

Pure Varus Posteromedial Rotatory Instability of the Elbow: Radiographic Findings, Treatment, and Outcomes

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INTRODUCTION:

Varus posteromedial rotatory instability (VPMRI) is a relatively rare, but subtle elbow injury that involves anteromedial coronoid facet (AMCF) fracture. Despite establishment of comprehensive classification system and improved understanding of the pathophysiology, definite treatment protocol has not yet been established. The aim of this study was to investigate radiographic findings, treatments, and outcomes of a large series of VPMRI and to propose its treatment guidelines.

METHODS:

We retrospectively reviewed 91 pure VPMRI cases with anteromedial coronoid facet (AMCF) fracture (O'Driscoll anteromedial type) which were treated at 6 fellowship training hospitals. Clinical and radiographic outcomes were evaluated for a mean follow-up period 46.8 months (range, 12-192 months) using the Mayo Elbow Performance Score (MEPS), and the Quick Disabilities of the Arm, Shoulder and Hand (Quick-DASH) score, and serial plain radiographs.

RESULTS:

In AMCF fracture, there were 4 cases of subtype 1, 67 cases of subtype 2, and 20 cases of subtype 3. On MRI, complete tears of lateral ulnar collateral ligament and medial collateral ligament were observed in 83.1% (59/71 cases) and 33.8% (24/71 cases). Operative treatment was performed in 68 cases (74.7%) including both side fixation in 39 cases (57.4%), medial side fixation only in 16 cases (23.5%), and lateral side fixation only in 13 cases (19.1%). Nonsurgical treatment was performed in 23 cases (25.3%). Overall, the mean MEPS and Quick-DASH scores at the final follow up were 93.7 ± 12.2 and 7.9 ± 15.6. Complications (22.0%) after treatment included hardware irritation in 6 cases, elbow stiffness in 6 cases, ulnar neuropathy in 5 cases, arthritic change with recurrent dislocation in 1 case, screw penetration into the joint in 1 case, cubitus varus in 1 case. Reoperation was performed in 15 cases (15.8%). No significant differences regarding all final clinical scores and ROMs were observed between the surgical group and the nonsurgical group, but significant differences were observed regarding number of fragment (p=0.109), displacement (p=0.002), complication rate (p<0.001) (Table I, II, and III).

DISCUSSION AND CONCLUSION:

Depending on the pattern of the coronoid fragment and the degree of the lateral ligamentous injury, surgical treatment of unstable VPMRI using various fixation techniques including either medial or lateral fixation, or both, yielded satisfactory final clinical outcomes. However, the surgeons should be aware of high complication and reoperation rates. Stable VPMRI with AMCF fracture that has small number of fragment and minimal displacement can be treated nonsurgically (Figure 1).

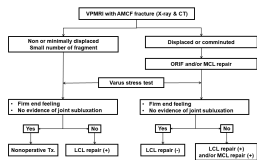


TABLE I. Correlation Between Variables and Final Clinical Outcomes in All Patients

Variables	VPMRI cases		Quick DASH score	
	N (SD)	P-Value	N (SD)	P-Value
Age	51.0 (8)	0.149	53.0 (8)	0.718
Sex				
Male (%)	64 (71)	0.001	74 (81)	0.001
Female (%)	18 (20)		14 (16)	
Side				
Left (%)	49 (54)	0.001	58 (64)	0.001
Right (%)	42 (47)		23 (26)	
Constant injury				
Yes (%)	11 (12)	0.001	11 (12)	0.001
No (%)	80 (89)		70 (78)	
Dislocation				
Yes (%)	12 (13)	0.001	11 (12)	0.001
No (%)	79 (87)		60 (67)	
Operation				
Yes (%)	68 (75)	<0.001	71 (79)	<0.001
No (%)	23 (25)		24 (27)	
Arthritic change				
Yes (%)	6 (7)	0.001	6 (7)	0.001
No (%)	85 (94)		85 (94)	
Stiffness				
Yes (%)	6 (7)	0.001	6 (7)	0.001
No (%)	85 (94)		85 (94)	
Ulnar neuropathy				
Yes (%)	5 (6)	0.001	5 (6)	0.001
No (%)	86 (95)		86 (95)	
Number of coronoid fragment				
1 (%)	4 (4)	0.109	4 (4)	0.109
2 (%)	63 (69)		63 (69)	
3 (%)	24 (27)		24 (27)	
Displacement of coronoid fracture				
Yes (%)	11 (12)	0.002	11 (12)	0.002
No (%)	80 (89)		80 (89)	
Complications				
Yes (%)	15 (17)	<0.001	15 (17)	<0.001
No (%)	76 (84)		76 (84)	

TABLE II. Correlation Between Variables and Final Clinical Outcomes in the Operative Group

Variables	VPMRI cases		Quick DASH score	
	N (SD)	P-Value	N (SD)	P-Value
Age	51.0 (8)	0.091	53.0 (8)	0.112
Sex				
Male (%)	64 (71)	0.001	74 (81)	0.001
Female (%)	18 (20)		14 (16)	
Side				
Left (%)	49 (54)	0.001	58 (64)	0.001
Right (%)	42 (47)		23 (26)	
Constant injury				
Yes (%)	11 (12)	0.001	11 (12)	0.001
No (%)	80 (89)		70 (78)	
Dislocation				
Yes (%)	12 (13)	0.001	11 (12)	0.001
No (%)	79 (87)		60 (67)	
Arthritic change				
Yes (%)	6 (7)	<0.001	6 (7)	<0.001
No (%)	85 (94)		85 (94)	
Stiffness				
Yes (%)	6 (7)	0.001	6 (7)	0.001
No (%)	85 (94)		85 (94)	
Ulnar neuropathy				
Yes (%)	5 (6)	0.001	5 (6)	0.001
No (%)	86 (95)		86 (95)	
Number of coronoid fragment				
1 (%)	4 (4)	0.001	4 (4)	0.001
2 (%)	63 (69)		63 (69)	
3 (%)	24 (27)		24 (27)	
Displacement of coronoid fracture				
Yes (%)	11 (12)	0.001	11 (12)	0.001
No (%)	80 (89)		80 (89)	
Complications				
Yes (%)	15 (17)	<0.001	15 (17)	<0.001
No (%)	76 (84)		76 (84)	

TABLE III. Correlation Between Variables and Final Clinical Outcomes in the Nonsurgical Group

Variables	VPMRI cases		Quick DASH score	
	N (SD)	P-Value	N (SD)	P-Value
Age	51.0 (8)	0.091	53.0 (8)	0.112
Sex				
Male (%)	64 (71)	0.001	74 (81)	0.001
Female (%)	18 (20)		14 (16)	
Side				
Left (%)	49 (54)	0.001	58 (64)	0.001
Right (%)	42 (47)		23 (26)	
Constant injury				
Yes (%)	11 (12)	0.001	11 (12)	0.001
No (%)	80 (89)		70 (78)	
Dislocation				
Yes (%)	12 (13)	0.001	11 (12)	0.001
No (%)	79 (87)		60 (67)	
Arthritic change				
Yes (%)	6 (7)	0.001	6 (7)	0.001
No (%)	85 (94)		85 (94)	
Stiffness				
Yes (%)	6 (7)	0.001	6 (7)	0.001
No (%)	85 (94)		85 (94)	
Ulnar neuropathy				
Yes (%)	5 (6)	0.001	5 (6)	0.001
No (%)	86 (95)		86 (95)	
Number of coronoid fragment				
1 (%)	4 (4)	0.001	4 (4)	0.001
2 (%)	63 (69)		63 (69)	
3 (%)	24 (27)		24 (27)	
Displacement of coronoid fracture				
Yes (%)	11 (12)	0.001	11 (12)	0.001
No (%)	80 (89)		80 (89)	
Complications				
Yes (%)	15 (17)	<0.001	15 (17)	<0.001
No (%)	76 (84)		76 (84)	

*The values are given in the same and for unpaired t-test. (Significance: p < 0.05)