

## FUNCTIONAL OUTCOME AFTER INTRAMEDULLARY K-WIRE FIXATION OF FIFTH METACARPAL NECK FRACTURES

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**ABSTRACT:** Fractures of fifth metacarpal (Boxer's fractures) are one of the common fractures in hand. This fracture if not treated properly, can lead to rotational deformities and functional limitations involving hand strength. This study involves 25 patients with boxer's fracture, who were treated with intra medullary fixation, using two Kirschner wires. Patients were followed up post operatively on 4, 8, and 12 weeks and at 6 months. Patients are assessed both clinically (Pain relief and handgrip strength) and radiologically (Signs of union). K-wires were removed at the 4<sup>th</sup> week of follow up. We recommend that this minimally invasive, percutaneous intramedullary fixation using two k-wires for 5th metacarpal neck fractures (Boxers fracture) gives good functional results with less morbidity.

**KEYWORDS:** Fifth metacarpal, k-wires, intramedullary.

**INTRODUCTION:** Metacarpal fractures are one of the common presentation in hand injuries. Boxer's fracture i.e. fracture of neck of fifth metacarpal usually result from direct injury or axial force acting along the fifth metacarpal and has an incidence of 50% of metacarpal fractures.<sup>1</sup> This fracture is notable for leading to rotational deformity, volar angulation<sup>2</sup> and functional limitations<sup>3</sup> without proper treatment. A number of modalities of treatment options<sup>4</sup> are available for these fractures including internal fixation using K-wires, plating and intramedullary K-wire.<sup>5,6</sup>

Conservative treatment with casting can sometimes lead to skin complications<sup>7</sup>. This study aims to assess the functional outcome in 15 patients with closed fracture neck of the fifth metacarpal, treated with intramedullary k-wire fixation. These fractures are more common in young active men, especially in the dominant hand and are aggression fractures (boxer's fractures).<sup>8</sup>

**MATERIALS AND METHODS:** This study includes 15 patients, who presented with closed fractures of neck of fifth metacarpal (Boxer's fracture) to the Emergency Department, Chettinad Hospital and Research Institute, between October 2013 to November 2014. Patients with open fractures, pediatric fractures, associated with other metacarpal fractures, patients with poly trauma were excluded.

INCLUSION CRITERIA	EXCLUSION CRITERIA
Fractures of fifth metacarpal neck	Open fractures
Closed fractures	Associated with other metacarpal fractures
Age > 18 years	Age < 18 years
	Poly Trauma
	Senile osteoporotic fractures

Table 1

## ORIGINAL ARTICLE

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The general condition of the patient, including the pre-injury status was recorded on admission to casualty. Mode of injury, handedness were recorded. Clinical examination was done to assess rotational deformity. Radiological investigations (X-rays-AP & Oblique views) were done to evaluate the fracture pattern, volar angulation at the fracture site and rotational deformity.

**SURGICAL METHODS:** After a detailed clinical and radiological examination, patients were taken up for surgical management. All patients underwent closed reduction and intramedullary K-wire fixation on the fifth metacarpal. Under regional anaesthesia, with Image Intensifier guidance, entry point was made at the dorso-ulnar aspect of base of the fifth metacarpal. Dorso ulnar cortex was opened with a 2mm drill bit at an angle of 60°. The hole is then enlarged with 3.2mm drill bit, in an oblique fashion.

Two K-wires of 1.25mm width are pre bent at 3 points. The blunt tip is inserted first to avoid perforation through the metacarpal head. First bend is made at the distal blunt tip at an angle of 20 degrees, second bend at an angle of 10 degrees about 2cm from the first bend; third bend of 90 degrees is made at a length slightly greater than the length of the metacarpal.

Two wires are inserted through the entry point into the medullary canal and slowly advanced. Fracture reduction is done using JAHSS manoeuvre.<sup>9</sup> The initial reduction is by flexing metacarpo-phalangeal and interphalangeal joints by 90 degrees, and using the proximal phalanx to elevate the metacarpal head. Wires are advanced further, their position checked using image intensifier. K-wires are then rotated so that proximal tip is pointing dorsally and slightly divergent. The aim is to achieve a three point stable fixation. Finally K-wires are bent and cut close to the entry portal. Compressive dressing was applied. Postop Xrays were taken. Dressings were changed and patients were discharged on the 3<sup>rd</sup> post-op day.

**RESULTS:** All the 15 patients were reviewed post-operatively at 1<sup>st</sup> week, 4<sup>th</sup> week, and 8<sup>th</sup> week and at 6 months. Out of the fifteen, 13 were male and 2 were female. Most common mechanism of injury was direct injury (Axial loading force punch) injury. 12 out of fifteen patients had injury on their dominant hand (right), 3 on their non-dominant hand. 4 patients had rotational deformity of little finger at the time of presentation. Mean time from injury to surgery was 3 days. (Range=1-4). The procedure was performed under regional anaesthesia by an experienced consultant surgeon.

Post-operatively, patients are assessed both clinically and radiologically. Clinical assessment was done using pain, handgrip strength and range of motion. Radiological assessment was done by determining the palmar tilt and metacarpo-phalangeal angle. K-wires were removed at 4<sup>th</sup> week, when x-ray showed complete union.<sup>10</sup> Patient were started on physiotherapy (Finger mobilisation).

**ANATOMICAL RESULTS:** All patients had radiological bony union with no rotational deformities. Volar tilt Pre-op 55-60\* and post op was 15-20\*.

**FUNCTIONAL RESULTS:** All patients had complete pain relief, regained hand grip and achieved full extension of little finger. None of the patients had any rotational or angulation deformities on

follow-up. One patient had superficial infection, which settled with antibiotics and regular dressings.

**DISCUSSION:** Intramedullary K-wire fixation is one of the useful methods for management of boxer's fractures. It has significant advantages than alternative methods, such as plating. It is a minimally invasive method, with faster recovery time, as opposed to the time taken for healing of soft tissues after dissection, as in plate osteosynthesis. Minimal surgical scar is more cosmetically acceptable by patients than those result from plating.

There is no breach of articular cartilage, as the K-wire is introduced from proximal end. Intramedullary approach provides a 3-point fixation that increases stability of the construct using 2 K-wires thereby maintaining the reduction.

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**Fig. 1: Instruments and Implants**

**CASE 1:**



**PRE OP**



**POST OP**

**CASE 2:**



**PRE OP**



**POST OP**

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