functional status preoperatively.**

References

1. Esser RD, Davis S, Taavoo T. Fractures of the radial head treated by internal fixation: late results in 26 cases. *J Orthop Trauma*. 1995;9:318–323.
2. Hotchkiss RN. Displaced fractures of the radial head: internal fixation or excision? *J Am Acad Orthop Surg*. 1997;5:1–10.
3. Mason HL. Some observations on fractures of the head of the radius with a review of one hundred cases. *Br J Surg*. 1954;42:123–132.
4. Pike JM, Athwal GS, Faber KJ, King GJ. Radial head fractures: an update. *J Hand Surg Am*. 2009;34:557–565.
5. Ring D, Quintero J, Jupiter JB. Open reduction and internal fixation of fractures of the radial head. *J Bone Joint Surg Am*. 2002;84:1811–1815.
6. Rosenblatt Y, Athwal GS, Faber KJ. Current recommendations for the treatment of radial head fractures. *Orthop Clin North Am*. 2008;39:173–185, vi.