Comparing Fixation Techniques in Metacarpal Fractures: Intramedullary Screw versus Open Reduction Internal Fixation

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INTRODUCTION:

The purpose of this study is to compare intramedullary headless screw (IMN) versus plate and screw fixation (ORIF) in metacarpal fractures, specifically looking at implant cost, OR time, outcomes, and complications. We hypothesize IMN will provide similar or improved clinical outcomes and decreased complication rates as compared to ORIF while simultaneously decreasing operating room time and lowering overall costs.

METHODS:

All patients with metacarpal fractures treated operatively, presenting to a single, level-one trauma center between January 2018 through December 2022 were identified. A total of 85 patients and 108 fractures were included. Patient records were retrospectively reviewed and standard demographic information, injury data, treatment information, operative details, and follow up information was recorded.

RESULTS:

The average age of all included patients was 32.4 years; 79% of patients were male. Mechanism of injury was similar in both the ORIF and IMN groups, with leading causes of injury including falls and MVCs. Tourniquet time was an average of 79.9 minutes in the ORIF group and 37.6 minutes in the IMN group ($p = 0.0005$). Overall procedure length was an average of 163 minutes in the ORIF group and 100 minutes in the IMN group ($p = 0.000021$). Average cost of the implant, time to motion, and time to union was not statistically significant between the two groups.

Complications including reoperation rates, wound infections, hardware complications, and non- or malunions were collected. There was a total of 9 patients (10.6%) that underwent reoperation, 8 in the ORIF group (16.3%) and 1 in the IMN group (2.7%). There were 2 superficial wound infections both in the ORIF group. There was 1 hardware complication, as defined by implant breakage in the ORIF group. There were 3 hardware removals, all in the ORIF group.

DISCUSSION AND CONCLUSION:

In our experience, the use of an intramedullary screw for fixation of metacarpal fractures is a reliable and safe method of fixation. The use of this procedure resulted in decreased tourniquet time resulting in decreased associated cost. Furthermore, it provides patients with similar return to motion and time to union with fewer complications. Additional long-term follow-up studies will be beneficial in the future, but based on our short-term data, we are optimistic that intramedullary screw fixation is a reliable and safe method of fixation for metacarpal fractures.

Complication	Total Population	ORIF	IMN
Reoperation	9	8	1
Wound Infection	2	2	0
Hardware Complication	1	1	0
Hardware Removal	3	3	0
Non/Malunion	3	2	1

	Total Population	ORIF	IMN
No. of Patients	85	49 (58%)	37 (42%)
No. of Fractures	108	60 (55%)	48 (45%)
Age in Years, mean	32.4	31.9	29.8
Male	67 (79%)	41 (84%)	27 (73%)
Hand Dominance RHD/LHD/Unk	62/15/8	33/11/5	30/4/3
Diabetes	3 (3%)	2 (4%)	1 (3%)
Current Smoker	20 (24%)	15 (31%)	5 (14%)
Hypertension	5 (6%)	4 (8%)	1 (3%)

	ORIF	IMN
Time to Surgery in days	8	10
EBL (mL)	10.8	10
Tourniquet Time (min)	79.9	37.6***
Procedure Length (min)	163	100***
Implant cost	$865.30	$990.90