



Retrograde Screw Fixation Results of Coronoid Fractures in Terrible Triad

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

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Short Research Article

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ABSTRACT

In this study, we aimed to evaluate the results of coronoid fracture fixation, in terrible triad of elbow injury with retrograde screws. Patients between 2008 and 2012 were reviewed. Six were men and 2 were women. Mean age was 44.5(21-62). Mean follow-up period was 25.25 months (8-50). According to Regan and Morrey classification, 6 of the fractures were Type 3 and 2 were Type 2. All cases were operated with single lateral incision. For coronoid fracture, reduction was maintained from anterior aspect and fixed with posterior percutaneous screws which were single 4.5 mm screw in 3 patients and double 3.5 mm screws in 5 patients. Mini and micro cannulated screws for 4 patients and anatomic radial head plates for 4 patients were used for radial head fractures. All lateral ligament complex repairs were performed with bone tunnel technique. The results of the treatment were evaluated with Mayo elbow performance scoring system. All the fractures were united and mean union time was 4 months (3-6). Mean active elbow flexion – extension range of motion at last visit was 108.2° (70°-130°). Mean Mayo elbow performance score

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of the patients was 87.5 (70-100). With retrograde screw fixation of coronoid fractures in terrible triad, we achieved a stable fixation.

Keywords: Elbow joint; dislocation; ulna fractures; terrible triad.

1. INTRODUCTION

The combined injury which consists of radial head and ulna coronoid process fractures in addition to elbow dislocation is named as terrible triad of the elbow [1,2]. The name terrible triad was first defined by Hotchkiss and Ring due to its difficulties in their management [2,3]. The most common mechanism of injury is a direct fall on the hand while the elbow and wrist are in extension. Coronoid fractures are classified according to Regan and Morrey classification system [4]. Regan type 1 and 2 fractures are the most common types of terrible triad injuries. Type 1 fractures are treated non-surgically while type 2 and 3 fractures need surgical fixation [5]. In this case series study; we aimed to evaluate the clinical results of type 2 and 3 coronoid fracture fixation with retrograde screws.

2. MATERIALS AND METHODS

We evaluated 8 cases of terrible triad injuries which were treated with retrograde screws for coronoid fractures between 2008 and 2012 and no other methods were used on other patients during this time period. Patients who were treated with suture laso, suture anchor or plates were excluded. Six of these patients were men, while rest of them was women. Mean age was 44.5 (21-62) (Table 1).

Mean follow up period was 25.2 (8-50) months. According to Regan and Morrey classification, 6 of the fractures were type 3 and 2 were type 2 (Fig. 1).

All of the patients were operated with a single lateral incision. In all patients lateral collateral ligament complex was repaired after the fixation of coronoid and radial head fractures respectively. For coronoid fracture, reduction was maintained from anterior aspect and fixed with posterior percutaneous screws which were single 4.5 mm screw in 3 patients and double 3.5 mm screws in 5 patients. Mini and micro cannulated screws for 4 patients and anatomic radial head plates for 4 patients were used for radial head fractures (Fig. 2).

All lateral ligament complex repairs were performed with bone tunnel technique. Anchors were also used when needed. Patients were followed postoperatively with regular periods. At last visit, the results of the treatment were evaluated with Mayo elbow performance scoring system.

3. RESULTS

In all patients surgery was performed under pneumatic tourniquet with single lateral incision. Postoperative pain and edema was controlled with long arm splint for 1 week. Indomethacin was administered for 6 weeks for heterotrophic ossification prophylaxis with 3x25 mg/day. Range of motion exercises were started after the first week and splint was terminated. All fractures were united at follow up and mean union time was 4 months [3-6]. None of the patients had lateral collateral ligament insufficiency. Mean active elbow range of motion at last visit was 108.2° (70°-130°). Two patients had flexion contractures less than 30 degrees. Radial nerve neuropraxia was noted in 2 patients but they were resolved by 3 months. None of the patients developed any recurrent instability and only 1 patient was not able to turn back to his job prior to trauma. Mean Mayo elbow performance score of the patients was 87.5 (70-100).

4. DISCUSSION

Coronoid process has been shown to play a critical role in ulnohumeral stability. Medial, lateral and anterior approaches have been popularized in recent literature, but there is no universally accepted approach. Common fixation techniques include anchors, lag screws, suture laso and plating [6]. In all our patients we operated the injuries of terrible triad through single lateral incision. Without the necessity of a separate incision, after the reduction of the coronoid fracture, we fixed it with a percutaneous retrograde screw from the posterior cortex of proximal ulna.

Coronoid fractures typically occur secondary to a shearing mechanism that produces a transverse fracture; thereby, the coronoid is driven against

the unyielding distal part of the humerus. Fracture fragments usually remain attached to the anterior articular capsule. Thus, a coronoid fracture is a pathognomonic sign of an episode of posterior elbow instability.

Tablo 1. Demographic data of the patients

	1	2	3	4	5	6	7	8
Age	33	41	45	62	38	51	30	56
Type of fracture	Type 3	Type 3	Type 2	Type 3	Type 2	Type 3	Type 3	Type 3
Sex	Male	Male	Female	Male	Male	Male	Female	Male



Fig. 1. Fracture type of a patient



Fig. 2. After fixation of fracture

Recent studies showed that fixation of the coronoid fracture are more important than replacement of the radial head or repair of the collateral ligament. When it is unable to fix the fracture, soft tissues of the coronoid fragment should be sutured to the defect, using a suture lasso or suture anchor [7].

The terrible triad of the elbow is difficult to treat. A study using a standard protocol reported flexion- extension arc of 112°, recurrent instability in 6% and the need for secondary intervention in 22% of the patients, and an external fixator was recommended whenever instability persisted [3]. In our study we never experienced any recurrent instability and needed an external fixator.

Limited number of patients is an important weak point of this study. Also similar studies with control groups would give more satisfactory results.

5. CONCLUSION

Treatment of coronoid fractures is a challenge for orthopaedic surgeons. Type- 2 fractures, the most common type in the terrible triad, are most difficult to synthesize. But the patients in our study had mostly type 3 fractures due to patient selection for retrograde screw fixation.

In summary the coronoid process is an important element for the stability of the elbow. A lateral approach was used for osteosynthesis of the coronoid and radial head. We achieved an adequate stabilization for the coronoid fracture with retrograde screw technique.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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