



Comparison of Intramedullary Screw and Plate-Screw Fixation in the Treatment of Metacarpal Fractures

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Background

- Metacarpal fractures = ~40% of all hand fractures
- Majority are isolated, simple fractures of the metacarpal neck or shaft that can be treated non-operatively

Background

- Surgical indications:
 - Marked displacement
 - Shortening
 - Malrotation
 - ...not correctable with closed manipulation

Background

- Multiple operative techniques/implants:
 - Kirschner wires
 - Interfragmentary screws
 - Plate-screw constructs
 - Intramedullary nails
 - Cannulated intramedullary headless screws



Metacarpal Plating

- Allows for anatomic reduction and stabilization that facilitates early motion
- Reported complication rates as high as **32-36%**
 - Soft tissue dissection
 - Implant tendon irritation
 - Plate prominence



Intramedullary Headless Screw (IHS)

- Newer technique described for extra-articular fractures
- Similar stabilization allowing early motion



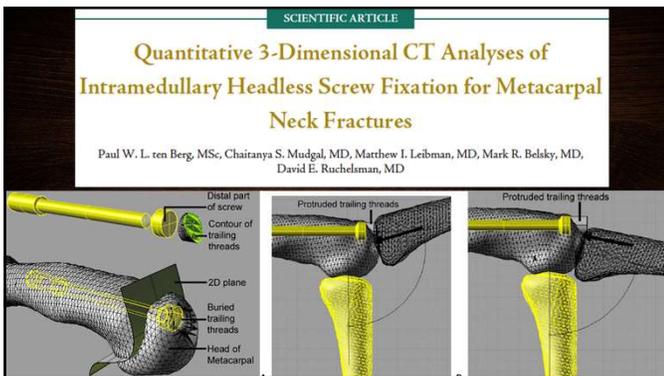
Intramedullary Headless Screw (IHS)

- Minimal tissue dissection
- Minimal reported complications



Surgical Technique





SCIENTIFIC ARTICLE

Quantitative 3-Dimensional CT Analyses of Intramedullary Headless Screw Fixation for Metacarpal Neck Fractures

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- Mean articular surface area violated by screw:
-12%, 8%, 4% (hyperextension to flexion)

Study Purpose

- To compare radiographic and clinical outcomes of IHS fixation and PS fixation in the treatment of extra-articular metacarpal neck and shaft fractures

Hypothesis

- IHS fixation will yield similar outcomes with fewer complications than PS fixation

Methods

- Retrospective chart review completed using the CPT code 26615 in our practice database

– *Open treatment of metacarpal fracture, single, with or without internal or external fixation, each bone*

Methods

- Inclusion criteria:

- Plate or IHS fixation from 2010-2016
- Simple fractures of the metacarpal neck and shaft

- All surgeries performed by 1 of 4 fellowship-trained hand surgeons

Methods

- Exclusions:

- Thumb metacarpal
- Head or base fractures
- Spiral or long oblique fractures
- Comminution
- Open injuries with soft tissue damage preventing primary closure
- Polytrauma of the ipsilateral extremity

Study Population

- 91 fractures
- 79 patients

Methods

- Outcome measures:
 - Time to union
 - Radiographic parameters
 - Angulation (AP & Lateral)
 - Shortening
 - MCP joint range of motion
 - Quick Disabilities of the Arm, Shoulder and Hand (DASH) score

Table 1. Population Demographics.

	Plate	IM Screw	p-value
No. of Patients	42	37	
No. of Fractures	49	42	
Gender			
F	7	6	1.00
M	35	31	
Age (years)	28 (16 – 57)	30 (14 – 71)	0.429
Metacarpal:			
II	4 (8.2%)	0	
III	7 (14.3%)	1 (2.4%)	
IV	22 (44.9%)	9 (21.4%)	
V	16 (32.8%)	32 (76%)	
Fracture location			
Neck	4	22	
Shaft	45	20	
Fracture type			
Transverse	19	23	
Short oblique	30	19	
Injury to surgery (days)	11 (1 – 41)	10 (1 – 25)	0.498

Results

Table 2. Clinical and Radiographic Outcomes.

	Plate (n=49 fxs.)		IM Screw (n=42 fxs.)		p-value
	Mean	SD	Mean	SD	
Time to union (weeks)	9.3	4.7	7.7	2.7	0.069
AP Angulation (°)	2.2	5.8	3.2	6.5	0.406
Lateral Angulation (°)	1.2	3.1	2.3	5.4	0.229
Shortening (mm)	0.0	0.0	0.6	1.3	0.001
MCP ROM (°)	86.9	7.5	89.2	3.5	0.080
Quick DASH score	1.1	1.6	0.4	1.0	0.076
Nonunion (n)	2		0		
Hardware removal (n)	2		0		

Complications

- No fixation failures
- No infections

Stiffness

- Patients who had NOT reached full ROM (i.e. <90° MCP joint motion)

–IHS group – 7% (3/42)

–Plate group – 18% (9/49)

Not statistically significant

Nonunion

- 2 patients in the Plate group lacked radiographic union at final follow-up
 - Both patients were asymptomatic
- All patients in the IHS group achieved radiographic union

Re-operation

- 2 patients in the plate group elected to have their hardware removed for plate prominence
 - Neither patient reported pain or dysfunction
 - Both had full range of motion
- No patients in the IHS group have required or requested hardware removal

Conclusions

- Fixation of transverse or short oblique fractures of the metacarpal neck and shaft with intramedullary headless screw (IHS) implants leads to similar radiographic and clinical outcomes compared to plate-screw fixation
- IHS may offer a less-invasive treatment option with potential for a lower rate of complications and reoperation

Future Study Directions

- Prospective, randomized controlled trials
- Long-term effect of IHS on the MCP joint

Thank you!

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