



## Orthopaedics

# PROSPECTIVE STUDY OF ANTEGRADE INTRAMEDULLARY PINNING VERSUS RETROGRADE INTRAMEDULLARY PINNING VERSUS TRANSVERSE K-WIRES FIXATION OF NECK OF 5TH METACARPAL FRACTURE IN A GOVERNMENT MEDICAL COLLEGE SETUP

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**ABSTRACT**

**Introduction:** Fractures of the neck of the fifth metacarpal, the so-called "Boxer's Fracture," are very common injuries of the hand. The objective of the paper is to evaluate the outcome of boxers fracture clinically and radiologically and functionally by three methods i.e. intramedullary nailing antegrade and retrograde and transverse K-wire fixation. **Materials And Methods:** Prospective clinical study of 45 cases of neck of 5th metacarpal fractures operated between February 2022 and August 2023 in Gandhi hospital with a minimum follow-up of 3 months. **Results:** At 0 1 and 3 months we tested clinical ,radiological and functional outcomes by measuring the ROM and VAS and DASH SCORE and used statistical analysis by anova to evaluate the results. **Conclusion:** Antegrade intramedullary pinning has been a reliable and safe modality for treatment of displaced fifth metacarpal neck fractures and this studies have shown that antegrade intramedullary pinning produces better outcomes than other surgical methods.

**KEYWORDS :****INTRODUCTION**

Fractures of the neck of the fifth metacarpal, the so-called "Boxer's Fracture," are very common injuries of the hand. The patients are usually active young men, and these are typical injuries of aggression or alcohol intake. Severe angulation or shortening can be a surgical indication for fifth metacarpal neck fracture.

**AIMS AND OBJECTIVES**

1. To evaluate the outcome of boxers fracture clinically and radiologically by three methods i.e. intramedullary nailing antegrade and retrograde and transverse K-wire fixation.

2. To evaluate the functional outcome (ROM VAS AND DASH) of boxers fracture by three methods i.e. intramedullary nailing antegrade and retrograde and transverse K-wire fixation.

**CRITERIA****Inclusion Criteria:**

Closed, isolated, and simple fracture of the neck of the little finger metacarpal bone Age > 18 yrs With angulation > 30 degrees or shortening > 3 mm

**Exclusion Criteria:**

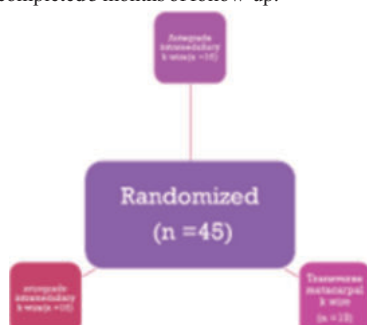
Open fractures, fractures extending to the metacarpal shaft or to the articular surface. Patients presenting with multiple injuries or fifth metacarpal malunion.

**MATERIALS AND METHODS**

Prospective clinical study of 45 cases of neck of 5th metacarpal fractures operated between February 2022 and August 2023 in Gandhi hospital with a minimum follow-up of 3 months. Patients were randomly allocated to one of the following groups:

- Antegrade intramedullary K-wire group (n = 16)
- Percutaneous retrograde intramedullary K-wire group (n = 16)
- Transverse K-wire group (n = 13)

All patients completed 3 months of follow-up.



|                         | Antegrade<br>k wire | Retrograde<br>k wire | Transverse<br>metacarpal<br>k wires |
|-------------------------|---------------------|----------------------|-------------------------------------|
| Age (median)            | 25(18 – 48)         | 28(19 – 54)          | 26(20 – 46)                         |
| Sex (m/f)               | 15/1                | 14/2                 | 13/0                                |
| Dominant<br>hand (R/L)  | 14/2                | 13/3                 | 12/1                                |
| Angulation<br>(median)  | 32                  | 34                   | 32                                  |
| Shortening (m<br>edian) | 4 mm                | 4 mm                 | 3 mm                                |

**Surgical Procedure**

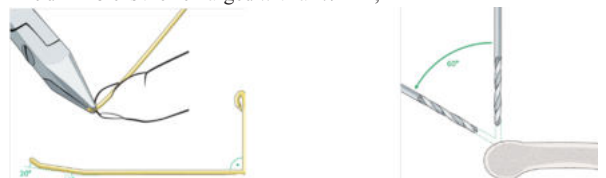
- **Anesthesia:** Ulnar nerve block at wrist level with local infiltration of local anesthetic at the entry site.
- Written consent was obtained, and patients were informed about the surgical procedure.

**Antegrade K-wire Technique**

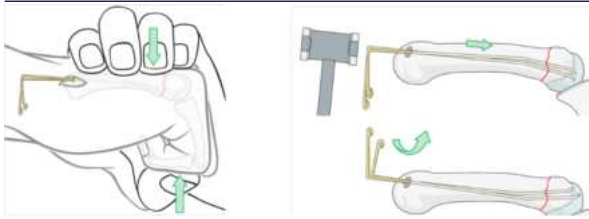
For intramedullary pinning, two K-wires, of diameter 1 mm were used.

- These wires were contoured in order to obtain a 20 degree distal angulation.
- A small incision was made at the level of the carpometacarpal joint.
- Tilt the drill by approximately 60 degrees so that it enters the intramedullary canal at as obtuse an angle as possible.
- Do not drill through the opposite cortex.

The drill hole is then enlarged with a 2.7 mm,



- The fracture then was reduced using the **Jahss maneuver** as the metacarpophalangeal joint and proximal interphalangeal joint were flexed at an angle of 90° and upward pressure was applied on the flexed finger to correct apex dorsal angulation.
- The wires were introduced into the metacarpal shaft.
- The distal angulation of the first wire was oriented dorsally.
- The two other wires were oriented in a radial and an ulnar direction, respectively.
- Clinical and X-rays checks of the adequacy of fracture fixation and the rotational position of the finger were carried out.



- The K-wires were then bent, cut



#### Retrograde K-wire Technique

- The fracture was reduced using the Jahss maneuver, and when fracture reduction was confirmed using an image intensifier,
- Then, 1.2 mm two K-wires were pinned on the fifth metacarpal head into the shafts from radial and ulnar sides, using a crossed-pin configuration.
- The fixation and position of the wires were confirmed by fluoroscopy.
- Finally, the K-wires were cut and bent so that they were outside the skin.



#### Transverse Metacarpal Pinning

- Two two K-wires of diameter 1.5 mm were used.
- The first K-wire was introduced through the ulnar border of the hand and passed from the little to the ring metacarpal shaft, approximately 10 mm proximal to the fracture.
- After reduction, the second K-wire was introduced through the ulnar border of the hand and passed from the little to the ring metacarpal head, avoiding the articular surfaces.
- This second wire was passed parallel to the first.
- If stability is not satisfactory, a 3<sup>rd</sup> k wire can be passed like 2<sup>nd</sup> k wire parallel to 1<sup>st</sup> k wire
- The position of the finger in extension and flexion was then examined to check the rotation.
- Final clinical and X-ray checks of the adequacy of fracture fixation



#### Postoperative Management

- A well-molded ulnar gutter short-arm splint was applied in all cases.
- The splint was positioned with the wrist in 20° extension, the metacarpophalangeal joint at 60° flexion, and the interphalangeal joint in full extension in both patient groups.
- At 1 week postoperatively, the splint was changed to a short-arm splint; full ROM of the metacarpophalangeal and interphalangeal joints was allowed in both groups.
- The K-wires were removed 6 weeks after surgery under local anaesthesia.

#### Clinical Evaluations

- Clinical assessments were performed at 1 month and 3 months postoperatively.
- These assessments included ROM of the injured fifth metacarpophalangeal joint, VAS for injured fifth metacarpophalangeal joint pain, and DASH score.
- Active ROM for patients with injured fifth metacarpophalangeal joints was measured using a finger goniometer, and pain during daily activity was recorded using a VAS, in which 0 indicated no pain and 10 indicated the most severe pain
- The DASH questionnaire consists of 30 items: 21 address the ability to perform specific activities and nine address symptoms. DASH responses are scored from 0 to 100, and higher scores indicate greater patient disability
- data were expressed as mean and lower to upper values.
- The statistical tests used was a multiple ANOVA test
- p Value under 0.05 was considered as significant

#### RESULTS

At 3 months postoperatively, all clinical outcomes favored antegrade pinning:

|            | Antegrade group | Retrograde group | Transverse pinning |
|------------|-----------------|------------------|--------------------|
| ROM        | 80 (87-90)      | 69 (45-90)       | 66(46 - 80)        |
| VAS points | 2 (0-5)         | 4 (0-8)          | 4(0-9)             |
| DASH score | 4.3 (0-15.8)    | 10.3 (0-28.4)    | 9.8(0-26.7)        |

#### DISCUSSION

- Boxer's Fractures of the neck of the fifth metacarpal bone usually occur as a result of punching or in a fall.
- This injury has been described as "a tolerable fracture in an intolerable patient"
- Palmar displacement of the fifth metacarpal head and metacarpal shortening as a result of this fracture can have detrimental effects on hand function
- According to biomechanical studies, such displacement can alter the intrinsic muscle and the tendon balance, leading to a loss of grip strength and an extension deficit.
- The management of the boxer's fracture is still controversial.
- Conservative treatment gives good results for fractures presenting with small displacement suggested that 30 degree is the upper limit of acceptable angulation of palmar displacement of such fractures

- With respect to this trial, we included all patients with angulation of 30 degree or more, although the degree of angulation at which active treatment is considered to be mandatory remains controversial

## CONCLUSION

- Antegrade intramedullary pinning has been a reliable and safe modality for treatment of displaced fifth metacarpal neck fractures and this studies have shown that antegrade intramedullary pinning produces better outcomes than other surgical methods
- Percutaneous retrograde intramedullary pinning also provides reliable fracture reduction and minimal limitation of MP joint of little finger
- Transverse pinning is associated with loss of reduction after 1 week of postop mobilization, and itself associated with interosseous muscle damage

## REFERENCES

1. Ali A, Hamman J, Mass DP. The biomechanical effects of angulated boxer's fractures. *J Hand Surg Am.* 1999;24:835–844. doi: 10.1053/jhsu.1999.0835. ]
2. Balogun JA, Akomolafe CT, Amusa LO. Grip strength: effects of testing posture and elbow position. *Arch Phys Med Rehabil.* 1991;72:280–283.
3. Crosby CA, Wehbe MA, Mawr B. Hand strength: normative values. *J Hand Surg Am.* 1994;19:665–670. doi: 10.1016/0363-5023(94)90280-1.
4. Facca S, Ramdhian R, Pelissier A, Diaconu M, Liverneaux P. Fifth metacarpal neck fracture fixation: locking plate versus K-wire? *Orthop Traumatol Surg Res.* 2010;96:506–512. doi: 10.1016/j.otsr.2010.02.009. ]
5. Foucher G, Chemorin C, Sibilly A. [A new technic of osteosynthesis in fractures of the distal 3rd of the 5th metacarpus][in French] *Nouv Presse Med.* 1976;5:1139–1140. ]
6. Fujitani R, Omokawa S, Shigematsu K, Tanaka Y. Comparison of the intramedullary nail and low-profile plate for unstable metacarpal neck fractures. *J Orthop Sci.* 2012;17:450–456. doi: 10.1007/s00776-012-0223-y. ]
7. Hunter JM, Cowen NJ. Fifth metacarpal fractures in a compensation clinic population: a report on one hundred and thirty-three cases. *J Bone Joint Surg Am.* 1970;52:1159–1165