

## Trans-Ulnar Basal Coronoid Fracture-Dislocations: Outcomes of Surgical Treatment

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### INTRODUCTION:




Trans-ulnar fracture-dislocations of the elbow are complex injuries that can be difficult to classify and treat. The Mayo classification of proximal trans-ulnar fracture-dislocations categorizes these injuries according to what the coronoid remains attached to: Trans-olecranon, Monteggia variant, and Trans-ulnar basal coronoid fracture-dislocations (Figure 1). Trans-ulnar basal coronoid injuries, in which the coronoid is not attached to either the olecranon or the metaphysis, present substantial challenges to achieve anatomic reduction and stable internal fixation. The purpose of this study was to analyze the outcome of surgical treatment of basal coronoid trans-ulnar fracture-dislocations.

**METHODS:** Between 2002 and 2019, 36 consecutive trans-ulnar basal coronoid fractures underwent open reduction and internal fixation (ORIF) at a single institution. Four elbows had less than 6-month follow up, and 4 elbows had undergone prior fixation attempts at outside institutions and were consequently excluded. Among the 28 elbows remaining, there were 13 females and 15 males with a mean age of 56 years (range 28-78) at the time of injury. The mean clinical and radiographic follow-up times were 37 months and 29 months respectively. Radiographs were reviewed to determine rates of union, Hastings and Graham heterotopic ossification (HO) grade, and Broberg and Morrey arthritis grade. Patients were also prospectively contacted to gather patient-reported outcomes and additional information on complications and reoperations.

### RESULTS:

A posterior approach was performed in all elbows with 7 elbows having an additional deep lateral approach, 2 elbows with an additional deep medial approach, and 2 elbows with additional deep lateral and medial approaches. The ulnar nerve was transposed in 6 elbows and decompressed in 6 elbows. All ulnar fractures were fixed with a posterior plate. The basal coronoid fragment was fixed with separate lag screws in 17 elbows, lag screws through the plate in 4 elbows, a separate anteromedial plate in 4 elbows, and suture fixation in 2 elbows. One coronoid received no fixation and rapidly developed grade 3 arthritic changes. Radial head fractures were treated in 23 elbows with 13 elbows treated with radial head arthroplasty (RHA), 4 undergoing partial excision, and 3 undergoing ORIF. Union occurred in 25 elbows, could not be determined at most recent follow up for 1 elbow; the remaining 2 elbows developed nonunion of the coronoid. Both nonunions occurred in patients with a single posterior approach and no radial head injury, one of which received suture only fixation of the coronoid. Complications occurred in 10 elbows (36%): deep infections (4), ulnar neuropathy (2), elbow contractures (2), and nonunion (2). There were reoperations in 11 elbows (39%): irrigation and debridement with hardware removal (4), hardware removal (3), ulnar nerve transposition (2), contracture releases with HO removal (2), and revision ORIF with iliac crest autograft (1). The other nonunion was treated nonsurgically. No patients with a medial approach and anteromedial plate developed an ulnar neuropathy or required hardware removal. The mean flexion-extension arc was 106° (SD±38°) and the mean pronation-supination arc was 137° (SD±46°). The mean Quick Disabilities of Arm, Shoulder, and Hand score was 11 (SD±12) points with a mean Single Assessment Numeric Evaluation-Elbow score of 81 (SD±15) points. At final radiographic follow up, 16 elbows (57%) had HO (8 class I and 8 class II), and 20 elbows (71%) had arthritis (8 grade 1, 6 grade 2 and 6 grade 3).

**DISCUSSION AND CONCLUSION:** Trans-ulnar basal coronoid fracture-dislocations are severe injuries associated with high rates of reoperation, heterotopic ossification, and posttraumatic arthritis. However, patients often obtain a functional range of motion and reasonable patient-reported outcome measures. Trans-ulnar basal coronoid fractures that cannot be adequately visualized or reduced through the ulna fracture via a posterior approach may require a separate deep exposure to properly address the coronoid fragments.

What is the coronoid attached to?	Classification	
Ulnar Metaphysis	Trans-olecranon fracture dislocation	
Olecranon	Monteggia Variant	
Neither	Trans-ulnar basal coronoid	

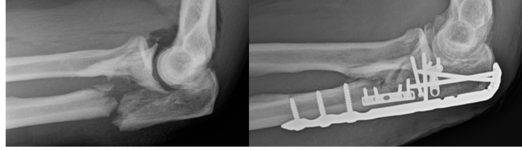


Figure II: Preoperative and postoperative radiographs of a trans-ulnar basal coronoid injury that required medial plating of the separate coronoid fragment in addition to a provisional medial plate for the ulna reduction prior to placement of the olecranon plate.