Functional outcome in fracture of phalanges managed with mini distractor in a tertiary care centre of North India

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ABSTRACT

Introduction

Phalangeal fractures are extremely common injuries in hand that are dealt with in emergency department. Some of the common causes of hand injuries are crush, compression, machinery injuries, explosive/ firearm injuries. The principal management involves restoration of articular congruity and fixation. This study reviewed functional results in a group of patientswith phalangeal fracture treated with a mini external fixator.

Purpose/ Aim

The aim of the study was to study the functional outcome in fracture of phalanges managed with mini distractor.

Materials and methods

Prospective analysis of 20 cases of phalangeal fracture over a period of 6 months. Inclusion criteria included skeletally mature patients, open and closed fractures, comminuted fractures, either intra-articular or extra-articular. Exclusion criteria for the use of mini fixators were skeletally immature patients, and associated neurovascular injury.

Results

Results were markedly better in extra- articular fractures than the intraarticular fractures and in closed fractures more than open fractures. Functional outcome was assessed by ASSH TAF score. Excellent and good results were observed in the majority of patients (75%). Poor results were seen in patients (25%) when the fracture was intra-articular and the time of external fixator removal was increased by more than 3 weeks.

Conclusion

Our study concluded that an external fixator is a suitable and alternative technique for stabilizing comminuted and open fractures of phalanges.

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INTRODUCTION

Phalangeal fractures are extremely common injuries in the hand (Figure 1). These injuries are dealt with in emergencies everyday. These fractures can be managed conservatively or operatively depending upon the nature of the injuries, fracture pattern and stability of the fracture.

The standard treatment options for the hand fractures include K-wires, plating, intraosseous wiring, etc. These may lead to further damage to soft tissue and joint stiffness.

The principal management involves restoration of articular congruity and fixation of fracture with an internal or external fixation device. Key treatment involves anatomic reduction, stable fixation followed by early mobilization.

In comminuted and intra- articular fracture, fixation with K-wires leads to incapability of early mobilization secondary to smaller size of bone fragments. There is also a risk of infection because of open wounds.

Plate fixation of extra-articular fractures has been found to have complications like infection, complex regional pain syndrome and plate loosening.

External fixators offer significant advantages in the form of minimal surgical trauma, preservation of fracture hematoma, short operative time with minimal anaesthetic complications and a removal of a fixator as simple outpatient procedure (Figure 2). The external fixator acts through distraction mobilization of the involved joint to maintain articular integrity through capsule-ligamentotaxis.

MATERIAL AND METHODS

A prospective study was done on 20 patients which were admitted to GMC hospital Jammu from August 2021 to February 2022. The patients age ranged between 20 to 55 years with a mean age group31.5. All patients were men(Table 1).

Inclusion criteria was skeletally mature patients, open and closed fractures, comminuted fractures, either intra-articular or extra-articular fracture. Exclusion criteria for the use of mini-distractor was skeletally immature patient and associated neurovascular injury.

Surgery was done in a supine position under local anaesthesia. Two transverse pins were applied from the dorsi-ulnar or dorsi-radial direction after debridement of the wound. A connecting bar was used and by applying distraction fracture was reduced.

In some intra-articular comminuted fractures, interfragmentary K-wire was used. The check X-ray was taken post-operatively. A follow up examination was donetwice a weekfor the 1st week, then weekly for 2 weeks, then after 2 weeks.

In all cases,physiotherapy is done after removal of the distractor. First, stickiness of the fracture was checked and a buddy strap was done for about 7 to 10 days, after which active physiotherapy started. Functional outcome was assessed by ASSH TAF score (Figure 3).

RESULTS

The study included all males. In the majority of cases, the distractor was removed by 19-22 days. Out of 20 patients, excellent and good results were seen in (n=15) 75% of cases. Poor results were seen in (n=5) 25% of cases. Results were markedly better in extra-articular fractures than in intra-articular fractures (Figure 4) (Table 2).

Stiffness at the end of 2 months remained in (n=5) 25% of cases. Stiffness was more in those cases in which application of distractor was applied for more than 20 days and in which physiotherapy was delayed.

Pin site infection was observed in (n=2) 10% of cases.It was managed with daily pin side dressings.

Loosening of pins occurred in (n=1) 5% of cases (Table 3).

DISSCUSSION

The incidence of phalangeal fractures is most common in males. It is seen most common in 10-40 years old. In a study done by Pritsch and Engel, most of the patients were young men between 20-30 years old. In our study, 18 patients were between20-40 years old. All the patients were male in our study.

Ahmad F El-Shaer and colleagues reported excellent results in six patients (30%), good in four patients (20%), fair in four patients (20%) and poor in six patients (30%). In our study, excellent results were observed in four patients (20%), good in eleven patients (55%) and poor in five patients (25%).

In a study by Ahmad F El- Shaer and colleagues, loosening of fixator was observed in five patients (25%). In our study, loosening of pin was observed in only one case (5%).

Li et al. reported 26 patients with only intra-articular fractures and the results were excellent in 8 (30.9%) cases, good in 13 (50%) cases, fair in 3 (11.5%) cases and poor in 2 (7.6%) cases. In our

study, 6 patients had intra-articular fractures, and results were good in 2 (33.3%) cases and poor in 4 (66.6%) cases.

Dernth and colleagues reported that 28 (85%) of 33 patients were satisfied with their results. In our study, 18 patients (90%) were satisfied and they stopped the follow up programme when hand function reached a plateau.

CONCLUSION

The external fixator is a suitable and alternative technique for stabilizing comminuted and open fracture of phalanges. It is simple, can be performed under regional anaesthesia and it allows easy post-operative care of soft tissue.

Figure 1

Figure 2

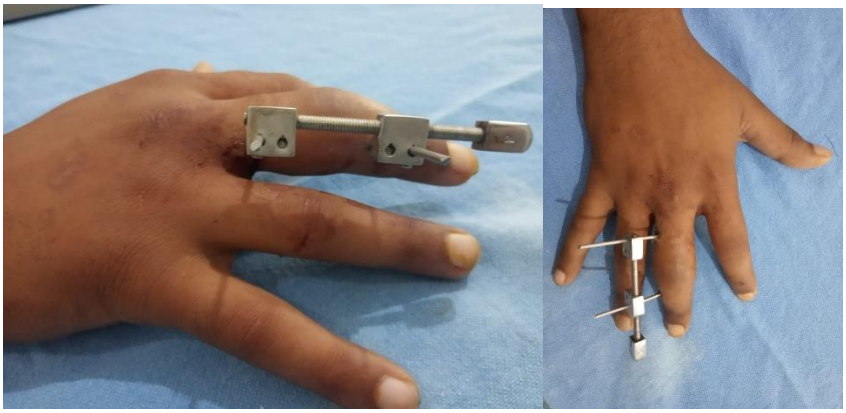
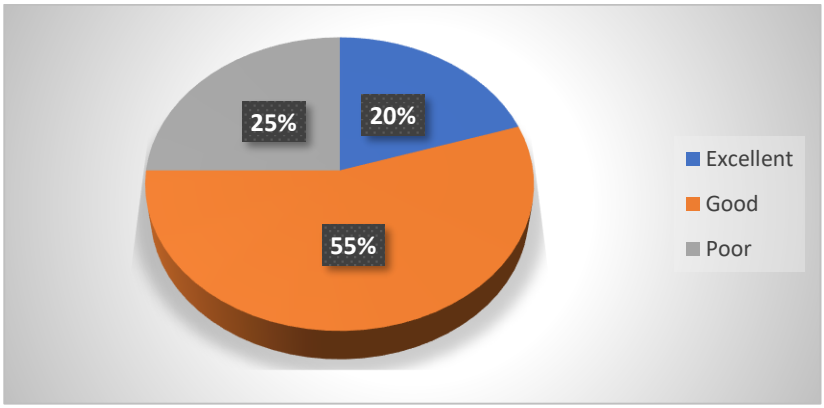


Figure 3

Degree of flexion	Rating
TAF from MCPJ to DIPJ: digit 2–5	
>220	Excellent
120–80	Good
<80	Poor
TAF from MCPJ to IPJ: thumb	
>220	Excellent
120–80	Good
<80	Poor

Clinical Assessment Committee. Total Active Flexion (TAF) scale, American Society for Surgery of the Hand (ASSH) report. New Orleans, 1976. TAF, total active flexion; MCPJ, metacarpophalangeal joint; DIP, distal interphalangeal joint; IPJ, interphalangeal joint

Figure 4



Case 1

(a) (b)

(c) (d)

(a) Pre-operative and (b) Immediate post-operative radiographs (c) and (d) follow up radiographs

Clinical pictures at follow up

Case 2

Case 3

Table 1

Distribution of patients according to age

Age Groups	No. of Cases	Percentage
20-25	3	15%
25-30	6	30%
30-35	5	25%
35-40	4	20%
40-45	1	5%
45-50	1	5%
Total	20	100%

Table 2

Distribution of patients as per functional outcomes

Grade	No. of Cases	Percentage
Excellent	4	20%
Good	11	55%
Poor	5	25%
Total	20	100%

Table 3

Distribution of patients according to complications

Complications	No. of patients	Percentage
Stiffness	5	25%
Infection	2	10%
Pin loosening	1	5%

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