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Original Research

A comparison of outcome of K- wires and JESS in treatment of metacarpal fractures

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ABSTRACT:

Background: Metacarpal fractures comprise between 18–44 % of all hand fractures. Non-thumb metacarpals account for around 88 % of all metacarpal fractures. The present study was conducted to compare outcome of K- wires and JESS in treatment of metacarpal fractures. **Materials & Methods:** 128 cases of metacarpal fractures were divided into 2 groups of 64 each. Group I underwent standard internal fixation and group II underwent JESS. Parameters such as side, causative agent, associated injuries and complications were compared. **Results:** Group I had 34 males and 30 females and group II had 36 males and 28 females. Left side was involved in 20 in group I and 30 in group II, right side 44 in group I and 34 in group II, etiology found to be RTA seen 40 in group I and 34 in group II, assault 14 in group I and 16 in group II and domestic violence 10 in group I and 14 in group II. Associated injuries was skin loss 5 in group I and 7 in group II, tendon injury 10 in group I and 3 in group II, colie's fracture 12 in group I and 8 in group II and head injury 20 in group I and 12 in group II. Post- operative complication was skin necrosis 3 in group I and 1 in group II, wound infection 6 in group I and 3 in group II, osteodystrophy 1in group I and malunion 5 in group I and 2 in group II. The difference was significant (P< 0.05). **Conclusion:** JESS method found to be better as compared to K- wires in treatment of Metacarpal fractures.

Key words: Head injury, Metacarpal fractures, Road traffic accident.

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INTRODUCTION

Metacarpal fractures comprise between 18-44 % of all hand fractures. Non-thumb metacarpals account for around 88 % of all metacarpal fractures, with the fifth finger most commonly involved. The majority of metacarpal fractures are isolated injuries, simple, closed, and stable. While many metacarpal fractures have excellent outcomes without surgery, there is a paucity of literature and persistent controversy to guide the treating physician on the best treatment algorithm.[1]

Fractures of the metacarpal shaft occur as a result of axial loading, torsion, or direct falls and are classified as transverse, oblique, or comminuted. The fractures of all metacarpals from the first to the fifth are characterized by swelling and deformity, and inappropriate treatment may result in functional loss in the hand and disability.[2]

Metacarpal fractures follow the same descriptive classification patterns as other long bone fractures. They may be open or closed, and intra- or extra-articular. Fracture lines may be oblique, transverse, spiral, or comminuted. Metacarpal fractures tend to have apex dorsal angulation due to the force exerted by the intrinsic and extrinsic flexors on the distal fragment. On examination, there may be loss of knuckle contour from shortening and more proximal dorsal bony

prominence secondary to excessive angulation. Shortening is usually detected radiographically. Shortening is more common at the border digits or with multiple fractures, as the intermetacarpal ligament helps to prevent shortening more than 3–4 mm in the central digits.[3]

The goals of treatment are restoration of length, correction of rotational deformity, if present, establishing adequate stability, proper soft tissue management, and early initiation of movement.[4] Fixation techniques involve the use of K-wires, intramedullary nails, cerclage wires, plating, lag screws, tension band wires, and/or external fixators. JESS is a simple, versatile and light weight fixation with the added possibility of incorporation of splints or conversion to dynamic mobilization units.[5] The present study was conducted to compare outcome of K- wires and JESS in treatment of metacarpal fractures.

MATERIALS & METHODS

The present study was conducted among 128 cases of Metacarpal fractures of both genders. All were enrolled after obtaining their written consent.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 64 each. Group I underwent standard internal fixation and group II underwent JESS. Parameters such as side, causative agent, associated injuries and complications were compared. Results thus obtained were compared and assessed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

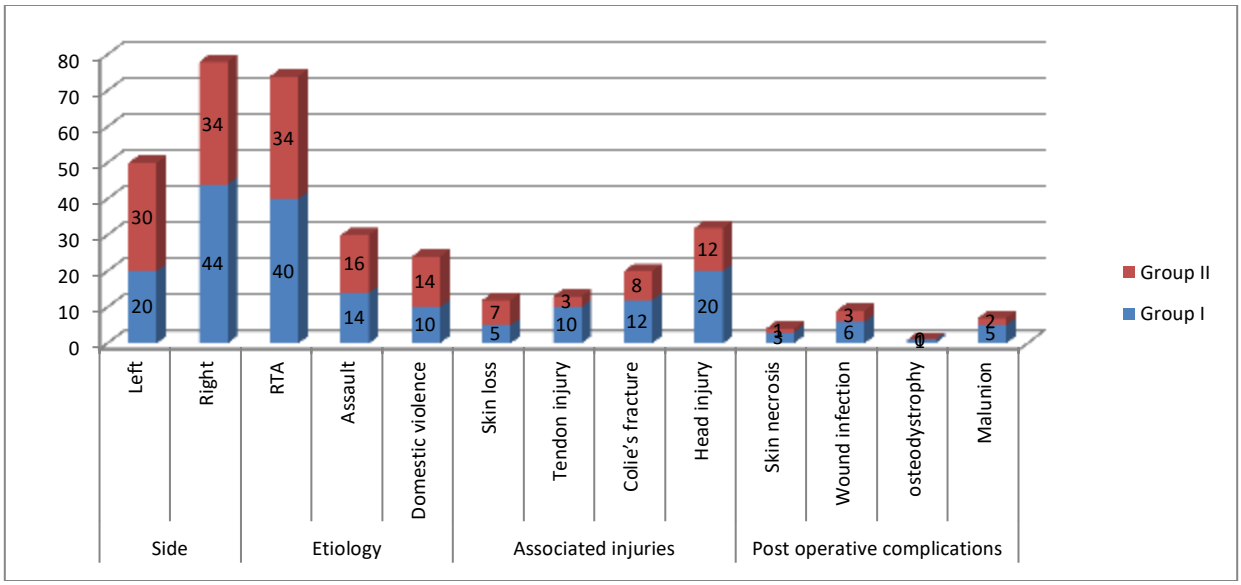
Groups	Group I	Group II
Method	K- wire	JESS
M:F	34:30	36:28

Table I shows that group I had 34 males and 30 females and group II had 36 males and 28 females.

Table II Assessment of parameters

Variables	Parameters	Group I	Group II	P value
Side	Left	20	30	0.03
	Right	44	34	
Etiology	RTA	40	34	0.01
	Assault	14	16	
	Domestic violence	10	14	
Associated injuries	Skin loss	5	7	0.01
	Tendon injury	10	3	
	Colie's fracture	12	8	
	Head injury	20	12	
Post operative complications	Skin necrosis	3	1	0.04
	Wound infection	6	3	
	osteodystrophy	1	0	
	Malunion	5	2	

Table II, graph I shows that left side was involved in 20 in group I and 30 in group II, right side 44 in group I and 34 in group II, etiology found to be RTA seen 40 in group I and 34 in group II, assault 14 in group I and 16 in group II and domestic violence 10 in group I and 14 in group II. Associated injuries was skin loss 5 in group I and 7 in group II, tendon injury 10 in group I and 3 in group II, colie's fracture 12 in group I and 8 in group II and head injury 20 in group I and 12 in group II. Post- operative complication was skin necrosis 3 in group I and 1 in group II, wound infection 6 in group I and 3 in group II, osteodystrophy 1in group I and malunion 5 in group I and 2 in group II. The difference was significant ($P< 0.05$).



DISCUSSION

Metacarpal shaft fractures are less forgiving. Mobility at the CMC joint allows the patient to adapt appropriately to 10°–15° of apex dorsal angulation in the ring and small fingers, respectively, without functional impairment.[6] Conversely, the index and middles finger can tolerate only minimal apex dorsal angulation, and reduction should be attempted with greater than 10° of angulation.[7] Although the MCP joint can hyperextend to accommodate flexion deformity in the metacarpal, this compensation can result in inadequate force at the proximal inter-phalangeal (PIP) joint leading to extensor lag, a phenomenon known as pseudo-clawing. Careful attention on exam must be paid to the ability to extend the PIP in both MCP flexion and extension.[8] Angulation in the coronal plane is less common but may occur in border digits, leading to divergence of the digit in both flexion and extension. It is possible to compress, neutralize or distract a fractures fragment and also allowing aggressive and simultaneous treatment of bone and soft tissue lesions. It is possible to immediately move the proximal and the distal joints.[9] The present study was conducted to compare outcome of K- wires and JESS in treatment of metacarpal fractures.

In present study, group I had 34 males and 30 females and group II had 36 males and 28 females. Alwatari et al[10] evaluated functional outcomes of isolated fifth metacarpal fractures treated by antegrade intramedullary K-wiring. Twelve patients met inclusion criteria. Mean follow-up was 34.5 months, a range of 23 to 56 months. The patients had a mean of 97.8% range of motion in the injured hand compared to the non-injured. They had a mean of 90.2% strength on the injured hand compared to the non-injured. Complex regional pain syndrome was documented in one patient. Radiographically, all patients showed full union on follow-up. Subjectively, Visual Analogue Scale (VAS) scores had a mean of 1.08. Disabilities of the Arm, Shoulder and Hand (DASH) scores had a mean of 6.9 and Steele scores had a mean of 378.5.

In present study, left side was involved in 20 in group I and 30 in group II, right side 44 in group I and 34 in group II, etiology found to be RTA seen 40 in group I and 34 in group II, assault 14 in group I and 16 in group II and domestic violence 10 in group I and 14 in group II. Associated injuries was skin loss 5 in group I and 7 in group II, tendon injury 10 in group I and 3 in group II, colie's fracture 12 in group I and 8 in group II and head injury 20 in group I and 12 in group II. Post- operative complication was skin necrosis 3 in group I and 1 in group II, wound infection 6 in group I and 3 in group II, osteodystrophy 1in group I and malunion 5 in group I and 2 in group II. Joshi et al[11] reported 90% excellent results among patients who were treated with external fixation.

Metacarpal shaft fractures are less forgiving. Mobility at the CMC joint allows the patient to adapt appropriately to 10°–15° of apex dorsal angulation in the ring and small fingers, respectively, without functional impairment. Conversely, the index and middles finger can tolerate only minimal apex dorsal angulation, and reduction should be attempted with greater than 10° of angulation. Although the MCP joint can hyperextend to accommodate flexion deformity in the metacarpal, this compensation can result in inadequate force at the proximal inter-phalangeal (PIP) joint, leading to extensor lag, a phenomenon known as pseudoclawing. Careful attention on exam must be paid to the ability to extend the PIP in both MCP flexion and extension. Angulation in the coronal plane is less

common but may occur in border digits, leading to divergence of the digit in both flexion and extension.[12]

CONCLUSION

Authors found that JESS method found to be better as compared to K- wires in treatment of Metacarpal fractures.

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