

# Trauma Rounds

Case Reports from the Mass General Hospital and Brigham & Women's Hospital

A Quarterly Case Study

Volume 2, Summer 2011

## Fractures of the Distal Humerus



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Fractures of the distal end of the humerus, while relatively uncommon, continue to stimulate discussion as to the optimal method of treatment. Unfortunately, there are relatively few Level I or even Level II studies to guide the fracture surgeon.<sup>1</sup> I will attempt to identify and clarify a number of contemporary issues and provide a perspective of 30 years experience in the study and management of these injuries.

### Epidemiology

People are living longer and healthier, and the incidence of distal humerus fractures is increasing. In a revealing retrospective, epidemiological study from Finland of women over the age of 60 years, the incidence of distal humerus fracture increased from 12/100,000 women in 1970 to 28/100,000 women in 1995.<sup>2</sup> These data suggest a likely 3-fold increase by 2030. Also noteworthy is that we are all treating more complex fracture types in these osteoporotic patients. This has provoked some disagreement as to whether or not attempts should be taken to obtain stable internal fixation versus treatment with a total elbow arthroplasty.

### Preoperative Planning

Although there is little evidence regarding the importance of CT scanning or MRI in preoperative decision making regarding more complex articular fractures, the ability to isolate the distal humeral articular surface in multiple planes is certainly helpful in shearing articular fractures.

### Fracture Classification

The classification systems of the AO group as well as Orthopaedic Trauma Association are widely accepted, yet they both have limitations - especially in accurately defining some articular injuries. We have published a classification of articular shearing fractures extending from a simple capitellum fracture to the very complex articular shearing fracture in multiple

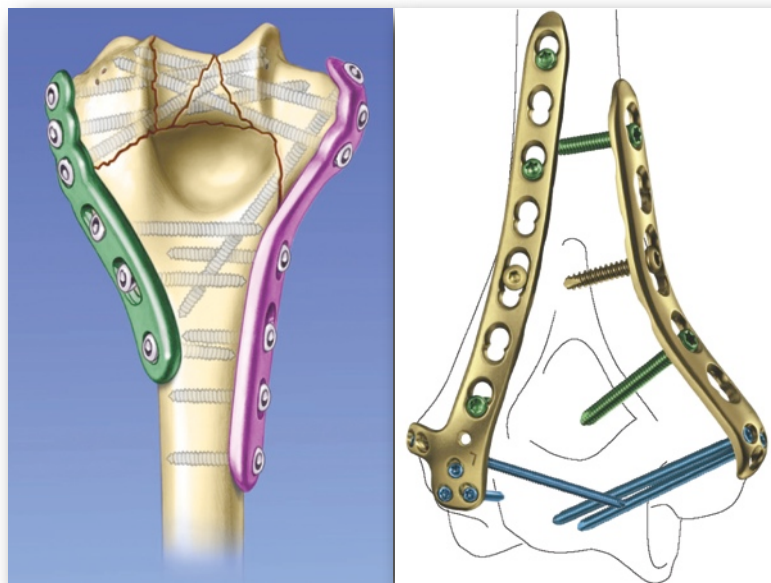


Figure 1: Two forms of plate application are seen here: (left) Medial lateral, (right) 90-90.

fragments extending across to include the medial and lateral epicondyles.<sup>3</sup>

### Surgical Exposures

*What to do with the ulnar nerve?* There remains some disagreement among investigators as to whether the ulnar nerve should be mobilized as well as transposed anteriorly to rest in the soft tissues. There is fair evidence for transposition of the ulnar nerve in all patients who exhibited preoperative ulnar nerve symptoms, but insufficient evidence for anterior transposition if the patient had no preoperative symptoms.

Having treated a large number of patients for reconstructive problems following surgery for a distal humerus fracture, I have been impressed with how often the ulnar nerve is found compressed at or distal to Osborne's ligament at the entrance of the two heads of the flexor pronator muscle. For this reason, it has been my preference to mobilize the ulnar nerve a minimum of 6-8 centimeters proximal and distal to the medial epicondyle.

## Approach to the Fracture

Enthusiasm has been tempered for an olecranon osteotomy approach to the distal humerus due to reported complications of nonunion at the osteotomy site, yet it still provides excellent exposure for those complex very distal articular fractures. I still favor this approach, creating a chevron shaped osteotomy with the apex pointing distally and secured with standard tension wire fixation modified only by two tension wires.

Alternative exposures include a midline split of the triceps, triceps elevation with a small fragment of the proximal olecranon, or the extended lateral approach, which is especially useful for anterior shearing articular fractures.

The literature suggests that a triceps-splitting approach will lead to functional outcomes similar to that of the olecranon osteotomy, without associated complications.

## Fracture Stabilization

Some current discussion focuses on whether to apply plates and screws parallel to each other, or placing the implants orthogonal to one other (Figure 1). Biomechanical studies have not demonstrated a major advantage for either method, but there is some evidence to support the use of parallel plate applications for comminuted or osteoporotic fractures.

The development of anatomically shaped implants with angular stable locking screw fixation may offer some advantages in providing stable internal fixation in the osteoporotic patient. There is, however, little evidence in the literature to support this concept. One should always realize the ability to anatomically shape standard implants to meet the unique requirements of complex fractures.

For stable fixation of complex, articular shearing fractures, I find that headless screws placed from anterior to posterior direction through an extended lateral approach are predictable for most fracture patterns.

## Indications for Total Elbow Arthroplasty

Arthroplasty for complex fractures in the older aged patient, especially those with complex multi-fragmented fractures has



Figure 2: Radiograph of a patient who underwent total elbow arthroplasty for a distal humerus fracture.

seen renewed interest following the publication of the Canadian Multi-center Trial.<sup>4</sup> Patients over 65 years were prospectively randomized to total elbow arthroplasty or open reduction and internal fixation. The results suggested that those patients who had the arthroplasty functioned better on both objective and patient rated scores (Figure 2). These data combined with additional studies would support the indications for total elbow arthroplasty for patients over the age of 65 years who have sustained a displaced comminuted fracture NOT amenable to stable internal fixation.<sup>1</sup>

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