

FUNCTIONAL OUTCOMES FOR TREATMENT OF METACARPAL FRACTURES BY
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ABSTRACT

Objective: comparison of functional results of treatment of metacarpal fractures with intramedullary and transverse k- wires and studying the proximal and distal complications of both methods. **Methods:** A case control study of 94 patients with hand metacarpal fractures. patients were divided randomly into two groups : group I : patients were treated with titanium elastic nails (tens) intramedullary. group II: patients were treated with transverse k-wires. all patients were followed with clinical and radiological evaluation after surgery, with dash scale values. **Results:** This study included 94 patients who had 97 fractures, 67% of them were males. Most of the patients were young and the right hand fractures were the most common with 67 patients because the majority of humans are right- handed. Traumatic injuries were the most common cause of fractures 56.7%. Proximal complications had been recorded in 10 patients (6 from group I and 4 from group II). The majority of DASH scale values were excellent in both groups (75 out of 94). **Conclusion:** both methods were efficient and safe with a little advantage for intramedullary k-wires in metacarpal fractures.

KEYWORDS: Metatarsal Fracture, TENS, Transverse, K-wires.**1. INTRODUCTION**

Metacarpals fractures are described by the degree of angulation, shortening or rotation, the type of fracture (transverse, oblique spiral, comminuted or involution). The most common cite for the fractures of second metacarpal up to fifth is the neck, while the first metacarpal fractures (thumb) usually occur at the base.^[1]

The main goals in the management of metacarpal fractures include the restoration of function, mobility and the maintenance of proper bone axes. Fixation of fractures to reduce pain and tissue injuries especially neurovascular structures.^[2,3]

Metacarpal fractures can be fixed with transvers or intramedullary kirchner wires. The choice of implants depends on several factors: Type of the fracture (open, closed), location, shape (oblique, spiral or transverse) and the patient himself.^[4]

There are different types of k-wires which can be used in metacarpal fractures such as intramedullary and transverse.^[5] Intramedullary k-wires are known for stability which plays a crucial role in fractures treatment and decreases complications as mal-union.^[6] In addition, intramedullary k- wires needs minimum incisions comparing with other types.^[7]

Transverse k-wires technique has an advantage with open fractures^[8], but complications such as rotations cannot be avoided.^[9]

2. MATERIALS AND METHODS**Study Design:** Prospective Case – Control Study**Study Sample:** The study included 94 patients with metacarpal fractures who were admitted to the Department of Orthopedic Surgery at Tishreen University Hospital during the period from 2019 to 2022.**Inclusion Criteria**

The only non stable closed and isolated metacarpal fractures with patients older than 16 years.

Exclusion Criteria

- Open fractures.
- Multiple fractures.
- Fractures of metacarpal of the thumb.
- Comminuted fractures.
- Fracture with neurological or tendons injuries.

Methods

A case control study of 94 patients with metacarpal fractures. Detailed information were taken from all the patients with clinical and radiological examination (X-

ray with all positions anterior-posterior, 45 degrees and oblique).

Patients were divided randomly into two groups

- Group I: Patients Were Treated With intramedullary k-wires (TENS).
- Group II: Patients Were Treated With Transverse k-wires

All patients were followed with clinical and radiological evaluation after surgery, with DASH scale values^[10] as following

- Excellent : less than 5
- Good : 6-15
- Not bad : 16-35
- Bad : more than 35

3. Statistical Analysis

- Graphs and tables were used to characterize descriptive data.
- Averages, standard deviations and measures of central tendency were used to characterize quantitative data.
- Independent T student test to compare the average of two independent groups.

- Chi – square to study the relationships between qualitative variables.
- IBM SPSS statistical program (version 20) was used to analyze the results.

4. RESULTS

4.1. Sample characteristics

The study included 94 patients (97 fractures) with 63 males (67%) and 31 (33%) females. The age of the patients ranged from 18 to 64 years, with an average of 29.2 ± 6.5 years.

Table 1: Sample characteristics.

	Group I	Group II
N	50	44
Males	33	30
Females	17	14
Age (mean \pm SD)	29.04 \pm 7.05	29.04 \pm 6.1

4.2. Distribution of the sample according to injury-side

The right side was the most frequent with 67 patients (71.3%), then the left side with 24 patients (25.5%) and at last bilateral injuries with 3 patients (3.2%).

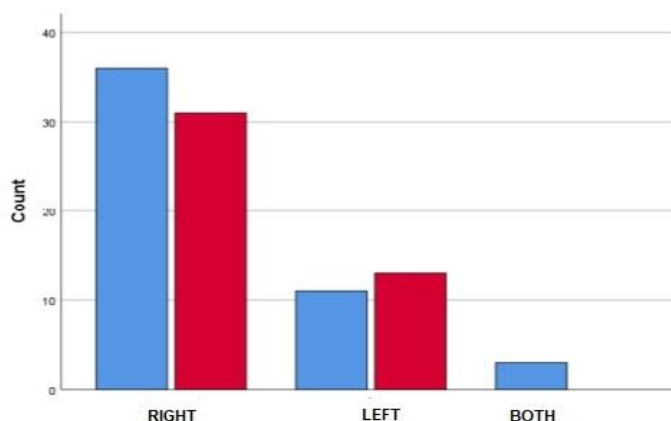


Figure 2: Distribution of the sample according to injury-side.

4.3. Distribution of the sample according to injury-reason

Trauma Injuries Were The Most Popular Reasons Of Fractures With 58.5% From All The Participating Patients.

Table 2: Distribution of the sample according to injury-reason.

Reason Of The Injury	Group I	Group II	TOTAL (%)
Sport	11	10	21 (22.3%)
Trauma	29	26	55 (58.5%)
Traffic Injury	9	5	14 (14.9%)
Other	1	3	4 (4.3%)

4.4. Distribution of The Sample According To DASH Scale

Even though both groups had scored excellent results, we found a significant statistical difference between the two-groups (p-value <0.05).

Table 3: DASH scale in patients.

DASH Scale	Group I	Group I	Total	p-value
Excellent	43	32	75	0.03
Good	8	2	10	
Not bad	1	8	9	
Bad	1	2	3	

4.5. Distribution of The Sample According To Fracture Types

Fractures were classified according to radiological assessment as following

Table 4: Types of fractures in study sample.

Fracture Type	Group I	Group II
Comminuted	6	6
Transverse	29	22
Oblique	15	11
Spiral	3	4

4.6. Distribution of The Sample According To Surgical Complications

Proximal Complications			
	Group I	Group II	P VALUE
Non	42	39	0.53
Angulation	2	3	
Rotation	2	1	
Compound	2	0	
Distal Complications			
Non	46	32	0.26
Osteomyelitis	1	0	
Adhesion	3	5	
Mal-Union	2	6	
Non-Union	1	1	

DISCUSSION

This study included 94 patients who had 97 fractures, 67% of them were males. Most of the patients were young and the right hand fractures were the most common with 67 patients because the majority of humans are right-handed.

Traumatic injuries were the most common cause of fractures 56.7%.

Proximal complications had been recorded in 10 patients (6 from group I and 4 from group II) with no significant statistical differences (p-value >0.05).

Also for distal complications, we did not notice any significant statistical differences (p-value >0.05) and that's because of accurate procedures and continuous follow-up for patients.

The majority of patients participating in this study had achieved excellent DASH scale values in both groups. however the results were better at intramedullary K-wires method (group I) due to early and easy movement ability with this method.

The results of our study matched the majority of international studies with males ratio and young ages as well as the safety and the efficacy of these two surgical methods. We found that intramedullary k-wires technique was better in early movements which corresponded with Winter et al. study.^[11]

We didn't found any significant differences between the two groups according to complications which differ from Galal et al. study^[12] who found less complications ratio with transverse k-wires technique.

Our study used DASH scale only in contrast with Winter et al.^[11] and Wond et al.^[13] who used other scales in evaluating. However, they had the same results, about the superiority of intramedullary k-wires, as our study reviewed.

CONCLUSION

Both methods were efficient and safe with a little advantage for intramedullary k-wires in metacarpal fractures.

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Ethical approval

This research received approval from the Scientific Research Ethics Committee at Tishreen University.

Patient consent

Written informed consents were obtained from all the patients for publication.

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