

**Original article:**

## **Study of external fixator's efficacy in metacarpal and phalangeal fractures management at tertiary care centre**

**<sup>1</sup>Dr. Virendra Pal Singh, <sup>2</sup>Dr. Kusumchandra Ambhure\***

<sup>1</sup>Assistant Professor, Varun Arjun Medical College, Shahajahanpur, Uttarpradesh

<sup>2</sup> Associate Professor, Department of Orthopedics, SMBT Medical College, Maharashtra

Corresponding author\*

### **Abstract**

**Introduction:** The Kirschner-wire is the preferred anchoring device in the UMEXTM framework. Schanz screws or threaded pins have a habit of wrapping themselves around sensitive soft tissues.

**Material and methodology:** Following that, a study was conducted at Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & RF, Gannavaram, to evaluate the results of metacarpal and phalangeal fractures treated with the Universal Mini External Fixator, to determine their value in various fracture patterns, & to make recommendations regarding potential applications.

**Results:** The majority of the patients (69%) were between the ages of 21 and 40. The eldest was 58 years old, while the youngest was 19 years old. The patient's average age was 32.97 + 10.41 years. With a P=0.046, a good outcome is strongly associated with younger age groups. In this study, 86.6% cases were males, and 13.4% cases were females.

55.2% of cases have proximal phalanx fractures, metacarpals (34.2%) & middle phalanx (10.55%) are seen.

**Conclusion:** The majority of phalangeal and metacarpal fractures are treatable with minimal surgery. Multiple fractures, open fractures, and intraarticular fractures all require operational reduction and stabilisation in order to achieve the best possible position for bone healing and early movement.

**Keywords:** external fixator, metacarpal and phalangeal fractures

### **Introduction:**

The Kirschner-wire is the preferred anchoring device in the UMEXTM framework. Schanz screws or threaded pins have a habit of wrapping themselves around sensitive soft tissues. Any attempt to loosen these tissues is met with the inevitability of the schanz screw backing out. Furthermore, dense cortical bone seen in the diaphyseal regions of bones necessitates threaded anchoring device pre-drilling. Only a few cases of metacarpal and phalangeal fractures have been reported using "Universal Mini External Fixation".<sup>1,2</sup>

### **Material and methodology:**

Following that, a study was conducted at Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & RF, Gannavaram, to evaluate the results of metacarpal and phalangeal fractures treated with the Universal Mini External Fixator, to determine their value in various fracture patterns, & to make recommendations regarding potential applications. External fixation is the optimum treatment for hand and finger fractures with comminution or accompanying soft tissue injuries, according to Fricker; The novel AO mini-external fixator, unlike previous methods, allows for less bulky unilateral fixation, allowing for faster mobilisation, and the

unique design of the double clamps allows for preliminary intra-operative stabilisation with only one wire in each fragment.

All patients with hand fractures who meet the inclusion criteria, both in-patients and out-patients, will be included in the study. In the department of Orthopedics, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences, Chinnaoutpally, Gannavaram from November 2019 to December 2021.

SAMPLE SIZE- 30

**INCLUSION CRITERIA:**

1. Fractures of metacarpals and phalanges .
2. Male and female patients of age group 20- 70 years.
3. Patients with Grade I compound fractures (Gustilo & Anderson classification).
4. patients fit for surgery

**EXCLUSION CRITERIA:**

1. flexor or extensor tendon injury in hand
2. Age less than 18 years.
3. Grade II and III Compound fractures.
4. Associated with other fractures and dislocations in ipsilateral limb
5. Pathological fractures.
5. Patients unfit for surgery

The majority of the patients (69%) were between the ages of 21 and 40. The eldest was 58 years old, while the youngest was 19 years old. The patient's average age was 32.97 + 10.41 years. With a P=0.046, a good outcome is strongly associated with younger age groups. In this study, 86.6% cases were males, and 13.4% cases were females.

**Results:**

**Table 1 : The distribution is depending on the hand's component (including thumb)**

PART OF HAND	NO.	%
Metacarpal	13	34.21
PP (Proximal phalanx)	21	55.26
MP (Middle phalanx)	4	10.55
DP (Distal phalanx)	0	0

Total	38	100.0
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55.2% of cases have proximal phalanx fractures, metacarpals (34.2%) & middle phalanx (10.55%) are seen.

**Table 2 : Based on site of fractures**

SITE OF FRACTURE	No.	%
Shaft	22	57.8
Juxta-Articular	9	23.6
Intra-Articular	7	18.4
Total	38	100.0

Out of 38 hand fractures, 22 of the fractures involved shaft, 9 fractures were juxta-articular and another 7 were involving the intra-articular joint surface.

**Table-3 : Distribution on the basis of Fracture Pattern :**

FRACTURE PATTERN	No.	%
Comminuted	19	51.53
Bicondylar Intra Articular fracture	2	4.70
Avulsion type Intra-Articular fracture	1	2.17
Unicondylar Intra Articular fracture	2	5.41
Juxta-Articular	5	13.51

Short Oblique Shaft fracture	7	18.92
Transverse Shaft fracture	2	5.41
Total	38	100.0

Around 51.53 percent of the fractures are comminuted.

Inference: Shaft and juxta-articular fractures were highly related with a good result(P=0.033).

**Table 4 : Open fractures**

Gustilo-Anderson type	No.	%
Type-1	10	33.3
Type-2	20	66.6
Total	30	100

Most of Open fracture was Type-II comprising 66.6%

Table 11:

83.33 percent of the cases were operated on during the first three days, while 16.67 percent were operated on four to seven days following the accident.

With a P=0.022, a good outcome is highly associated with cases operated within 3days.

Table-12 : Healing time :

**Discussion:**

Any endeavor to obtain good joint function requires anatomical reduction of the articular fracture fragments & restoration of joint congruity and a steady functional arc of movement while the fixation device is giving stability for early mobilization.<sup>3</sup> Application of guideline of ligamentotaxis in hand injuries fulfills the above specified criteria of fixation promoting function. This minimally invasive strategy respects the delicate soft tissues and avoids harm to complex intrinsic anatomical structures, thus avoiding open reduction to attain alignment. From November 2019 to December 2021, Treatment of 30 patients with 24 phalangeal and 16 metacarpal fractures was done with Universal-Mini-External-fixator and with patients ranging from 20 years to 70 years. In our study, 8 patients (26.66 percent) had

associated injuries, 4 of them had long bone fractures, while others had injuries involving other systems, such as chest injuries (II and IIIrd rib fractures) and one head injury. The dominant hand had almost all of the phalange and metacarpal fractures in all of these patients. Associated injuries were included since their occurrence causes surgery to be postponed. In the event of a head injury, the surgical treatment was postponed until the patient recovered.<sup>4,5</sup>

According to Swanson et al., open fractures were categorised. Orthopaedic surgeons have mostly adopted Gustillo's classification of open fractures and subsequent adjustments. Swanson and coworkers determined that Gustillo's categorization is not easily applicable to open hand fractures after evaluating a large number of patients with hand fractures.<sup>6</sup> They created a different categorization for open fractures since their research found that wound contamination, a delay in treatment of more than 24 hours, and systemic sickness were critical variables in an increased probability of infection. Due to their peripheral location, hand fractures are a regular occurrence. Because they live an ambulant lifestyle, the majority of the patients were men.<sup>7</sup>

#### **Conclusion:**

The majority of phalangeal and metacarpal fractures are treatable with minimal surgery. Multiple fractures, open fractures, and intraarticular fractures all require operational reduction and stabilisation in order to achieve the best possible position for bone healing and early movement.

#### **Discussion:**

1. Watson-Jones R, Barton NJ; Fractures and Joint Injuries of the hand. 7<sup>th</sup> edition, Noida: Elsevier Publishers; 2009. Pp 650-695
2. BB Joshi and Associates, Basic manual of Hand Trauma – Skeletal and soft tissue stabilization.
3. Johnson D, Tierman E, Richards AM, Cole RP. Dynamic external fixation for complex intraarticular phalangeal fractures. J Hand Surg Br. 2004 Feb;29 (1): 76-81
4. Jenkin E. Treatment of intra-articular metacarpal and phalangeal fractures with an external fixation minidevice. Handchir Mikrochir Plast Chir 2013 Sep;15(3): 198-203
5. Hand Fixation workshop using the Umex System Bioskill lab, Orthopaedic Learning centre (OLC), Prince of Wales Hospital, Shatin, Hong kong Dr.sudhir warrier, Dr Samir Kumta, Mr Ravi Sarangapani.
6. Shehadi SI. External fixation. In: Rockwood and Greene's fractures in adults. Philadelphia: Lippincott Williams & Wilkins, 2006; 6<sup>th</sup>:257-296
7. Barton N. Internal fixation of the Hand. J Hand Surg Br. 2009;14:139-142