Managing a Terrible Triad With Concomitant Posteromedial Rotatory Instability: A Surgical Case Study

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Summary: Complex elbow injuries involving the anteromedial facet of the coronoid (AMF) may result in persistent posteromedial rotatory instability. Management of these injuries often results in poor outcome. We treated an 86-year-old female patient with a posterior elbow dislocation and unstable anterior and medial coronoid facet fractures (O’Driscoll type 2–3) that proved unstable after closed reduction. A single lateral approach was used to perform a lateral ligament repair and apply an internal joint stabilizer to neutralize the forces on the closely reduced elbow and AMF fracture. Direct fixation was not provided for the coronoid fracture to avoid a medial exposure and its associated morbidity. At 6 weeks, patient reported minimal pain and demonstrated a flexion/extension arc from 131 to 15 degrees. At final follow-up of 21 months, the patient denied any pain, expressed a return to regular activities, and demonstrated an almost equal range of motion compared with her uninjured contralateral side. In our case, an internal joint stabilizer applied from the lateral side was successful in restoring joint congruency, maintaining AMF reduction, and permitting early rehabilitation. The AMF was partially reduced by closed manipulation and healed in a position that provided stability.

Key Words: posteromedial rotatory instability, internal joint stabilizer, coronoid fracture, anteromedial facet of the coronoid

INTRODUCTION

The elbow is the second most commonly dislocated joint in the body, and 49% of these dislocations are complex.1 Primary stabilizers of the elbow include ulnohumeral joint congruency, the anterior bundle of the medial collateral ligament (MCL), and the lateral collateral ligament (LCL) complex.2 The ulnohumeral articulation itself provides up to 75% of varus and valgus support.3 The MCL is a primary restraint to valgus load and internal rotation.2

The coronoid process provides the majority of osseous constraint against posterior dislocation and varus displacement.3,4 Loss of the anteromedial facet of the coronoid (AMF) can lead to posteromedial rotatory instability due to loss of the its buttressing effect.5 Only 40% of the AMF is supported by the proximal ulnar metaphysis, making it prone to injury in axial and varus loading.6 The AMF fracture is also often associated with LCL rupture and MCL posterior band injury.5,7

Management of posteromedial rotatory instability regarding AMF fracture has been studied recently and noted to fail often.8 The Regan and Morrey9 classification system is useful in guiding treatment of coronoid fractures associated with terrible triad injuries. The O’Driscoll system categorizes coronoid fractures in more detail. It considers anatomical and morphological characteristics of coronoid fractures and the coronoid’s role in elbow stability.10 Under this model, type II fractures involve the anteromedial facet. These can be further subdivided into subtype 1 (rim), 2 (rim and tip), or 3 (rim and sublime tubercle).11 Although stable fractures (subtype 3-1 and 3-2) need not be addressed directly,11 the more unstable (subtype 3-3) may need additional management. Common treatment methods include buttress plating and graft reconstruction.7

The AMF of the coronoid, radial head, LCL, and MCL are rarely compromised simultaneously, but this injury will result in great degree of instability.12 More commonly, the terrible triad (TT)
injury involves the anterior coronoid, radial head, LCL, and MCL but not the AMF. Surgical management of the TT is often indicated particularly if there is evidence of static elbow subluxation or dislocation after radial head reconstruction, and a single lateral approach is commonly used. If an AMF fragment is present, repair is usually needed to restore MCL stability. However, open reduction and fixation of an AMF fracture is typically managed from a medial exposure, with a resultant increase in surgical dissection, duration, and morbidity.

After complex elbow injury, supervised Range of Motion exercises should begin within 15 days of surgery because of the propensity of the elbow to develop stiffness. Unfortunately, this is not always possible due to poor fixation after surgical management of AMF fractures.

PATIENT INFORMATION
A 86-year-old female patient was injured by a fall onto an outstretched arm from a standing position. She presented to the emergency department with a posterior ulnohumeral dislocation, a type II fracture of the radial head, and a displaced fracture of the anterior and medial coronoid process (Fig. 1). She was reduced and splinted at the hospital. Five days after injury, she presented at our facility where radiographs (Fig. 2A, B) demonstrated a persistent elbow subluxation, a fracture of the AMF, and a mildly displaced type II radial head fracture. She was indicated to undergo surgical treatment because of persistent subluxation and displaced AMF.

SURGICAL TECHNIQUE
The patient was treated in an outpatient setting. The surgical procedure included reducing the elbow joint subluxation, debriding a small radial head fragment, installation of an internal joint stabilizer (IJS-E, Skeletal Dynamics, LLC, Miami, FL), and lateral ligament repair.

The Kocher lateral approach was used to expose the joint. The type 2 radial head fracture consisted of a small nonarticular fragment (estimated 1/5 of the total RH circumference) which was excised. The coronoid fracture was a type II, subtype III on the O’Driscoll system. The AMF fracture reduced anatomically when the joint was reduced. We stabilized the elbow with an internal joint stabilizer (IJS-E, Skeletal Dynamics) to maintain joint reduction and neutralize forces on the coronoid. The unilateral fixation device was applied on the lateral aspect. The lateral ulnar collateral ligament was repaired by reinsertion to the medial epicondyle using bone tunnels just proximal to the axis pin. At the completion of the procedure, the joint proved stable through a full range of motion and the AMF fragment appeared not to displace. A medial approach was not performed.

POSTOPERATIVE COURSE
At 1 week, we removed the postoperative dressing, provided a posterior elbow orthosis, and instructed the patient to begin occupational therapy. On the sixth week of follow-up, the patient presented with a subjective pain score of 0/10 and a range of motion of 140 degrees’ flexion to 30 degrees from full extension. At 15 weeks, the patient denied pain, had returned to regular activities, and presented with full range of motion (0–145 degrees). Radiographs showed a healed AMF. Patient refused implant removal surgery.

The final visit was conducted at 21 months (Fig. 3). The patient denied any pain, with a QuickDASH score of 0 and an MEPS of 100. The operative elbow presented a flexion extension arc of 98.6% that of contralateral (0–145 degrees), 75 degrees of pronation (contralateral 70 degrees), and 92 degrees of supination (contralateral 90 degrees) (Fig. 4). The patient exhibited a grip strength of 30 lbs (contralateral 34 lbs) and a key grip pinch strength of 11 lbs (contralateral 9 lbs).
TT injuries with an AMF fragment are uncommon and less so in the elderly population or resulting from low-energy trauma. Outcomes of AMF fractures are often made worse by problems including recurrent dislocations, varus malalignment, varus subluxation, radiographic arthritis, and poor functional outcomes requiring revision surgeries. Therefore, these injuries should be treated promptly and aggressively.

TT injuries are treated from a lateral approach to access the radial head, anterior coronoid, and lateral ligament complex. Contrarily, the management of AMF fractures typically requires a medial approach. However, a medial exposure is not a frequently performed procedure. It can be technically challenging, and it increases morbidity when performed in addition to a lateral exposure. By using a lateral approach and an internal joint stabilizer, we were able to treat a TT injury in an elderly patient with a concomitant AMF fracture in a simple manner and without a medial approach and its associated morbidity.

CONCLUSIONS
It is possible to treat successfully an AMF fracture-dislocation by means of a single lateral approach, close reduction of the AMF fracture, repair of lateral ligaments, and neutralization with an internal joint stabilizer. This technique obviates the added morbidity of a medial surgical approach.

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REFERENCES

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