

Clinical outcome of fixation versus conservative management of basal fractures of the ulnar styloid following volar plate fixation of distal radius fractures

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The Egyptian Orthopedic Journal; 2018 supplement (2), December, 54: 24-27

Abstract

Background

Distal radius fractures are usually associated with ulnar styloid fractures which may affect functional outcome. Fixation of ulnar styloid fractures has been debated for a long time.

The aim of this study was to compare the results of fixation and conservative management of ulnar styloid basal fractures after volar plating of distal radius fractures in absence of DRUJ instability.

Patients and Methods

This is a prospective randomized control trial conducted at an academic Level 1 Trauma Center between 2015 and 2017. The study included 31 patients (22 males and 9 females). The mean age was 36 years (20-50 years). The dominant hand was affected in 14 cases and the non-dominant hand was affected in 17 cases. Patients were assessed for pain by Visual Analogue Scale (VAS) and grip strength compared to the sound side. Functional evaluation was performed by using the Modified Mayo Wrist Score (MMWS) the Quick-DASH (Disabilities of the Arm, Shoulder and Hand) questionnaire.

Results

In the first group, the mean postoperative visual analogue scale (VAS) for pain was 0.46 (range, 0 to 2), the mean quick DASH score was 26.23 (range, 17 to 35) and the mean postoperative modified Mayo wrist score (MMWS) was 75 (range, 65 to 85). The mean grip strength was 61.33 % of the sound side (range, 45 to 80%)

In the second group, the mean postoperative visual analogue scale (VAS) for pain was 0.44 (range, 0 to 2), the mean quick DASH score was 23.67 (range, 16 to 34) and the mean postoperative modified Mayo wrist score (MMWS) was 72.78 (range, 70 to 85). The mean grip strength was 54.38 % of the sound side (range, 30 to 80%)

Conclusion

Results were comparable in both groups with no significant differences in functional outcome.

Key words

Ulnar styloid, fixation, DRUJ, instability.

Introduction

Ulnar styloid fractures accompany around 51- 65% of distal radius fractures and may affect outcome. Because of its close association with the triangular fibrocartilage complex (TFCC), fractures of the ulnar styloid might indicate possible TFCC disruption and resultant distal radioulnar joint (DRUJ) instability. [1-7]

The role of internal fixation of the ulnar styloid in absence of DRUJ instability is a controversy. Some authors think that fixation avoids the symptomatic non-union, and others think that fixation will add surgical time, scar, risks, and prominent implants.[8-13]

The aim of this study was to compare the results of fixation and conservative management of ulnar styloid basal fractures after volar plating of distal radius fractures in absence of DRUJ instability.

Patients and methods

This prospective randomized controlled trial was conducted between 2014 and 2017 on a group of 31 patients with distal radius fracture associated with fracture at the base of the ulnar styloid.

The inclusion criteria were (1) closed fractures, (2) skeletally mature patients, (3) stable DRUJ. **The exclusion criteria** were (1) open fractures, (2) skeletally immature patients, (3) unstable DRUJ, (4) associated upper fractures in the same limb, (5) arthritic wrist.

There were 22 males (70.97 %) and 9 females (29.03 %), with a mean age of 36 years (range, 20 to 50 y). The dominant hand was affected in 14 patients (45.2%) and the non-dominant in 17 patients (54.8%). Patients were divided into 2 groups; the first group included 15 patients to whom ulnar styloid fixation was done. The second group included 16 patients with conservative management of ulnar styloid. Randomization was done by using the double blind method.

Technique:

Surgery was performed under general or brachial plexus anaesthesia. An upper arm tourniquet was applied after administration of a single dose of antibiotic. All distal radius fractures were internally fixed with a volar plate and screws through a standard volar Henry approach.[14] DRUJ stability was assessed intraoperatively after internal fixation of the distal radius by looking for subluxation or dislocation of the distal ulna with either anteroposterior stress (the piano key sign) or forearm rotation. Only patients with stable DRUJ were included in the study. Fixation of the ulnar styloid was done by tension band wiring using an ulnar approach with caution not to injure the dorsal cutaneous branch of the ulnar nerve (figures 1,2).



Figure (1): Identification of the dorsal cutaneous branch of ulnar nerve.



Figure (2): Final intraoperative radiograph after fixation.

Patients had a below elbow plaster splint applied for 6 weeks postoperatively. Patients were encouraged to mobilize the digits and elevate the limb to avoid post-operative edema.

Sutures were removed 2 weeks after surgery. Patients were followed up clinically and radiologically every two weeks for the first three months, every month thereafter up to six months.

Patients were evaluated for union, range of motion and grip strength. Functional assessment was done using Modified Mayo Wrist Score (MMWS) the Quick-DASH (Disabilities of the Arm, Shoulder and Hand) questionnaire. [15-17]

Results

The first group included 15 patients to whom ulnar styloid fixation was done. The group included 12 males (80%) and 3 females (20%). Their mean age was 32.6 years (range, 20 to 50 y). The mean follow-up period was 5.60 months (range, 3 to 6 m).

The mean postoperative visual analogue scale (VAS) for pain was 0.46 (range, 0 to 2), the mean quick DASH score was 26.23 (range, 17 to 35) and the mean postoperative modified Mayo wrist score (MMWS) was 75 (range, 65 to 85). The mean grip strength was 61.33 % of the sound side (range, 45 to 80%).

One patient had ulnar styloid non-union (6.66%). One patient had superficial infection at the ulnar wound (6.66%) which improved on dressing and antibiotics. Two patients had irritation of dorsal cutaneous branch of the ulnar nerve (13.33%) which improved on neurotonics and had their hardware removed 6 months after surgery.

The second group included 16 patients to whom ulnar styloid fixation was not done. The group included 10 males (62.5%) and 6 females (37.5%). Their mean age was 39.44 years (range, 20 to 50 y). The mean follow-up period was 4.84 months (range, 1.5 to 6 m).

The mean postoperative visual analogue scale (VAS) for pain was 0.44 (range, 0 to 2), the mean quick DASH score was 23.67 (range, 16 to 34) and the mean

postoperative modified Mayo wrist score (MMWS) was 72.78 (range, 70 to 85). The mean grip strength was 54.38 % of the sound side (range, 30 to 80%).

Two patients had ulnar styloid non-union (12.5%) with no affection of the daily activities.

Results were comparable in both groups (table 1, figure 3) with more complications in the first group.

Table (1): Comparison of results in both groups.

	First group			Second group		
	Mean	Min	Max	Mean	Min	Max
VAS	0.46	0	2	0.44	0	2
Quick DASH	26.33	17	35	23.67	16	34
MMWS	75	65	80	72.78	70	85
Grip strength	61.33%	45%	80%	54.38 %	30%	80%

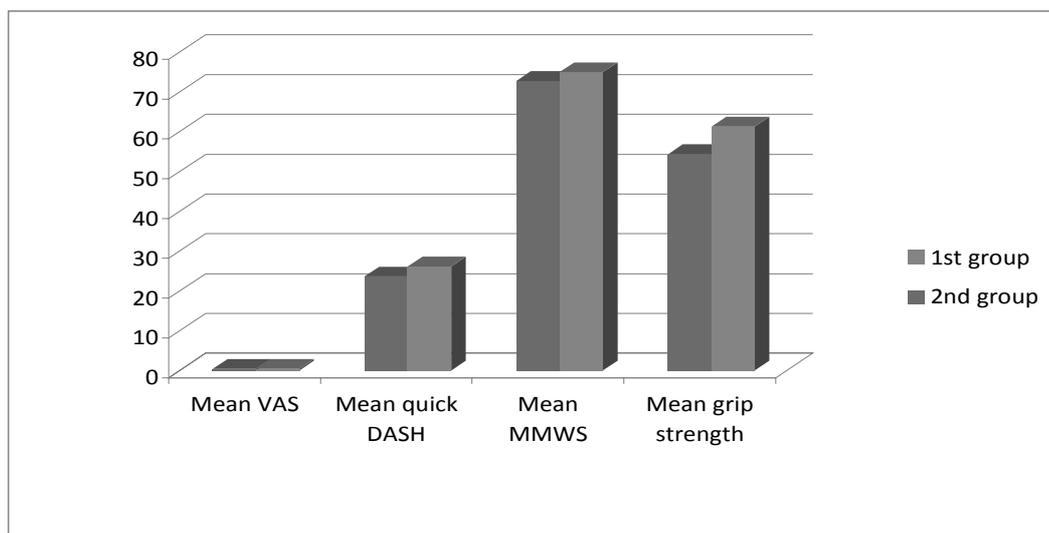


Figure (3): Mean results in both groups.

Discussion

Ulnar styloid fractures often accompany distal radius fractures. It is unclear how this additional injury affects functional outcome or DRUJ stability. Some authors suggest that this fracture has minimal to no clinical or radiographic impact when accompanying distal radius fractures. Displaced ulnar styloid fractures causing DRUJ instability must be treated with ORIF. However, controversy exists regarding the op-

timum management of ulnar styloid fractures if DRUJ is stable. Comparative studies were conducted trying to solve this surgical dilemma whether to fix ulnar styloid fractures or not when associated with distal radius fractures in cases where DRUJ is stable.[18,19]

Souer and colleagues retrospectively analyzed two groups of 76 matched patients with internally fixed fracture of the distal radius, one with a fracture of the ulnar styloid base and the other without ulnar fracture.

The two groups were analyzed for differences in motion, grip strength, pain and the DASH (Disabilities of the Arm, Shoulder and Hand) score at six, twelve, and twenty-four months postoperatively. Their study revealed that unfixed fracture of the base of the ulnar styloid does not affect function or outcome after internal fixation of distal radial fracture, even when the ulnar fracture was initially displaced $>$ or $=$ 2 mm.[12]

Reichl and colleagues performed a study on 480 patients divided into three groups (patients without a fracture of the styloid process of the ulna, patients with a tip fracture and those with a basal fracture). 238 patients were examined at least 1 year after injury to evaluate the effect of ulnar styloid fracture on radiological and functional outcome. They found that neither the presence nor the location of ulnar styloid fracture affected radiological or functional outcome. They believed that fixation of ulnar styloid was unnecessary as long as reduction of the distal radius fracture was anatomical and fixation was stable.[20]

Chen YX and colleagues included 106 patients in their study and concluded that when the DRUJ is stable, an untreated ulnar styloid fracture does not affect the wrist outcome in patients with unstable distal radius fracture treated with external fixation.[21]

Sawada and colleagues concluded in their prospective study that there was no need to fix ulnar styloid fractures after volar plating of associated distal radius fractures.[22]

This study revealed comparable results in both groups denoting that fixation of basal ulnar styloid fractures will add no benefits in functional outcome after volar plating of distal radius fractures provided that DRUJ is stable.

Conclusion

Although distal radius fractures are commonly associated with basal ulnar styloid fractures, yet the study showed that in cases where DRUJ is stable, there is no need to fix ulnar styloid fractures when associated with distal radius fractures as there was no difference in clinical outcome whether ulnar styloid fracture was fixed or not.

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