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To Study The Incidence of missed Distal Radio-Ulnar Joint (Druj) Injuries, Its' Early Diagnosis by Dynamic C.T. Scan and Management by Modified Kapanji Method

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Abstract

Background and Method: All the patients coming to the Department of Orthopaedics of Index Medical College Hospital & Research Centre, Indore, with an aim to Study The Incidence of missed Distal Radio-Ulnar Joint (Druj) Injuries, Its' Early Diagnosis by Dynamic C.T. Scan and Management by Modified Kapanji Method and diagnosed with distal radio-ulnar joint injuries. All the trauma cases were received in the casualty and primary treatment with detailed examination and required imaging studies were done. The x-ray included antero-posterior and postero-anterior views with dynamic CT scan and CT scan for head injury patient was done through all investigation operative procedure were planned. The required consent was taken by the patient beforehand.

Result: DRUJ injuries are more prevalent among young males than females. In age group 16 to 30 female (45%) is higher than male (38.8%). DRUJ injuries was seen more in left (55%) than right (45%) hand. Fall on out stretched hand (58%) is the major mechanism of DRUJ injuries followed by trivial trauma in 42%. DRUJ injury was missed in 18.33%, chronic in 20%, acute in 38.33% and sub-acute in 23.33%.

Conclusion: Present study conclude that DRUJ injuries are more prevalent among young males than females. DRUJ injuries was seen more in left (55%) than right(45%) hand with fall on out stretched hand is the major mechanism. Physical examination is effective in diagnosis; radiological examination suggested for further investigations. Positive symptoms of DRUJ injuries were in 100%, physical examination was positive in 85% and negative in 15%. Positive CT findings in 66.67% and negative in 33.33%. X-ray findings were positive in 71.67% and negative in 28.33%.

Keywords: incidence, DRUJ, wrist & joint injuries

Introduction

The distal radio ulnar joint (DRUJ) is part of forearm articulation that comprises proximal radioulnar joint (PRUJ), forearm bones and interosseous membrane (IOM) allowing the pronosupination. DRUJ functionally and anatomically is included with the ulnocarpal articulation of wrist. The DRUJ has developed from the original pectoral fin of early fish to the bipedal primate wrist to its current form in human wrist. From the syndesmotoc DRUJ of brachiating primates with restricted forearm rotation, three key variations happened i.e. development of separate DRUJ, recession of the distal ulna from the ulnar carpus and the development of an ulnocarpal meniscus. (Louis DS *et al.*, 1998) [1].

Fracture of the distal radius is the most common type of fracture in the upper extremity. Because the radius plays a fundamental role in the stability of the wrist joint, preservation of ligamentous function of the wrist and the biomechanics of radio-carpal and radio-ulnar joints, anatomical reduction and correction of articular surface incongruity decreases the potential of degeneration and accelerates post-injury rehabilitation [2].

Distal radius fracture is accompanied by several complications. DRUJ instability, the most disabling complication. The prevalence of DRUJ instability is reported to be 10–19% after distal radius fracture. Both acute injuries and biomechanical changes related to chronic injuries result in pain and decrease in radio-carpal and radio-ulnar range of motion. (W.B. Geissler, *et al.* 1996) [3].

The DRUJ preserve the stability with the help of articular surface congruity and with normal function of triangular fibrocartilage complex (TFCC). The ulnar head articulates with the sigmoid notch of the distal radius and the congruency between the bones provides some stability to the DRUJ, nevertheless this articulation is not deep and depend on soft tissue stabilizers to maintain the joint integrity. TFCC is the most essential soft tissue stabilizer of the DRUJ. The dorsal TFCC is important in stabilizing the DRUJ during pronation while the volar TFCC is important in DRUJ stabilization during supination.

This indispensable stabilizer is commonly injured in distal radius fractures and leads to DRUJ instability. The incidence of TFCC injury in distal radius fracture was shown to be 30–70%.¹⁴ Unrecognized DRUJ injuries cause motion restriction, joint surface incongruity, subluxation of the ulnar head and decreased grip strength. In addition, the DRUJ plays a critical role in normal forearm rotation and early treatment of acute injury provides better results than surgical management of chronic instability. Since the TFCC originates from the base of the ulnar styloid, the fractures involving the proximal half of the ulnar styloid result in DRUJ instability. (M.M. May, *et al.* 2002)^[4].

Material and Method

All the patients coming to the Department of Orthopaedics of Index Medical College Hospital & Research Centre, Indore, during the study period from Nov 2017 to 2019 Oct and diagnosed with distal radio-ulnar joint injuries.

The patient's clinical history and examination findings were recorded prospectively in a case record form. Then radiological investigations like X-rays and CT scan were advised.

Opinions of operating consultant surgeon were taken in two separate proformas regarding their findings, diagnosis and plan of management. First opinion was taken on the basis of the X-ray alone and second opinion was taken after showing the CT scans. Any change in the plan of management was noted.

All the trauma cases were received in the casualty and primary treatment with detailed examination and required imaging

studies were done. The x-ray included antero-posterior and postero-anterior views with dynamic CT scan and CT scan for head injury patient was done through all investigation operative procedure were planned. The required consent was taken by the patient beforehand.

Inclusion criteria

- All candidates having acute, chronic wrist injury.
- All neglected and missed cases of DRUJ injuries.

Exclusion criteria

- Systemic disease (SLE, Rheumatoid arthritis, osteoarthritis)
- Un-consenting patient.

Results

Table 1: Age-Sex distribution of DRUJ injuries

Age	Male		Female		Total
	Count	%	Count	%	
7 to 15	9	18.37	0	0.00	9
16 to 30	19	38.78	5	45.45	24
31 to 45	8	16.33	3	27.27	11
45 to 58	13	26.53	3	27.27	16
Total	49	81.67	11	18.33	60

DRUJ injuries are more prevalent among young males than females. In age group 16 to 30 female (45%) is higher than male (38.8%).

Table 2: Site of DRUJ injuries distribution.

Site of Injury	Male		Female		Total
	Count	%	Count	%	
Left	27	27.55	6	27.27	33 (55%)
Right	22	22.45	5	22.73	27 (45%)
Total	49	81.67	11	18.33	60

DRUJ injuries was seen more in left (55%) than right (45%) hand.

Table 3: Mechanism of DRUJ injuries distribution

Site of injury	Mechanism of Injury	Male		Female		Total
		Count	%	Count	%	
Right	Trivial trauma	11	22.45	4	36.36	15 (25%)
	Fall on out stretched hand	11	22.45	1	18.33	12 (20%)
Left	Trivial trauma	9	18.37	1	9.09	10 (17%)
	Fall on out stretched hand	18	36.73	5	45.45	23 (38%)
Total		49	81.67	11	18.33	60

Fall on out stretched hand (58%) is the major mechanism of DRUJ injuries followed by trivial trauma in 42%.

Table 4: Incidence of missed DRUJ injuries.

Injury	Count	%
Missed	11	18.33
Chronic	12	20.00
Acute	23	38.33
Sub-acute	14	23.33
Total	60	100

DRUJ injury was missed in 18.33%, chronic in 20%, acute in 38.33% and sub-acute in 23.33%.

Discussion

In present study DRUJ injuries were more prevalent among young males than females. In age group 16 to 30 female (45%)

is higher than male (38.8%). Similarly in the study of Guo *et al.*, out of fifteen patients majority of males were 10 (67%) male and 5 (33%) female patients with an average age of 40 years old. (Guo *et al.*)^[5], whereas in a study, out of 74 DRUJ injury patients majority were female (44) than male (30). Majority (76%) of the females were at osteoporotic age (mean 52, range 18-79), while only 5 males had osteoporosis (mean 35, range 18-64). In Pugazhendhi *et al.* study^[6], of 56 DRUJ injury patients 35.7% (n=20) were males and 64.3% (n=36) were females (M: F ratio 5:9). The patients distribution was dissimilar in all age distribution groups with the majority 42.9% (n=24) in the 66 to 75 age group, of 24 patients 16 were female and 8 were male followed next at 32.1% (n=18) in the age group 56 to 65 years and least 25% (n=14) in the age group 46 to 55 years. (Pugazhendhi *et al.*)^[6].

In our study, DRUJ injuries were seen more in left hand (55%)

than right (45%) hand of patients. Similarly Louis Catalano *et al.* results found increased involvement of the left wrist than the right wrist. (Louis Catalano *et al.*)^[7], right side (dominant wrist) was more involved (80%) than left side with 20% of the cases which was contradictory to our results. More common right side involvement may be because of more number of right handed persons using their right hand first for protecting themselves while fall on the ground. Pesola *et al.*^[8] suggests a lateralizing predisposition for left distal radius fractures in older compared with younger individuals who are right hand handed. Study results had equal involvement of both wrists. (Bradway JK *et al.*)^[9].

In current study fall on out stretched hand (58%) is the major mechanism of DRUJ injuries followed by Trivial trauma in 42%. Similarly, in the study of Louis Catalano *et al.* and majority of patients 67% fall on out stretched hand followed by study's RTA trauma predisposition is 10%. (Louis Catalano *et al.*) Bradway JK *et al.*^[9] also reported fall on the outstretched hand as the most common mode of injury contrary to our findings. However, mode of injury in majority of cases was road traffic accident (RTA). Of 20 cases, injury occurred due to road traffic accident in 14 (70%) patients and fall on the out stretched hand in 6 (30%) patients. RTA are more common in the Indian subcontinent may be due to disobeying traffic rules, road conditions, vehicle's condition, driving under influence of alcohol, fast careless driving, inflation and increase in number of vehicles, increased per capital income.

In current study DRUJ injury was missed in 18.33%, chronic in 20%, acute in 38.33% and sub-acute in 23.33%. Similarly in the study, 83 patients with a total of 93 acute DRF were included in their study. The incidence of DRUJ instability was 22.9% (n=17/74), and majority (83.33%, n=15/18) of the patients were males. There were three open DRF that were associated with DRUJ instability. Acute DRUJ instability associated with a forearm fracture is more frequent than previously assumed. In a review of forearm injuries, Goldberg *et al.* reported that two or more sites of injury are routine and that the DRUJ is affected in 60% of patients. (Goldberg *et al.*)^[10] Complex distal radial fractures may be associated directly with TFCC injury or may render the DRUJ unstable because of an associated fracture of the sigmoid notch, as described by Bowers. Galeazzi fracture-dislocations and their variants may be associated with either palmar or dorsal dislocation. Longitudinal instability may accompany radial-head fractures and disruption of the central portion of the interosseous membrane^[11]. (Bowers) In the study of Squires *et al.*, distal radioulnar joint (DRUJ) plays a key role in forearm stabilization and rotation. It is a site of both acute and chronic injuries and is frequently imaged to evaluate chronic wrist pain, forearm dysfunction, and traumatic forearm injury. (Squires *et al.*) In the study of Tsai *et al.*, the incidence of DRUJ instability was reported to be 10–19% after distal radius fracture. (Tsai *et al.*)^[12].

Conclusion

Present study conclude that DRUJ injuries are more prevalent among young males than females. DRUJ injuries was seen more in left (55%) than right (45%) hand with fall on out stretched hand is the major mechanism. Physical examination is effective in diagnosis; radiological examination suggested for further investigations. Positive symptoms of DRUJ injuries were in 100%, physical examination was positive in 85% and negative in 15%. Positive CT findings in 66.67% and negative in 33.33%. X-ray findings were positive in 71.67% and negative in 28.33%.

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