

A case series of proximal phalanx fracture treated with extension block splint : An observational study at a tertiary care centre.

Abstract:

Background: Proximal phalangeal fractures are common fractures of the hand. The fracture are difficult to treat because of vicinity of 2 important joints and presence of tight osseofascious tunnel. The purpose of this study was to evaluate the efficacy of extension block splint in the management of proximal phalangeal fracture of hand.

Methods: Patients(n=21) with proximal phalangeal fractures were treated by extension block splint and evaluated prospectively. Patient were followed up after 1 week, 3 weeks, and thereafter on monthly basis. average follow up period was 9.8 months. Outcomes were assessed by Belsky's criteria.

Results: In our study, 76.19% patients had excellent outcomes, 19.04% had good , 4.76% had poor outcomes. 2 patients had extensor lag which subsided at further follow up.

Conclusion: The results of this prospective study shows that with careful selection of patients extension block splint is a simple, safe and effective technique for managing proximal phalanx fracture of hand.

Keywords: Proximal phalanx fracture , Hand , Extension block splint, Closed reduction.

Introduction : Fractures of metacarpals and phalanges are the most common fractures of upper extremity and account for 10% of total such cases . The outer rays of hand are most commonly injured (1). Phalangeal fractures are almost twice as common as metacarpal fractures and most occur in proximal phalanx (2,3,4). Phalangeal fractures are often neglected or regarded as trivial injuries (5). Proximal phalanx of fingers is fractured more frequently than middle or even distal phalanges . Fractures usually present with the apex volar angulation due to the insertion of the interossei muscle onto the base of proximal phalanx , thus flexing the proximal fragment, while distal fragment is hyperextended by the central slip acting on the base of the middle phalanx (6) .

Material and methods : 45 proximal phalanx fractures of 2nd to 5th fingers of hand were treated in a single orthopedic unit at Jawaharlal Nehru Main Hospital & Research Centre, Bhilai, Chhattisgarh from January 2019 to March 2020.

In our prospective study 23 patients were treated with extension block splint, out of which 2 were lost in follow up. So, this study included 21 patients . The mechanism of injury, exact location of fracture were documented. At mean of 9.8 months (range: 5-15 months ) patients were assessed regarding functional outcomes and complications if any.

Inclusion criteria:

1. Extra - articular , undisplaced & stable
2. Extra-articular , Displaced and stable after closed reduction

Exclusion criteria :

1. Open Fracture
2. Paediatric Fracture
3. Thumb fracture
4. Multiple fracture
5. First presentation after more than 2 weeks from day of injury
6. Extra-articular , displaced and unstable after closed reduction
7. All intra-articular fracture

After careful history taking and clinical examination of the injured digit, AP and oblique radiographs were taken. Patients were taken to operation theatre and closed reduction was attempted under local anaesthesia and extension block splint was given. First volar slab is applied till distal palmar crease. Wrist is then positioned in slight extension and dorsal slab applied till DIP joint.

Check radiographs was taken under C-arm. Fractures which could not be reduced anatomically were taken for operative intervention and excluded from our study. Patient were followed up after 1 week and check x-ray taken. Any unacceptable reduction were counselled for operative intervention. No rotational deformity was accepted; 15 degrees of angular deformity in any plane and 3 mm shortening were accepted . All fracture were found to be acceptable. After 3 weeks, the slab was removed and active range of motion exercises started. Serial follow up was done and results were analysed by Belsky's criteria for assessment of finger injuries and were graded as

- 1) Excellent- pain free union/ no deformity/ total active motion (TAM) > 215 degrees, and PIP motion >100 Degrees
- 2) Good- Pain free union/ minimal deformity/ TAM>180 degrees, PIP motion >80 degrees
- 3) Poor- Pain or non- union ? deformity affecting function or cosmesis/ TAM<180 degrees, PIP motion <80 degrees(7)

TAM stands for Total active motion of MCP, PIP, DIP joint flexion combined together.

RESULTS: In our study period 45 patients were diagnosed with proximal phalanx fracture of 2nd to 5th phalanx of hand out of which 23 were treated with extension block splint and were followed up. 2 patients didn't turn up at first follow up and were excluded from study.

The mean age of patients was 43.76 (18-76). There were 15 males and 6 females.

Most common mechanism of injury was found to be domestic(n=13) followed by Road traffic accident and sports injuries of 3 cases each. 2 cases was due to assault.

Little finger was most commonly injured (n=13) followed by ring(n=7) and middle finger (n=1). No index finger fracture were seen in our study. Most common location of fracture

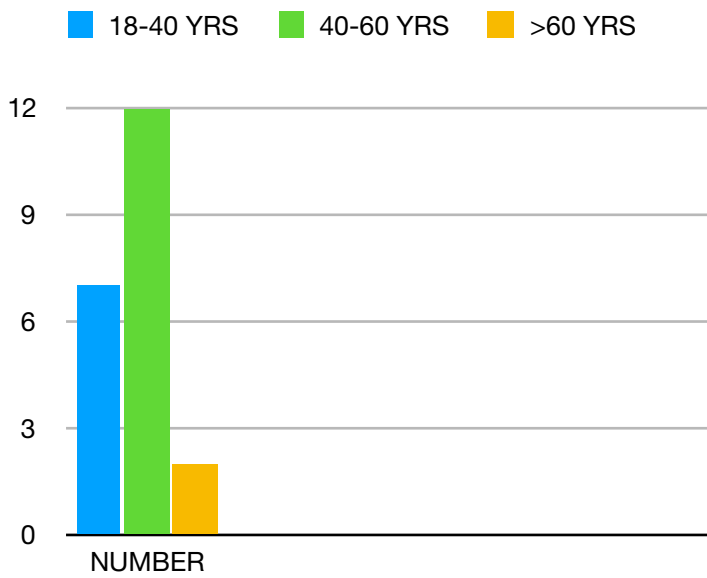


Figure 1. Age distribution

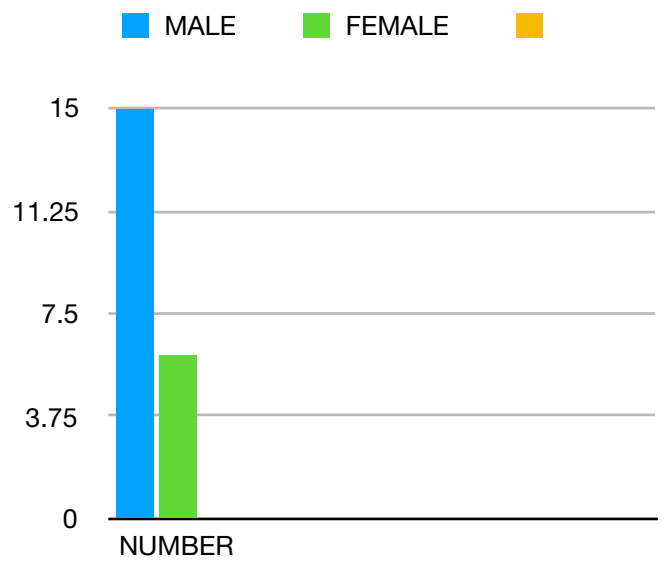


Figure 2. Sex distribution

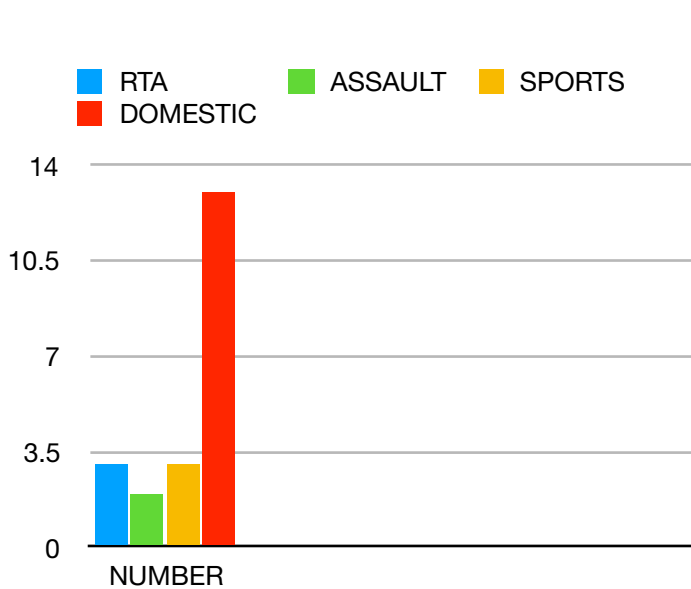


Figure 3. Mechanism of injury

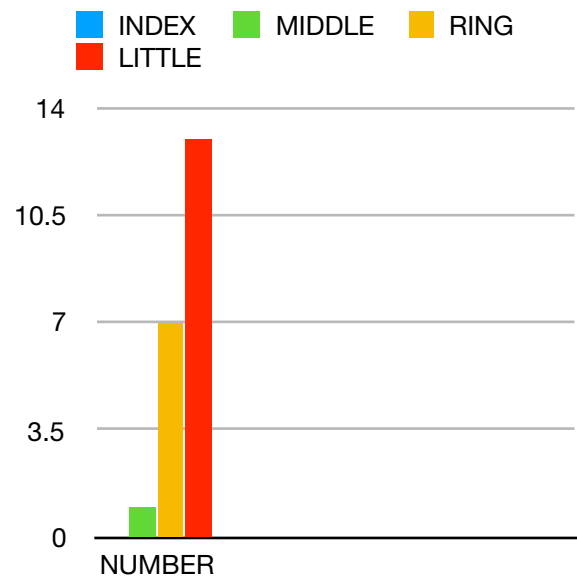


Figure 4. Injured digit

was shaft (n=11), followed by base(n=7), neck(n=2). Head was least common fracture site in our study(n=1).

Almost equal distribution were noted for dominant and non-dominant hand( 10- dominant, 11- non - dominant).

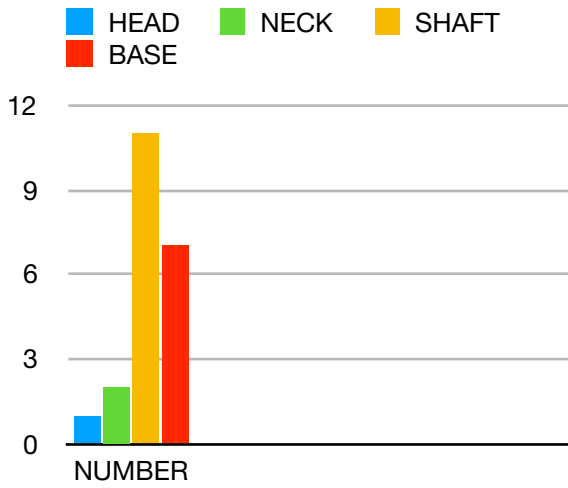


FIGURE 5. LOCATION OF FRACTURE

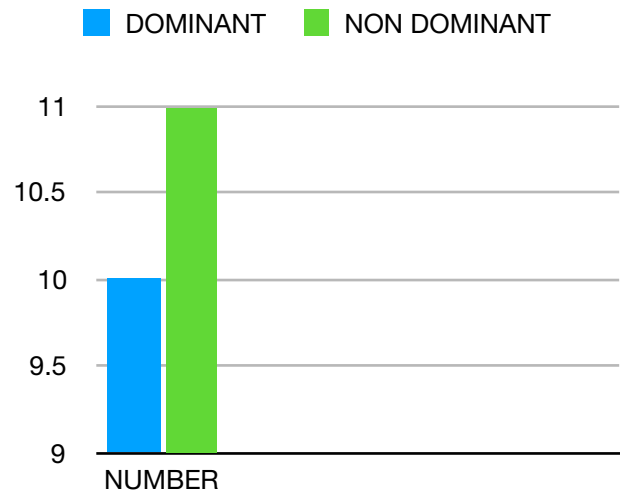


FIGURE 6. DOMINANCY OF HAND

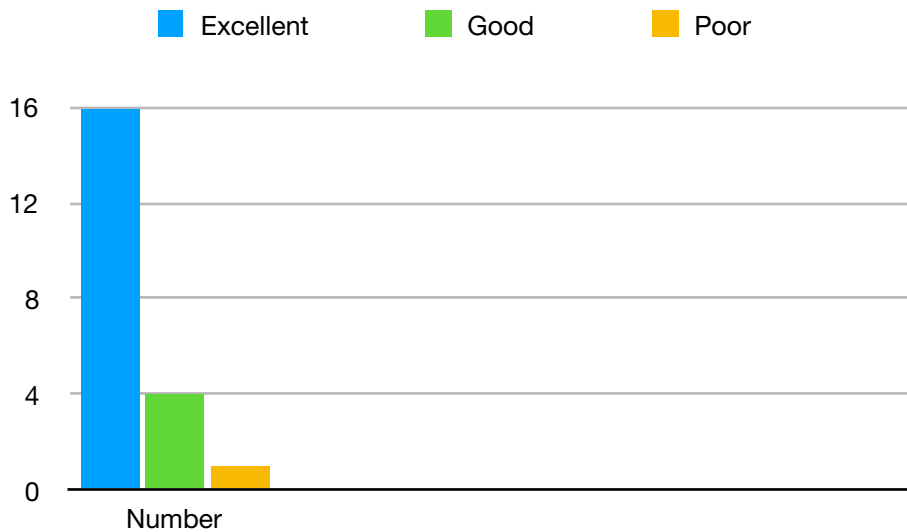


Figure7. Outcome assessment according to Belsky's Criteria

Average day presentation was 4.5 days (range 0-12 days).

In our study, excellent outcomes were seen in 76.19% patients, 19.04% had good outcomes whereas only 4.76% had poor outcomes.

Complications such as extensor lag, shortening, angular deformity, Metacarpophalangeal joint & Proximal interphalangeal joint stiffness, skin related complications were looked for. 2 patients had extensor lag of 15 degrees at 3 months of follow up and were put on supervised physiotherapy. On final follow up, there were no extensor lag in both the patients. No other complication were noted in our study.

#### Discussion :

Multiple treatment protocols and options ranging from splinting, percutaneous wires, external fixation, interfragmentary screw fixation to mini fragment plates point towards the challenges arising from the management of fractures of proximal phalanx. The key to acceptable functional result is to achieve a stable reduction with correct alignment and to allow early mobilisation of the digit. (4)

The most common complication after these fractures is malunion resulting in proximal interphalangeal joint extension lag which is worsened by extensor tendon zone IV adherence and shortening at the fracture site (4,8,9).

Extension block splint helped us to avoid surgery and anaesthesia related complications such as pin-tract infection, osteomyelitis, multiple surgical intervention (fixation and removal), lesser radiation exposure, decreased hospital stay. It is also cost-effective, simple and rapid procedure and shows good patient compliance. Study done by Jaswinder et al(10) showed conservative treatment modalities are sufficient for most stable fractures. Our study showed similar outcomes as compared with Rajesh et al who reported excellent outcome 72% of the patients, good in 22% and poor in 6%.

Limitation of this study is a relatively less number of cases and non-comparison of extension block splint with other treatment modalities.

#### Conclusion:

Extra-articular, undisplaced and stable; displaced and stable after closed reduction fracture of proximal phalanx of hand can be treated with extension block splint with acceptable results.

Strict adherence to physiotherapy and rehabilitation is mandatory for better outcome.

#### Conflict of Interest:

The authors declare no potential conflict of interest with respect to the research authorship and / or publication of this article.

Financial disclosure: The work was taken in orthopedic department of JLNHRC, Bhilai, Chhattisgarh.

Informed consent: Informed consent obtained from all participants of this study.

Human Rights: The patients know about reporting his/her injury to foreign medical journal.

Ethical approval : Ethical approval was obtained from Ethics Committee of JLNHRC.

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