Osteochondritis Dissecans of the Capitellum of the Elbow: A Comparison of Non-Operative and Surgical Outcomes at Long-Term Follow-up

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INTRODUCTION:

Osteochondritis dissecans (OCD) of the humeral capitellum is an often painful condition that typically affects the adolescent athlete. There is little consensus on treatment and a scarcity of long-term outcomes data. The purpose of this study was to (1) report the long-term outcomes associated with both operative and non-operative management of capitellar OCD, (2) identify factors associated with failure of non-operative management, and (3) determine whether delay in surgery affects final outcomes.

METHODS: All patients diagnosed with OCD of the capitellum from 1995-2020 within a defined geographic cohort were included in the study. All medical records, imaging studies, and operative reports were manually reviewed to record demographic data, treatment strategies, and outcomes. Comparisons across treatment strategies were made. Surgical treatment was considered delayed if it occurred more than 6 months after symptom onset.

RESULTS:

A total of 50 elbows with a mean follow-up of 9.4 years were included in the study. Of these, 7 (14%) were treated non-operatively and never underwent surgery during follow-up, while 43 (86%) underwent surgical intervention (27 had early surgery and 16 underwent delayed surgery after ≥ 6 months of non-operative treatment). When compared to non-operative management, surgical management resulted in superior MEPI scores (90 vs 83, p=0.05), decreased persistence of mechanical symptoms (9% vs 50%, p<0.01), and better elbow flexion (141° vs 131°, p=0.01) at long-term follow up. Older patients had a trend toward increased failure of non-operative management (p=0.06). The presence of an intra-articular loose body strongly predicted failure of non-operative management (p=0.01; OR 13). Plain radiography and MRI had poor sensitivities for identifying loose bodies (27% and 40%, respectively). Differences in outcomes following early versus delayed surgical management were not demonstrated.

DISCUSSION AND CONCLUSION:

Patients with capitellar OCD that was treated nonoperatively failed nonoperative treatment 70% of the time. Elbows that did not undergo surgery had slightly increased symptoms and decreased functional outcomes compared to those treated surgically. In this cohort, the greatest predictors of failure of non-operative treatment were older age and presence of a loose body; however, an initial trial of non-operative treatment did not adversely impact the success of future surgery at long term follow-up.

N	50
Non-operative cohort	7 (14%)
Delayed operative cohort	16 (32%)
Operative cohort	27 (54%)
Follow up (years)	9.4 (0.7-26)
Age	14.7 (9-24)
Sex	
Male	40 (80%)
Female	10 (20%)
BMI	25.7 (17.5-36.6)
Overhead athlete?	28 (56%)
Ethnicity	
White	45 (90%)
Black	2 (4%)
Other	3 (6%)
Time from symptom onset to presentation (months)	14.2 (0-96)
Laterality	
Right	31 (62%)
Left	19 (38%)
Dominant arm?	29 (52%)
Mechanical symptoms at presentation?	30 (60%)
History of trauma	
None	35 (70%)
Acute	3 (6%)
Remote	12 (24%)
Lesion grade on radiograph	
0	7 (15%)
1	33 (69%)
2	3 (6%)
3	5 (10%)
Lesion stability	
Stable	15 (31%)
Unstable	34 (69%)
Mean lesion diameter (mm)	10.6
Physeal status	
Open	10 (21%)
Closed	37 (79%)

Table 1: Baseline demographics for all patients

	Non-Operative (N = 7)	Surgery (N=43)	P-value
Follow up (years)	5.3 (0.7-13)	10.1 (1.6-24)	
Initial overall MEPI	71 (40-80)	69.4 (54-80)	0.72
Pain (0-45)	23.6	21	0.49
ROM (0-20)	18.6	19.3	0.49
Instability (0-10)	9.3	9	0.70
Strength (0-20)	19.1	19.9	0.10
Final overall MEPI	83 (65-95)	89.9 (65-95)	*0.05*
Pain	33	40.1	*0.04*
ROM	20	20	0.99
Instability	10	9.9	0.74
Strength	20	19.9	0.74
Ongoing mechanical symptoms	3 (50%)	4 (9%)	*0.01*
Return to sport	4 (67%)	34 (79%)	0.54
Same or higher level	2 (33%)	29 (67%)	
Decreased level	2 (33%)	5 (12%)	
Fail to return	2 (33%)	5 (12%)	
Range of motion			
Flexion	131	141	*0.01*
Extension	3	3	0.99
Pronation	77	79	0.55
Supination	84	85	0.47
Progression to osteoarthritis	1 (17%)	8 (19%)	0.90
Time from symptom onset to development of osteoarthritis (months)	36	93.1 (14-263)	0.44

Table 2: Long-term outcomes comparing patients treated non-operatively and those treated operatively

	Non-Operative (N = 7)	Delayed Surgery (N =16)	P-value
Age	12.6	15.2	0.06
Sex			0.20
Male	5 (71%)	15 (94%)	
Female	2 (29%)	1 (6%)	
BMI	24.4	23.9	0.96
Overhead athlete?	3 (43%)	10 (63%)	0.38
Ethnicity			0.50
White	7 (100%)	14 (88%)	
Black	0 (0%)	0 (0%)	
Other	0 (0%)	2 (12%)	
Laterality			0.67
Right	5 (71%)	10 (63%)	
Left	2 (29%)	6 (37%)	
Dominant arm?	3 (50%)	9 (64%)	0.55
History of trauma			0.11
None	2 (29%)	11 (69%)	
Acute	1 (14%)	0 (0%)	
Remote	4 (57%)	5 (31%)	
Time from symptom onset to presentation (months)	4.6	11.8	0.17
Mechanical symptoms	4 (57%)	8 (50%)	0.87
Range of motion			
Flexion	138	140	0.08
Extension	5	8	0.39
Pronation	76	76	0.40
Supination	83	84	0.67
Initial MEPI	70.6	71.3	0.90
Lesion size (mm)	14.2	10.2	0.50
Loose body?	1 (14%)	12 (56%)	*0.03*
XR	1 of 7 (14%)	3 of 16(19%)	
MRI	1 of 4 (25%)	2 of 5 (40%)	
CT	1 of 1 (100%)	6 of 7 (86%)	
Physeal status			0.83
Open	2 (33%)	4 (28%)	
Closed	5 (67%)	12 (72%)	
Lesion grade on radiograph			0.32
0	0	4	
1	4	9	
2	1	2	
3	1	0	
Lesion Stability			0.33
Stable	4 (67%)	7 (44%)	
Unstable	2 (33%)	9 (56%)	

Table 3: Baseline patient characteristics comparing patients successfully treated non-operatively versus patients who failed non-operative management.
(BMI: Body Mass Index, MEPI: Mayo Elbow Performance Index)

	Delayed Surgery (N = 16)	Early Surgery (N = 27)	P-value
Follow up (years)	12.5 (1.6-24)	8.6 (1.9-15.7)	
Surgical approach			
Open	1 (6%)	3 (11%)	—
Arthroscopic	13 (81%)	21 (78%)	
Both	2 (13%)	3 (11%)	
Operative intervention			
Debridement	14 (88%)	20 (74%)	
Loose body excision	12 (75%)	16 (59%)	—
Fragment fixation	7 (44%)	4 (15%)	
Microfracture	9 (56%)	11 (41%)	
OATS	1 (6%)	1 (4%)	
OCA	0 (0%)	3 (11%)	
Concomitant Procedure	6 (38%)	13 (48%)	
Capsulectomy	2 (13%)	7 (27%)	—
Synovectomy	3 (19%)	7 (26%)	
Plica excision	1 (6%)	1 (4%)	
Ulnar nerve decompression	0 (0%)	1 (4%)	
ICRS Grade			
0	0	0	—
1	3 (19%)	11 (41%)	
2	5 (33%)	3 (11%)	
3	2 (13%)	2 (7.4%)	
4	8 (50%)	11 (41%)	
Final overall MEPI	92 (80-95)	88.8 (65-95)	0.38
Pain	42	39.1	0.27
ROM	20	19.8	0.74
Instability	10	9.8	0.41
Strength	20	20	0.99
Improvement from preoperative MEPI	20.7 (0-35)	21.2 (0-50)	0.89
Ongoing mechanical symptoms	0 (0%)	4 (15%)	0.13
Return to sport	12 (75%)	22 (82%)	0.87
Same or higher level	11 (69%)	18 (67%)	
Decreased level	1 (6%)	4 (15%)	
Fail to return	2 (12.5%)	5(11%)	
Range of motion			
Flexion	142	140	0.39
Extension	3	3	0.78
Pronation	81	77	0.98
Supination	86	84	0.34
Progression to osteoarthritis	3 (19%)	5 (19%)	0.98
Time from surgery to development of osteoarthritis (months)	131 (14-263)	87 (24-228)	0.76
Need for revision operation	3 (19%)	4 (15%)	0.74

Table 4: Interventions and final outcomes amongst patients undergoing delayed operative intervention or immediate operative intervention for osteochondritis dissecans of the humeral capitellum
(ICRS: International Cartilage Repair Score, MEPI: Mayo Elbow Performance Index)