Across wrist external fixation for distal radius fractures in adults

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Abstract

Distal radius fractures, closed or open, are common upper limb injuries. Many classifications help understand them from different perspectives including correlations and comparisons between various management modalities, their outcome, complications etc. Over a period of 5 years 32 adults with 35 distal radius fractures managed with 35 across wrist external fixators were followed up for an average period of 85.9 weeks [1.65yrs] in a retrospective and prospective study.

Introduction

Distal radius fractures are common injuries accounting for over 15% of orthopaedic trauma [4]. Incidence of distal radius fractures appears to be both age and gender specific with a bimodal peak of distribution [8]. The sharpest increase in its incidence is seen in both elderly females and younger adult males [5]. Distal radius fractures in elderly are mostly ascribed to insufficiency osteoporotic fractures [7].

Review

Since 1814 when the commonest fracture was first described by the legendary Abraham Colles numerous classifications have evolved over the last two centuries. Frykman’s [3] and alpha numeric classification by AO group are relatively more popular presently for their greater utility: in better understanding of distal radius fractures, their management, complications, correlations and comparative studies [9].

Depending on multiple factors management option/s indicated in a particular patient may be chosen from reduction ± POP cast immobilization, percutaneous pinning, transfixation and cast, Kapandji’s K wire fixation, open reduction and plating, external fixation, and from a variety of recent advances like: fragment specific fixation, intramedullary fixation with micro nail and dorsal nail plate, bio absorbable plates, and arthroscopically assisted repair[9].

Material & method

In a preliminary study carried out between December 2008 and November 2013, 32 patients with 35 distal radius fractures were selected based on fulfillment of inclusion and exclusion criteria. Inclusion criterion was patients above 18 years of age. Exclusion criteria: pathological fractures other than osteoporosis, and unwilling patients. Fractures were reduced and under image intensification external fixation was done. Second metacarpal was drilled with 2.5 mm drill bit, radius shaft with 3.5 mm, Schanz pins were inserted and construct was completed. In case of unstable, comminuted fractures, K wire stabilization was done prior to applying fixator. In some cases fixator was applied on ulna and fifth metacarpal too. In patients with compound injuries vacuum suction drain was initially applied which was full or partial vacuum suction in a randomized manner [11]. Patients were started on rehabilitation program including physiotherapy from first post operative day.

After fixation patients were followed up at 2 weeks, 6 weeks and after fixator removal up to 3 months minimum in prospective cases, and up to the last follow up in retrospective cases. This was a 4 years retrospective and 1 year prospective study. In each case all relevant findings were recorded as per protocol presented to and approved by institutional research and ethics committee.

Observations

Initially in first part of study 36 patients with 39 across
wrist fixators were enrolled. Final follow up was done on 32 patients with 35 across wrist fixators: 3 had bilateral involvement.

Age range was 18 to 67 years: 25 males, 07 females. Mean age was 41.43 ± 13.8 yrs. Male female ratio 3.5 : 1. Majority 9 patients were between 41 and 50 yrs [28.12%], followed by 8 between 21 and 30 [25%], together accounting for more than half of fractures as well as patients.

The commonest mode of injury was road traffic accidents [n = 20, 62.5%], followed by fall from height [n = 08, 25%]. Assault, industrial accident, fall at ground level and other mode caused distal radius injuries in 1 each.

Majority 26 were open fractures [74.3%], 9 closed [25.7%]. Majority 11/35 fractures [31.4%] were Frykman type VIII, followed by type III [17%]. Maximum number of fractures [20 out of 35] were AO 23 type C – complete articular [57.1%] by AO classification.

Majority of patients [25/32] were operated within the first week of presentation. Mean time for external fixation following injuries was 4.09 days. 17 fixators were applied across right wrists in 14 males and 3 females, 18 fixators across left wrists in 14 males and 4 females. 3 males had bilateral across wrist fixation. A total number of 213 Schanz screws were inserted in 35 across wrist frames. 17 fixators had 8 screws each, 15 had 4 screws each, 2 with 6 pins each and 1 with 5 pins. 13 fractures were additionally stabilized with K wires before external fixation.

All 35 fixators were of static type, rigid frame configuration. None was degraded/descaled prior to removal.

Result & Analysis

32 adults with 35 distal radius fractures managed with 35 across wrist external fixators were followed up for an average period of 85.9 weeks [1.65yrs]: range 15 – 290 weeks.

Pin tract infection [PTI] was observed in 4 out of 213 pins: 2 pins with grade 2 infection and 1 pin each with grade 1 and 3 infection [pin wise infection 1.8%]. It was seen in 4 patients out of 32 [patient wise PTI 12.5%]. In 4 of 35 across wrist fixators [fixator wise PTI 11.42%].

2 fixators had loosening of 1 pin each due to infection. Reflex sympathetic dystrophy was seen in a patient who was operated 10 days after injury. 1 Schanz pin was found broken during a follow up. In a patient with neglected perilunate subluxation avascular necrosis of lunate bone was recorded as a late complication.

During or after fixation none had metacarpal fracture, radial nerve neuropathy, post reduction swelling, compartment syndrome. No patient had carpal tunnel syndrome, tendinous adhesion in flexor compartment, rupture of extensor pollicis longus, shoulder hand syndrome, fixator intolerance during follow up period.

34 of 35 fractures [≥97%] united within 8 weeks. Maximum [68.6%] united by 6 weeks. Average union time was 6.25 ± 0.72 weeks. One compound fracture in a female patient with associated hypothyroidism resulted into non union [2.9%]. Malunion was observed in 2 fractures [5.75%]; both AO 23 complete articular type: one 23 C2 and one 23 C3 / both Frykman type VIII. Post fixator removal both had radial deviation of hand and prominence of ulnar styloid.

Discussion

In contradistinction to earlier popular belief of distal radius injuries being prevalent among elderly and females recent literature shows an increased preponderance of these fractures in younger males [12,10]. One of the bimodal peaks in young males is attributable to involvement of two wheeler riders in increasing number of road traffic accidents [RTA’s] during the last decade. In the present study it contributed to and caused most of the compound fractures too.

2 [5.75%] malunions seen in patients with greater impaction and complete articular comminution caused by fall from height were comparable with over 6% - 8% in other studies [15,1]. Studies reported from nil to solitary non union in 13 and 24 cases [2,13,16,1]. One non union was recorded among 35 fractures [2.9%] in spite of 75% compound injuries in the present series.

Conclusion

With ever growing number of road traffic accidents, specially keeping in view the increasing number of 2/3/4 wheelers on roads, compound comminuted fractures of distal radius pose a significant challenge to orthopaedic acumen. External fixators play a much needed dual role in salvaging the situation by helping in management of fractures as well as soft tissue injuries. Proper pre operative planning, intra and
post operative precautions and fixator care minimize complications.

Over the decades external fixation of distal radius injuries has been yielding satisfactory, acceptable and comparable long term results. Ease of applicability, relatively shorter learning curve, and financial considerations make it a preferred modality in an orthopaedic surgeon’s options.

References