Complications of Capitellum Fracture Management Based on Screw Direction: A Retrospective Comparative Study

Areeb Ahmad, Kassem Ghayyad, Abdullah Taha, Daryl Christopher Osbahr, G Russell Huffman, Luke S Oh, Amir Kachooei

INTRODUCTION:

Capitellum fractures are rare, comprising less than 1% of elbow fractures, and are commonly treated with open reduction and internal fixation (ORIF). While anteroposterior (AP) and posteroanterior (PA) screw fixation (SF) are both used, their impact on complication rates and functional outcomes remains unclear. This retrospective study compares complications and postoperative range of motion (ROM) between AP and PA SF to determine the effect of screw direction on clinical outcomes.

METHODS: A retrospective review of 65 patients treated for capitellum fractures with headed or headless screws was conducted at a single institution (2014–2024). Fractures extending into the trochlea or with simultaneous AP and PA screw placement were excluded. Outcomes assessed included heterotopic ossification (HO), avascular necrosis (AVN), arthritis, nerve injury, reoperation rates, and postoperative ROM.

RESULTS: HO occurred more frequently with AP screws (26%) than PA screws (5.3%), trending toward significance (P = 0.087). Among patients in the AP (n = 46) and PA (n = 19) groups, there were no statistically significant differences in rates of avascular necrosis (7% vs. 0%), reoperation (4% vs. 10%), post-traumatic arthritis (4% vs. 0%), elbow contracture (2% vs. 5%), radiocapitellar gap (4% vs. 0%), nerve injury (2% vs. 0%), or capitellum collapse (7% vs. 11%). However, PA screws demonstrated superior postoperative supination (90° vs. 86°, P = 0.04) and pronation (90° vs. 87°, P = 0.04), while flexion and extension were similar.

DISCUSSION AND CONCLUSION: AP and PA SF had comparable complication rates, though PA screws may offer some advantage in minimizing HO. Although forearm rotation differed significantly, the 7° difference is not clinically significant and may relate to routine lateral collateral ligament release and repair during AP screw placement. Ultimately, the decision regarding screw direction should be individualized based on fracture pattern, preoperative imaging, ease of reduction, surgeon training, and comfort with the surgical approach.

Table 1. Patient Characteristics of both AP and PA groups

	AP (n =46)	PA (n = 19)	P value
Age (yrs)	52.8 (18.7)	46.6 (20)	0.2352
Sex (Male: female)	10:36 (22%: 78%)	3:16 (16%: 84%)	0.5855
BMI (kg/m^2)	27.97 (7.37)	27.51 (6.75)	0.8211
Side (Right; Left)	16:30	7:12	0.8745
Time from Injury to Surgery (days)	11.28 (10.1)	7.32 (4.26)	0.0338*

Abbreviations: AP, anteroposterior; PA, posteroanterior.

Table 2. Complication Profiles of AP and PA Groups

	AP (n =46)	PA (n = 19)	P value
Complications	17 (36.96)	4 (21.05)	0.2124
Heterotopic Ossification	12 (26.09)	1 (5.26)	0.0873
Avascular Necrosis	3 (6.52)	0 (0)	0.5498
Posterior Interosseous Nerve	1 (2.17)	0 (0)	1
Arthritis	2 (4.35)	0 (0)	1
Radio capitellar Gap	2 (4.35)	0 (0)	1
Capitellum Collapse Defect	3 (6.52)	2 (10.53)	0.6246
Elbow Contracture	1 (2.17)	1 (5.26)	0.5024
Reoperation	2 (4.35)	2 (10.53)	0.5740

Abbreviations: AP, anteroposterior; PA, posteroanterior.

Table 3. Postoperative Range of Motion of AP and PA Groups

	AP (n =46)	PA (n = 19)	P value
Elbow Flexion	133.78 (15.67)	134.74 (13.89)	0.9084
Elbow Extension	12.13 (18.50)	11.74 (14.93)	0.8708
Forearm Supination	85.46 (10.58)	90.00 (0)	0.0400*
Forearm Pronation	86.85 (7.18)	90.00 (0)	0.0400*

Abbreviations: AP, anteroposterior; PA, posteroanterior.

Table 4. AP and PA Cohort Reoperations

Patients Number	Screw # and Direction	Reason for Reoperation	Time to Reoperation (days)
1	1 PA headed screw	HWR and joint release for stiffness/sensitivity	185
2	2 AP headless screws	HWR open capsular release for stiffness/HO	180
3	2 AP headless screws	HWR for stiffness	128
4	3 PA headless screws	Open contracture release for stiffness	175

Abbreviations: HWR, hardware removal; HO, heterotopic ossification.