

# Suture Fixation of Coronoid Fractures – Using an 18 g Needle as Suture Passer – A Novel Technique

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## Learning Point of the Article:

Alternative Novel technique for Coronoid fracture fixation.

## Abstract

**Introduction:** Coronoid fractures in complex elbow dislocations and terrible triad injuries are usually tip avulsions. Only suture fixation of tip fragments may be possible.

**Case Report:** We have described a simple and cost-effective technique for suture fixation of the coronoid fracture using an 18 G needle as a suture passer.

**Conclusion:** This novel technique of using an Ethibond 18 gauge needle as a suture passer may obviate the difficulty usually associated with suture fixation of the coronoid.

**Keywords:** Coronoid tip fracture, coronoid suture fixation, Ethibond looped needle.

## Introduction

The coronoid process acts to buttress against the posterior translation of the ulna on the humerus. It is also the attachment site for the anterior elbow capsule, brachialis, and the medial collateral ligament of the elbow. Coronoid fractures are critical injuries and are suggestive of elbow instability. Coronoid fractures have traditionally been classified using the Regan and Morrey [1] system focusing on the height of the fracture on lateral radiographs. Type I is avulsion at the tip of the coronoid process, Type II involves <50% of the coronoid height, and Type III involves more than 50% of the coronoid height. O'Driscoll et al. [2] introduced a more comprehensive classification system that included fracture size, anatomic location, and mechanism of injury [3].

Transverse tip fractures are usually associated with terrible triad injuries of the elbow. In terrible triad injuries usually, the radial head fracture is comminuted and beyond reconstruction [4]. Most of the time radial head is resected and replaced. The lateral ulnar collateral ligament (LUCL) is also reattached. There is controversy regarding the management of coronoid fractures in terrible triad injuries. Fixation of larger fragments would definitely improve stability but the role of fixation of the tiny tip coronoid fractures is controversial. Usually, the coronoid fracture with the anterior capsule can be easily visualized and “held” through the “window” offered by the resected radial head. However, the difficulty is with the suture fixation of these tiny fragments. Intra-operative testing of stability can be done only after lateral ulnar collateral repair and radial head replacement

## Author's Photo Gallery



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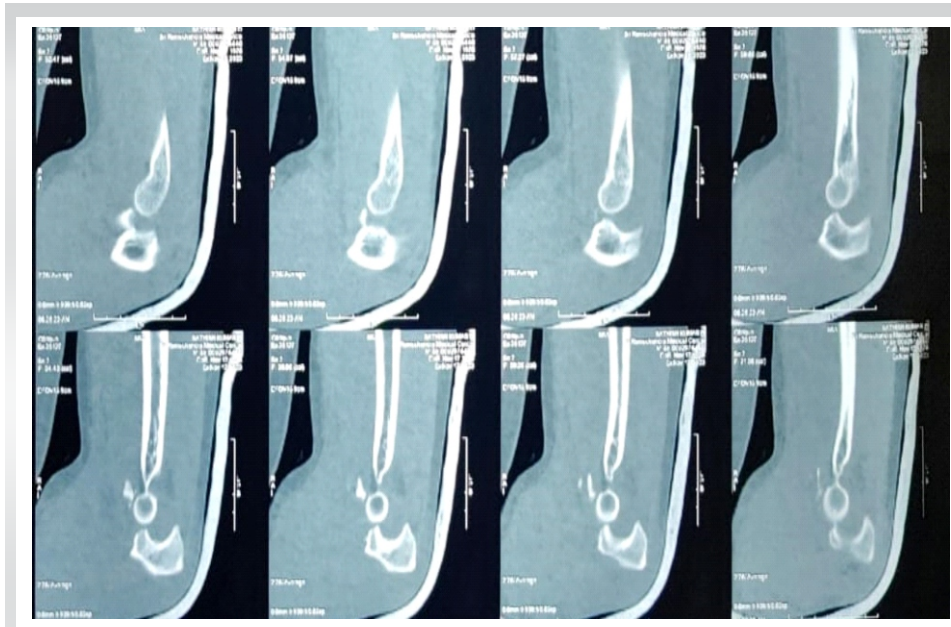
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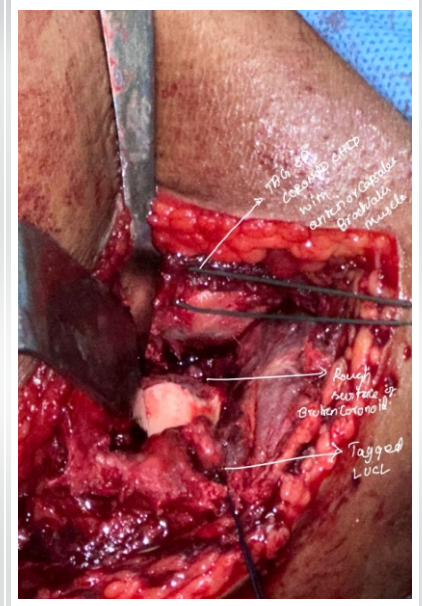
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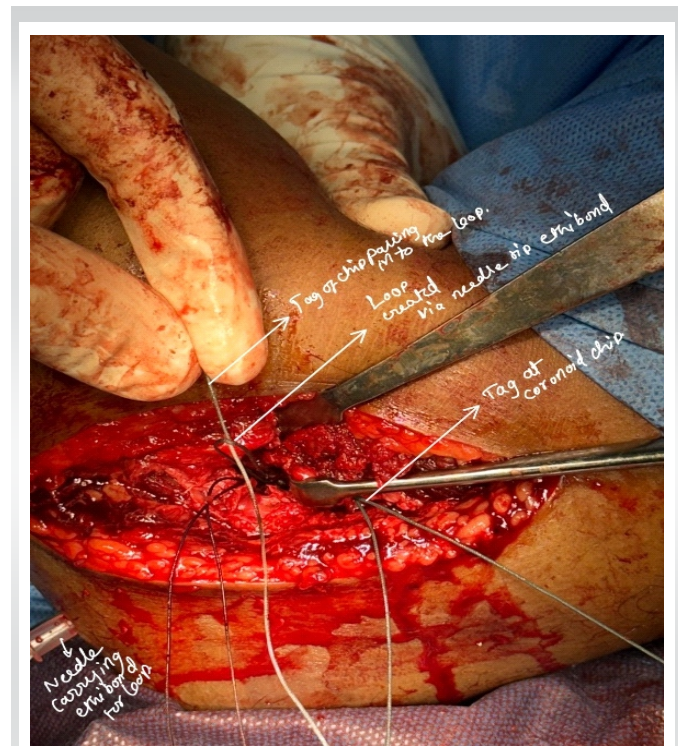
**Figure 1:** 1-1.3: X-ray and computed tomography images of a terrible triad of the elbow.



**Figure 2:** Intraoperative image of the tagged olecranon.

which closes the window for coronoid fixation. Hence, it may be better to pass the sutures for fixation of coronoid before radial head replacement and LUCL repair- “prophylactic fixation: [5-7]. Suture fixation of the coronoid may offer additional stability if radial head replacement and LUCL repair are not enough.

Basal coronoid fractures are usually associated with transolecranon fracture-dislocations and oblique anteromedial fractures with varus posteromedial rotatory instability. Usually, these fragments are larger and comminuted and are fixed through a separate medial approach to the coronoid. Typically Type I fractures are fixed with sutures passed through the anterior elbow capsule just above the bony fragment and repaired by placing drill holes through the subcutaneous border of the ulna into the base of the coronoid. Type II and Type III fractures can be fixed with screws or plates [8].



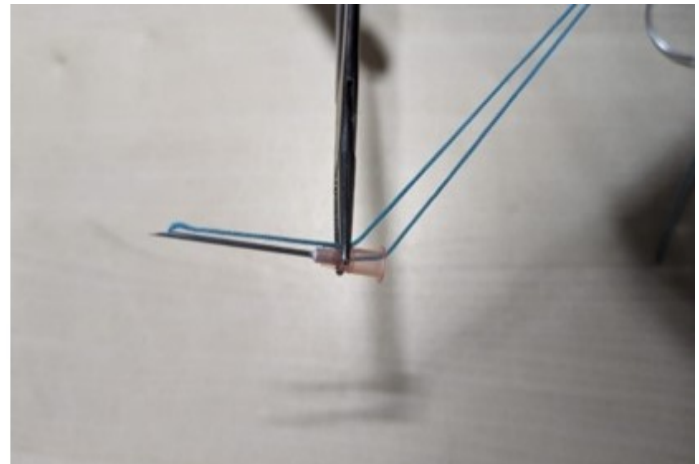
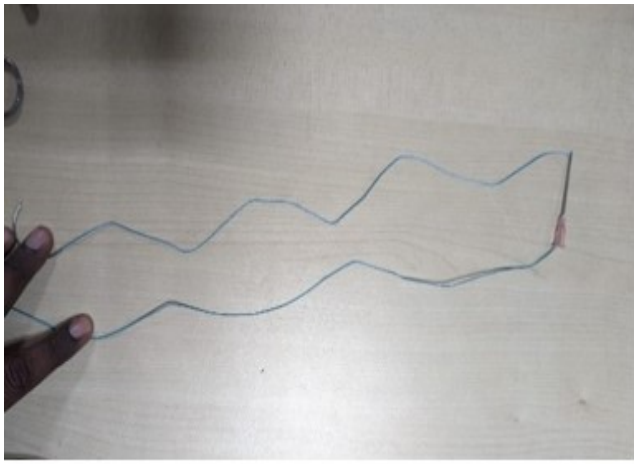
**Figure 3:** Intraoperative image of Ethibond looped 18 G needle through which tagged olecranon wire is passed through.

### Case Report

A 48-year-old male patient presented with complaints of pain and deformity over the left elbow following a slip and fall from the two-wheeler. Post-injury, the patient was not able to use his left upper limb. Clinically, there was diffuse swelling over the left elbow with a restricted range of movements. There was no distal neurovascular deficit.

Radiographs showed complex elbow dislocation.(Fig. 1). Reduction was attempted in the emergency department under sedation but the elbow was unstable after reduction. Temporary splinting was done and computed tomography was taken which showed that the elbow was still dislocated posteriorly. There was a comminuted displaced radial head fracture and fracture of the tip of the coronoid.(Fig. 1.2-1.3).

Under regional anesthesia and tourniquet control, exposure



**Figure 4:** 1 and 4.2: Ethibond looped 18 G needle.

was done using Kocher's approach. The LUCL was avulsed from the lateral epicondyle and this "bare" region provided access to the radial head. The LUCL was tagged with a suture. The radial head fragments were excised and preparation (sizing and broaching) was done for the insertion of radial head prosthesis.

The tiny coronoid fragment with an attached anterior capsule and brachialis was identified. It is easier to "catch" this fragment with the ulnohumeral joint reduced as the fracture then comes closer to its base.

Normally in these types of injuries coronoid fixation is important for elbow stability and suture fixation of coronoid becomes tricky without a suture passer as these sutures have to be passed through the ulna bony tunnel.

We demonstrate a cheaper and easier alternative by using an Ethibond looped 18 gauge needle as a suture passer through

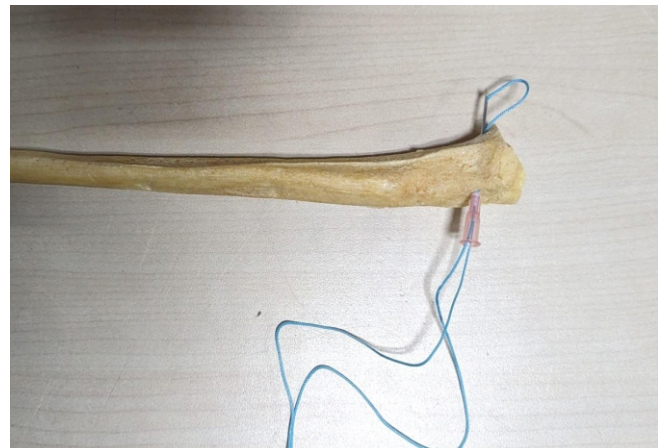
which the fractured coronoid can be stabilized to the ulna.

The coronoid fracture as previously described was accessed through the lateral window offered by the radial head excision.

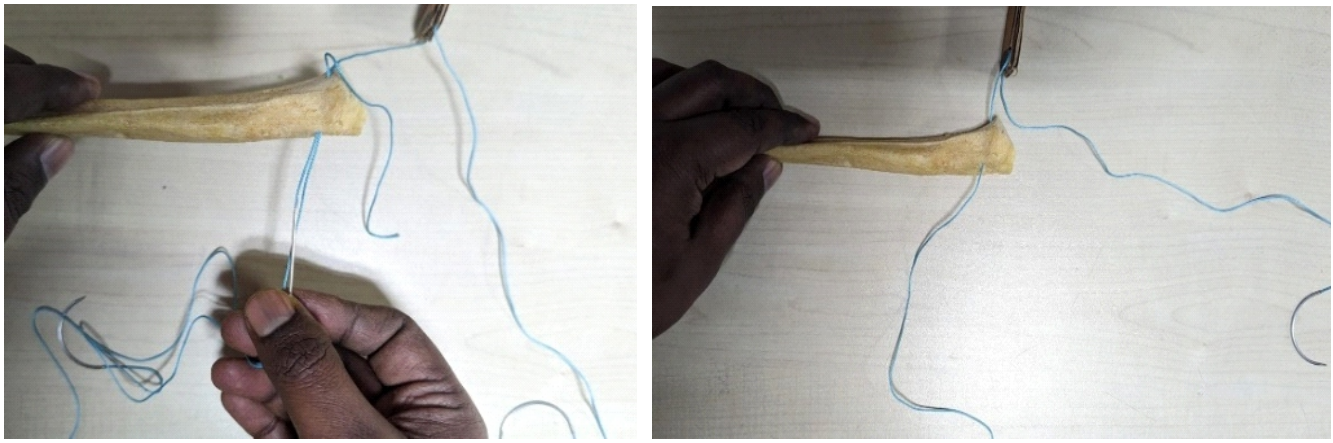
1. The suture (2 Ethibond) was first passed through the anterior capsule just proximal to the coronoid fracture (capsule-bone junction) and both ends were tagged (Fig. 2).
2. Through a separate small incision over the dorsal subcutaneous border of the ulna, two parallel drill holes were made with 1.8 mm Kirschner wire directed toward the coronoid (fracture floor/base) (Fig 4.1-4.2, Fig 5, Fig 6).
3. 2 Ethibond suture was inserted through the tip of the 18 G needle to create a loop as illustrated in Figure. (Fig 3).
4. The Ethibond looped 18-gauge needle was inserted through one hole till the needle tip was visualized through the lateral window. Using any small instrument or needle the loop was enlarged. One of the coronoid suture ends was inserted into the



**Figure 5:** Two parallel drill holes from the dorsal border of the ulna.



**Figure 6:** 18 G needle as suture passer inserted into the drill hole from the dorsal border of the ulna.



**Figure 7:** 7.1-7.2: Suture ends one by one passed through the loop in the needle and brought to the dorsal border of the ulna by pulling the needle out.

loop maintaining enough length. The needle was then pulled out which brings the coronoid suture into and out through the tunnel. The same procedure was repeated through the other ulna hole to bring the other end of the coronoid suture through the tunnel.

5. Both the suture ends were tied after ulnohumeral reduction, radial head fixation, and LUCL repair. (Fig . 7.1-7.2, Fig . 8). (Fig. 3).

### Discussion

Fixation of the coronoid tip is technically difficult and may require the usage of specialist equipment [9]. Suture fixation involves passing sutures or wires through drill holes in the ulna to capture the coronoid fragment or its anterior capsular attachment [10]. The proposed method of using an 18 G needle with an Ethibond loop as a suture passer is technically easy and financially feasible. Using an 18 G needle, Suture ends

can be easily passed through the ulnar bony tunnel and fixed. This is a simple technique to reproduce and can also be used in other areas where multiple sutures have to be passed through bony tunnels.

### Conclusion

Fracture of the coronoid and radial head and an associated Elbow dislocation constitute a highly unstable injury. Historically this type of complex fracture dislocation necessitates operative treatment. The majority of elbow instability arises when the coronoid process is not fixed which acts as the anterior buttress. There is a general belief that fixing Morrey type I/II coronoid process avulsion fracture is difficult. Several techniques have been described to fix the fracture pattern, such as the suture pullout technique, suture lasso technique, and suture anchors which require a steep learning curve and are not cost-effective. The above-described technique uses Ethibond and an 18-gauge needle to pass the sutures to fix the coronoid which is cost-effective and easy to perform.



**Figure 8:** Coronoid is fixed by suturing both ends over the dorsal border of the ulna.

### Clinical Message

This novel technique of using an Ethibond looped 18 gauge needle as a suture passer obviates the difficulty usually associated with suture fixation of the coronoid.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Conflict of interest:** Nil **Source of support:** None

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