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 \pm 12.2 and 7.9 \pm 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).

VPMRE with AMCP machine (X-ray & CT)			VAS pain score MEPS			PS	Quick DASH score				VAS pain score MEPS			Quick DASH score		Education Contraction and Contract and	Including			
			N ± SD		M = SD		M = SD				M = SD		Masth		M+ 50		Variables	Operative treakment (58)	Nonoperative Treatment (23)	7. color
		Variables	/ Pearson	P-Value	/ Pearson	P-Value	(Pearson	P-Value		Variables	/Terron	P-Vidor	(Protoen	P-Value	/ Peanog	P-Vilor		M+SD/N(%)	M + SD / N (%)	
	· · · · · · · · · · · · · · · · · · ·		Convibtion		Correlation		Constation				Correlation		Correlation		Correlation		Are	42.5 e 14.2	44.4 + 13.8	9.671
Non or minimury displaced	Displaced or comminuted	Arr	0.156	0.143	.0.178	0.100	0.097	0.358	-	Lor	0.772	0.041	4 233	0.071	0.720	0.122	Sav			0.477
on an interest of magnetic		Sea.		0.661		0.126		0.645		See.		0.175		0.153		0.199	Male	13(25.4)	17/71/0	
	CONT and/or MCL repair	Male (77)	0.0+13		044-005		76+147			Monato	07-11		00.7 - 10.0		70-110		Facult	11 (02.0)	6/31.6	
		Female (19)	10+15		41 3 × 16 7		94+178			Family (17)	14-17		P3.6 - 10.5		11.0 - 20.7		Side			0.053
Verus stress test		Side		0.947		0.004		0.449		Fearlier (17)	14812		10.0 10.0		17.0 8 20.0		1.4	#1 (MR 1)	10,011 75	
		1-8 (67)	00-11		63.2 - 17.8		22-162		×	Side		0.585		0.941		0.671	D. S.	41 (00.0)	15 (51.5)	
		Ride (11)	0.0+15		847+336		61+177			Latt (41)	09412		93.7 ± 13.3		\$5 A 17.5		Combined interes	ar (in a)	4((12))	0.002
Firm and feeling No evidence of joint sublucation Yes Yes No Yes Ves Ves	Firm and feeling	Combined interv		0.049		0.117		0.102		Right (27)	1.0 ± 1.5		\$5.9 ± 11.1		7.1 ± 12.5		V-	13 (89.0)	1/26/0	
	No evidence of joint sublucation	Var (15)	15+14		61.0 - 11.4		17.2 + 24.1		c	Combined injury		0.150		0.999		0.090	No.	14 (PV N)	2000	
		No (10)	0.0 - 1.1		64.1 - 111		41-114			Yes (12)	13 ± 10		93.3 ± 7.8		15.2 ± 21.4		140	30 (N. I)	20(203)	
		Distortion		0.332		6.832		0.009		No (56)	0.5 ± 1.4		95.8 ± 13.2		6.6 ± 13.6		Deboahon			0.285
		New (18)	12.12					D	Dislocation		0.583		1.000		0.565	14	10 (94.2)	3 (12.8)		
		No (75)	68-12		62.2 - 12.1		78-158			Yes (16)	1.1 ± 1.8		93.8 ± 12.8		87+149		Ne	32 (72.2)	20 (27.8)	
nonoperative (z.	andior MCL repair (+)	Omentar	0.001.0	0.643	10.7 4 12.1	0.007	1.0 - 1.7.8	0.834		No (52)	05+12		\$5.8 ± 12.4		5.0 ± 15.5		Artistic charges			0.094
		Operations						0.827		Arthebic change		-0.0011		< 0.0011		< 0.001*	Normal	51 (70.8)	21 (29.2)	
		No. (30)	0.0 . 1.0		0.2		23.163			Normal (51)	08+10		95.7 + 7.9		7.1 ± 12.7		Maa	14 (87.5)	2(125)	
		Automatic schement		- 0.0554		- 6.0014		10.0004		Mild (14)	0.6+0.8		83.6 + 10.1		42+65		Modevate	2 (200.0)	0 (3.0)	
		Manual Child								Moderate (7)	11+10		77.5 + 11.8		28.6 + 41.8		Severe	1 (190.0)	0 (5.0)	
		Solution (72)	0.7 = 1.0		92.3 = 6.1		02=113			farmer (b)	10.00		10.0.00		20.00		Heterotopic omification			0.674
		SEAS (18)	09413		91.9 # 12.8		89 a 17 2			Severe (1)		- 6.0034	10000	- 0.0034		- 0.0014	Nate	59 (74.7)	20 (25.3)	
		periodiale (1)	3.3 = 3.0		17.3 = 31.8		27.0 1 1 4			interior contracts		w.www.y				- 0.001	1	6-(66.7)	3 (33.3)	
		Setwie (1)	6.0 ± 0.0		30.0 = 0.0		13.0+0.0			Nose (19)	0.8 = 0.9		93.9 + 8.0		0.7 + 12.1		2A	3 (200.0)	0 (3.0)	
		Helerolopic evaluation		< 0.0001		< 0.0011		< 0.0001		1 (6)	0.1 ± 0.4		97.5 a 6.1		15+28		O'Deiscoll anteromedial subtype			0.664
		Note (79)	0.741.0		90.1 ± 3.0		024112			2A(0)	5.0=2.7		61.7 = 35.5		58.9 = 30.6		1	2 (50.8)	2 (50.0)	
		1(9)	0.9 ± 1.7		92.2 = 13.7		8.8 a 22.4		0	O'Discuil antennedial subtype		0.958		0.613		0.278	2	51 (76.1)	16 (23.5)	
		2A (9)	5.0+2.7		66.7 = 35.5		50.0 = 30.6			1(2)	1.0 ± 1.4		90.0 ± 141		34+48		3	15 (75.0)	5 (25.0)	
		O Deticol anteromental storype		0.730		0.396		0.215		2(51)	0.9=12		94.6 ± 12.1		6.7 ± 12.3		Namber of corosoid finguest			0.029
		1(4)	0.3 ± 1.0		\$5.0 = 20.0		3.4 ± 1.7			3 (15)	1.0 ± 1.8		91.3 ± 13.6		13.7 ± 23.7		1	26 (81.5)	16 (38.1)	
		2 (97)	09412		94.0 = 11.8		13.4 = 1.0		N	Number of coronoid fragment		0.663		0.757		0.765	2	23 (85.2)	4(14.8)	
		3 (20)	1101.0		99.5 # 15.1		21.2447			1.(16)	1.1 = 1.0		94.4=8.8		8.0 = 10.0		23	19 (\$5.4)	3 (13.6)	
		Number of cornaced tragment		0.095		0.971		0.845		2 (23)	0.8 = 1.4		92.2 = 16.1		9.8 + 21.0		Size of coronoid finguest (sun)	13.0 = 5.3	12.1 = 5.9	0.472
		1 (42)	10411		94.1 ± 8.9		7.0 4.9.4			23(19)	08=17		94.7 + 12.0		63+142		Displacement of covensid fragment (sum)	59+41	3.5 + 3.4	0.002*
		2(2)	0.7+1.3		\$9.3 = 15.1		8.4 = 19.7			Size of corporal fragment	0.022	0.534	-0.051	0.679	0.216	0.077	Union of coronoid fracture			0.094
		£ 5 (22)	10418		93.0 m 13.5		9.2 a 18.5		D	Displacement of commond fracture	-0.144	0.241	0.208	0.082	.0.053	0.669	Tes	55 (78.4)	16 (21.6)	
		Size of coroseid fragment	0.109	0.505	-0.091	0.991	0.174	0.100	1	Union of commaid fracture		0.489		0.111		0.765	No	10 (38.8)	7 (41.2)	
		Doptionness of coronoid fracture	-0.058	0.408	0.141	0.183	-2416	0.737		Ver (10)	00-11		AL 6 - 18 1		44-107		Complication	19 (27.9)	1 (4.8)	< 0.0011
		cason or coronoid fracture		0.533		# 270		0.208		No (10)	11.10		83.0 - 33.7		18.0 - 10.4					
		X 45 (74)	08+12		94.74.9.8		0.3 ± 10.2			200 (200)	1		ar.v = 21.7		18.0 8 30.8					
		Na (17)	12+15		\$9.4 = 15.4		15.3 ± 27.8			rank oner oberagor	0.274	0.8247	-0.115	0.100	0.259	0.0557				
		. The approx and lines to the mean ap		9	Super Inston		0.210		0.145		0.305									