

Comparison of closed reduction and percutaneous pinning versus open reduction and internal fixation of closed metacarpal fractures

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Objectives

- Compare the outcomes of CRPP vs. ORIF for isolated, closed metacarpal fractures
- Hypothesis: ORIF allows for earlier mobilization, less stiffness and higher patient satisfaction

Methods

Retrospective chart review of closed, single, isolated extra-articular metacarpal fractures from January 2009 to December 2016

Inclusion criteria:

- Minimum of two post-operative clinic visits, or
- Discharge plan or referral to hand therapy and compliance with the plan

Reviewed and Compared:

- Injury characteristics: Metacarpal injured; Injury location (base, shaft or neck); Fracture pattern (transverse, spiral/oblique or comminuted)
- Operative outcomes
- Functional outcomes

Results

- CRPP (K-wires) – 44; ORIF – 26
- ORIF: Plate fixation – 18 (69.2%); lag screws – 8 (30.8%)
- ORIF patients were operated at a later stage than those who had CRPP, 15.0 days from the time of injury, versus 7.4 days for the latter patients (p=0.0001)
- Injury characteristics: The only difference between the two groups was in the treatment of transverse and 5th metacarpal fractures, for which CRPP was employed at a significantly higher rate than ORIF (p= 0.0122 and 0.0261 respectively)
- There was a trend toward longer duration of follow-up in the patients treated with ORIF
- ORIF resulted in earlier removal of the splint and referral to OT
- TAM / Stiffness / OT referral / Complications: No difference
- Quick-DASH score – 17 (38.6%) patients in the CRPP group and 6 (23.1%) patients in the ORIF group responded: Mean score for each group was satisfactory and within 1 standard deviation of the normal population – mild degree of disability only

Table 1. Patient characteristics

Variable	CRPP (n=44)	ORIF (n=26)	P value
Age (mean and σ range)	37.9 \pm 2.7	36.8 \pm 3.2	0.798
Male Patients (%)	27 (61.4)	21 (80.8)	0.114
BMI (mean and σ range)	25.3 \pm 0.6	27.5 \pm 1.0	0.0484
Diabetes (%)	3 (6.8)	3 (11.5)	0.6760
Smokers (%)	14 (31.8)	10 (38.5)	0.6100
Injury to surgery time (days, mean and σ range)	7.4 \pm 0.6	15.0 \pm 2.0	0.0001
Occupation			
Manual Labor Workers (%)	9 (20.5)	4 (15.4)	0.7544
Non-Manual Labor Workers (%)	22 (50.0)	10 (38.5)	0.4576
Unemployed/Other (%)	13 (29.5)	12 (46.2)	0.2006
Mechanism of injury			
Fighting / Punching (%)	12 (27.3)	8 (30.8)	0.7890
Falls (%)	13 (29.5)	6 (23.1)	0.2684
Sports (%)	4 (9.1)	2 (7.7)	1.0000
MVA (%)	8 (18.2)	5 (19.2)	1.0000
Other (%)	7 (15.9)	5 (19.2)	0.7509

Table 2. Operative Outcomes

Outcome	CRPP (n=44)	ORIF (n=26)	P value
Follow-up (months, mean and σ range)	2.8 \pm 0.3	5.1 \pm 1.5	0.062
Post-operative visits (mean and σ range)	3.38 \pm 0.53	3.82 \pm 0.25	0.4007
Immobilization time (days, mean and σ range)	31.0 \pm 0.8	19.7 \pm 2.9	0.0001
TAM (degrees, mean and σ range)	234.8 \pm 7.4	225.8 \pm 12.1	0.503
TAM (% normal, mean and σ range)	90.7 \pm 2.2	86.6 \pm 4.0	0.332
Stiffness (%)	16 (36.4)	10 (38.5)	1.000
Complications	1 (2.3)	2 (7.7)	0.551
Referred to Hand Therapy (%)	31 (70.4)	14 (53.8)	0.201
Duration of Hand Therapy (days, mean and σ range)	63.1 \pm 9.4	82.2 \pm 17.3	0.294
Quick-DASH Score	16.3	18.7	0.805

Conclusions

ORIF of closed metacarpal fractures is equally effective and allowed for faster mobilization when compared with CRPP without compromising fracture stability, clinical or functional short-term outcomes

We recommend the use of ORIF in cases of delayed presentation, spiral/oblique fractures, and in cases where early mobilization is especially advantageous to the patient