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ENIGMA OF THE DISTAL ULNAR FRACTURES: A RESEARCH TOWARDS THE SOLUTION

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ABSTRACT: Forearm fracture are one of the common fractures, although complete data are not present regarding epidemiology of forearm fractures but at some international centers forearm diaphysis fractures account for 5% of all fractures out of which most of the fractures are distal forearm fractures. In literature little stress is given over the management of distal ulna fracture. In our research we have divided distal ulna fracture in different categories like combined fracture with radius, acute ulnar styloid fracture, ulnar styloid with nonunion, ulnar neck fracture, fracture with comminution. A systematic approach towards these fracture by using this classification can be helpful in management of these fracture.

Key Words: Distal ulna fracture, ulna styloid, fracture forearm.

Introduction

In the distal forearm fractures the radius is the bigger articulating bone whereas the ulnar is the smaller bone. Nevertheless it plays an important role in the stability of the wrist and the final outcome of the same. This is mainly due to the ligaments attached to the ulnar styloid. These distal ulnar fractures are often ignored and very little data is present in the literature to form an evidence based decision on the management of the distal ulnar. The distal ulnar fractures hence form an enigma on how the protocol for the management of these fractures. On examining the literature we have tried to form a consensus on the various types of the distal ulnar fractures, and with the help of these guidelines we might be able to treat the distal ulnar fractures better and not ignore these fractures.

Background

A systematic search of the literature was done and all the articles and case reports regarding the management of the distal ulnar fractures were assessed and

then included in the study. On searching the Cochrane library we were unable to find any article of the article of distal ulnar fracture. There were no articles with a control group found in our search. About 20 articles and 6 case reports were included in our study.

Distal Ulnar Fractures

For the ease of assessment of the management of the distal ulnar fractures we have divided it into 6 types:

1. Combined Distal Radius and Ulnar Fracture
2. Acute Ulnar Styloid Fracture
3. Symptomatic ulnar styloid fracture nonunion
4. Ulnar head fractures (2 part)
5. Distal ulnar neck or distal shaft fractures
6. Comminuted intra-articular distal ulnar fractures

All these fractures have been discussed separately in detail.

Combined Distal Radius and Ulnar Fracture

This is the most common type of distal ulnar fracture as distal ulnar fractures are most commonly associated with distal radius fractures. The management of the distal ulnar fracture entirely depends on the severity of injury to the distal radius and the management of the distal radius. If managed aggressively and wrist mobilization is warranted early then ulnar is to be managed aggressively. Generally distal ulnar fractures are to be treated once the management of the radius fractures has occurred.

Acute Ulnar Styloid Fracture

The management of the ulnar styloid fractures depends entirely on the ability of the fracture to cause distal radio-ulnar instability. The stability of the distal radio-ulnar joint depends upon the bony congruity between the sigmoid notch of the radius and the ulnar head along with the ligament surrounding it^[1-3]. This consists of the TFCC ligament (Triangular Fibro-Cartilage Complex)^[1-8]. This complex is attached from the dorsal and palmar edge of the sigmoid notch in the distal radius and run to the fovea of ulnar head and the base of ulnar styloid^[4-7, 9]. The ulno-radial ligament, which represents the transverse and peripheral part of the TFCC is major stabilizer of the DRUJ^[6, 10].

Current Management: On the management aspect we found 2 case reports, 11 retrospective and 5 prospective studies. We found out the following:

- More than 40% of radius fractures are associated with ulnar styloid fractures^[11-17]. This association increases to 86% in case of intra-articular fracture of radius^[18].
- Many a time the ulnar styloid fracture reduces on the reduction of the distal radius fracture^[19]. If such a situation occurs then the fracture can be managed none operatively with an above elbow casting for 6 weeks^[20].
- DRUJ stability depends on the exact restoration of the sigmoid fossa of the distal radius^[21].
- It is seen that ulnar styloid fractures at the base are associated with instability of the DRUJ^[22].
- Ulnar styloid tip fractures are stable as the main stabilizer, the ulnoradial

ligament, is attached to the base of the styloid.

There were the following controversies which were observed.

- Some studies showed that the ulnar styloid fractures associated with the distal radius fractures were more unstable than the ulnar styloid fractures alone^[11].
- Other studies showed that there was no functional difference between the two groups^[23, 24]. This was attributed to the following reasons. (1.) Fracture being distal to the ligament attachment^[25]. (2.) TFCC tear present without styloid fracture^[25]. This might be the reason for the late instability in cases of isolated distal radius fracture^[26]. Based on literature the various treatment protocol is as follows.
- Fixation of the ulnar styloid if the fragment is more than 2mm. this can be done via single K-wire^[10, 22], tension band wiring^[20], a wire loop/suture^[22] or screw fixation^[27].
- If DRUJ instability is present with or without styloid fracture then direct repair or repair with styloid fixation is required^[10,19,20].
- If styloid is undisplaced or reduces with traction then manage with above elbow cast^[20].

Symptomatic ulnar styloid fracture nonunion:

Causes for symptomatic ulnar styloid fracture nonunion is as follows:

- Impingement of overlying Extensor carpi ulnaris tendon^[28].
- Loose body^[27]
- Abut on carpus^[27,29]
- Nonfunctioning ulno-radial ligament^[27]

Characterized by ulnar side pain which worsens on load bearing. The nonunion has been associated with DRUJ instability in a single study^[30]. However, in the literature we saw that the functional scoring was the same if the styloid had united or had gone into nonunion^[14]. Also, that nonunion of styloid is not associated with any DRUJ instability^[25]. Management

of the symptomatic nonunion distal ulnar has been divided into 2 parts:

1. With DRUJ instability: removal of the fracture fragment and repair of the TFCC^[27]
2. Without DRUJ instability: removal of the fracture fragment^[21,27,31].

Ulnar Head Fractures:

Very little literature is found on the net regarding these fractures. Only a few case reports were there^[32-35]. For the effective management they can be divided into 2 groups.

1. Ulnar head fracture
2. Ulnar head fracture with associated shaft fracture.

Head Fractures

Treatment of displaced fractures with intra-articular step includes ORIF with buried headless compression screws^[32,34] or Kirschner's wires^[33] or with internal locked plates^[35].

Head Fractures with associated shaft fractures

Only 3 cases reported. All operated with ORIF with headless screw, Tension band wiring and small locking plate.

In these fractures the only advantage of rigid fixation and early mobilization is the improvement in the final functional outcome which is achieved by early mobilization.

Based on the current literature all cannot be advised operation. Preoperative CT scanning is helpful in assessing the fracture pattern. The fracture pattern determines the type of fixation.

- Intra-articular fracture → Headless screw fixation
- Extra-articular → condylar plate
- Associate ulnar styloid fracture → tension band wiring.

Distal ulnar neck or distal shaft fractures

Fractures occurring within 5 cm of the distal dome of ulnar is known as distal ulnar neck or distal shaft fractures. Only a

few case reports are available for the management of the distal ulnar neck or distal shaft fractures. The fractures generally reduce on the reduction of distal radius^[36]. However the functional outcome may be affected in cases of comminuted fractures associated with TFCC disruption^[37]. Closed reduction is difficult especially in cases and hence the non-operative management generally fails. These fractures can be treated with closed reduction and cast application^[36]. In case of irreducible fracture ORIF with various treatment options can be managed like blade plate^[36], tension band wiring supplemented by intra-fragmentary screws^[37] or an internal locking plate^[25].

Comminuted intra-articular distal ulnar fractures

Only one case report^[38] and one retrospective study^[39]. In the case report primary ulnar head prosthesis was used whereas in the retrospective study ulnar head resection and soft tissue interposition was done. The results of the primary ulnar head resection were better as compared to the ulnar head resection as functionally it was associated with decrease in the grip strength as compared to the contralateral side. Seeing this there are 2 treatment options available to us for the management of such fractures. Since, no clear cut guidelines are available for the management we would like to recommend the initial management by maintaining the alignment by cast and then go for a salvage procedure later on depending on the functional outcome.

Conclusion

The little amount of literature available in our search can be attributed to the fact that these type of fractures are generally missed or ignored. This may be the cause of future pain and instability of the wrist. These fractures should hence be

Managed aggressively and not ignored as these fractures may be the cause of great discomfort to the patients in their future. An Awareness for the correct management of

such fractures should be done and further literature is required to form evidence based treatment protocols for the management of such fractures.

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