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Original Research Paper

Orthopaedics

TO EVALUATE THE SPECTRUM AND ANALYSE THE PATTERN OF ASSOCIATED SOFT TISSUE, INTRINSIC/EXTRINSIC LIGAMENTS AND CARPAL BONE INJURY WITH DISTAL RADIUS FRACTURE

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ABSTRACT

Purpose: To evaluate the spectrum and analyse the pattern of associated soft tissue and bony injury with distal radius fracture.

Methods: This prospective observational study included 50 patients(35 males and 15 females) with mean age of 41.1(range 18 to 70 years) who sustained fracture of distal end radius and reported to our hospital. These patients were evaluated using MRI.

Results: Of the 50 distal radius fracture, TFCC injury was present in 32 cases(20 partial and 12 complete),SLIL tear in 13 cases and ulnar styloid fracture in 29 cases, Radioulnar ligament tear in 5 cases, Scaphoid fracture in 2 cases and extrinsic ligament tear in 1 case.

Conclusion: We evaluated our results and compared them with those obtained by various other studies utilizing different modalities and found our results comparable to most other studies. So we can conclude that distal radius fracture is accompanied by significant associated bony and soft tissue injuries which should be evaluated at the time of patient presentation via MRI or arthroscopy and should be addressed at the time of primary fracture fixation.

Level of Evidence: Diagnostic study- Level 3

KEYWORDS : Distal Radius Fracture, MRI, TFCC

INTRODUCTION:

Distal radius fractures (DRF) represent 14% of all extremity injuries[1]. They are a significant cause of patient morbidity and results in significant loss of industrial manpower hours[2,3]. Many patients have continuing morbidity following fracture of distal radius, despite restoration of osseous alignment. So the impact of accompanying soft tissue injury is now under scrutiny[4]. While recognising that restoration of skeletal integrity is crucial it is believed that associated soft tissue injuries may explain why such patients continue to have reduced grip strength, reduced range of movements and pain despite antomically healed fractures[4].

There are three intracarpal soft tissue of particular importance[5]: Triangular Fibrocartilaginous Complex, Scapholunate ligament and LunoTriquetral ligament. These tissues can not be fully detected on standard radiograph of wrist with distal radius fracture. Geissler[6] et al. evaluated 60 cases with intra-articular fractures and reported that TFCC injury was present in 43% cases, SLIL injury in 31% cases and LTIL injury in 15% of cases.

The SLIL, in conjunction with the LTIL, imparts stability to the proximal row of the carpus. An isolated, complete tear of the SLIL results in scapholunate instability[7-10] and can progress to a predictable pattern of posttraumatic wrist arthritis through a scapholunate advanced collapse pattern.[10] When associated with distal radius fractures, SLIL injury cause progressive deterioration of the intercarpal relationship. Patients with SLIL injury and associated distal radius fractures may have worse wrist function than those with distal radius fracture alone if treated conservatively[11]. Complete SLIL injuries associated with distal radius fractures result in increased scapholunate joint pain and scapholunate dissociation[12]. Early diagnosis of these complete injuries facilitates reduction and repair and may lead to improved outcomes[13].

Injuries to TFCC are relatively common in patients with distal radius fracture with reported rates of 45-66%[4]. Unlike ligamentous disruption, conventional radiographic evaluation of TFCC is unhelpful unless there is either wide diastasis or dislocation of DRUJ and its evaluation can only be achieved by either arthrography, arthroscopy or MRI[14].Since most distal radius fractures occur in elderly, it is important to differentiate age related degenerative changes from acute tears[15].

The purpose of this study was to summarize the frequency of associated soft tissue and bony injury with distal radius fracture.

MATERIALS AND METHODS:

Institutional review board approval was obtained by the ethics committee of our hospital, and patients provided written informed consent to participate in the study.

This prospective observational study done between September, 2014 to June, 2016 included 50 patients(35 males and 15 females) with mean age of 41.1(range 18 to 70 years) who sustained fracture of distal end of radius and reported to our hospital. Patients with polytrauma, vascular injury, superior radioulnar joint involvement, compound fracture, fracture proximal to metaphysis and patients with past history of injury to ipsilateral wrist were excluded. Patients were evaluated using Radiograph and MRI. High-field strength 3-Tesla magnets were used to generate high-quality images, which enhanced evaluation of the ligaments and cartilage as well as the triangular fibrocartilage. Three imaging planes were obtained: axial, coronal, and sagittal.(Table. 1)

Table 1

Routine wrist MR imaging protocol				
Pulse sequence	FOV (cm)	Slice thickness (mm)	Matrix	TR/TE
Axial T1	10	3	320X192	480-500/19

Axial T2 FS	10	3	320X192	>4000/45
Coronal T1	10-12	3	256X256	575-625/20
Coronal T2 FS	10-12	3	320X192	>4500/45-57
Coronal 3D GRE	10	2	320X224	19/10
Saggital T2 FS	10	3	320/192	>5000/45-49

Abbreviations: *3D GRE, 3-dimensional gradient recalled echo; FOV, field of view; FS, fast spin; TR/TE, repetition time/echo time.*

Axial images of the wrist covered from the distal radius and ulna to the proximal metacarpals with the plane of imaging paralleling the distal radius. The wrist was in neutral position during imaging. With the hand in gently fisted position , the hand, wrist and forearm were supported on their ventral aspect by the surface coil platform such that the long finger metacarpal rested in 15 degree of extension relative to the forearm. Taping the hand and wrist to the supporting platform provided additional stablization and minimized motion artefact.

RESULTS:

Fig. 1

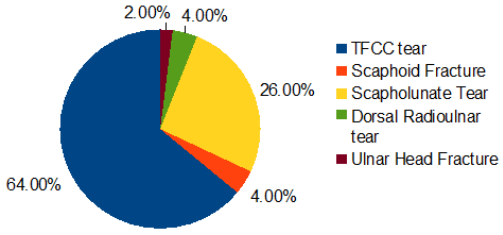

Chart showing TFCC tear as a major part of soft tissue injury Out of 50 cases, 32(64%) were with TFCC tear (Fig. 2-4)

Fig. 2 Central TFCC tear

Out of 32 cases with TFCC tear, 20(62.5%) were partial and 2(37.50%) were complete.

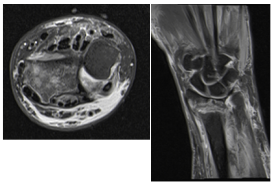

Fig. 3 Complex ulnar sided TFCC tear

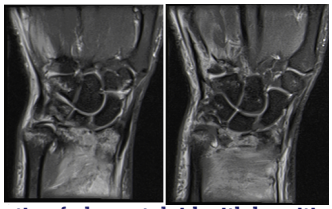

Fig. 4 Fracture tip of ulnar styloid with longitiudinal split of TFCC from ulnar to central portion

Two Patients (4%) were with Carpal Bone (scaphoid) fracture (Fig. 5)

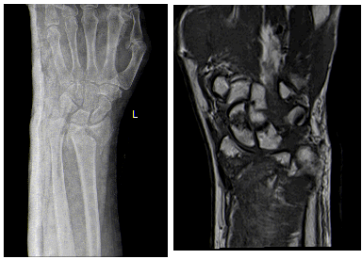

Fig. 5 Scaphoid Fracture diagnosed on MRI

13 Patients (26%) were with Scapholunate tear (Fig. 6) out of which 3(6%) were dorsal and 10(20%) were volar.

Fig. 6 Scapholunate tear

Two cases were with Torn Dorsal Radio Ulnar Ligament and 1 was with Un displaced Fracture Of Ulnar Head.

DISCUSSION

In this study, we did not aim to advocate the use of arthroscopy for treatment of distal radius fractures in the wrist. Instead, we found that arthroscopy was a valuable and sensitive adjunct for determining the prevalence and severity of soft tissue lesions that were not detectable on standard radiographs of wrists with such fractures.

Richards et al[16] arthroscopically identified 46 TFCC injuries in 118 patients with distal radius fractures. Spence[(17)] evaluated 21 patients and found that 10 patients had associated soft tissue injuries. Mudgal and jones using plain xrays described 10 cases of SLIL injury in 4 part intrarticular distal radius fracture[(18)]. We found our study comparable to most other studies. So To conclude, we can say say that distal radius fracture is associated with significant soft tissue and other bony injuries which should be analysed at the time of patient presentation and should be addressed at the time of fracture fixation.

However, limitation of our study was there was no treatment directed towards repair of those associated injuries and there was no follow up of the patients. The aim of our study was to only evaluate and analyse the pattern of associated soft tissue and bony injuries. Further studies are required to confirm MRI findings arthroscopically and repair the associated injuries which is to be followed up later to evaluate any persistant reduced grip strength or residual wrist pain.

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