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Different Modalities of Managing Intra-Articular Fracture of Proximal Phalanx of Thumb Depending on Fracture Presentation

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Abstract

Proximal phalanx fractures can be epiphyseal or shaft fractures and can be intra-articular or extra-articular. They are most often the result of forced rotation, hyperextension or direct trauma. The fracture is generally well seen on plain radiographs, angulation of these fractures is best seen on the lateral projection. The clinical consolidation is in 4 or 6 weeks; radiological consolidation takes longer. However, it should be noted that the fingers don't tolerate immobilization very well so it shouldn't exceed 3 weeks.

Treatment can be conservative in the case of a non-displaced fracture. Surgery is required in the case of an open fracture, when there is significant displacement or instability after reduction. In our study we have included 10 patients, 4 of whom were treated with Suzuki frame application and the other 6 were treated with josh external stabilization system (JESS).

Keywords: Proximal phalanx fracture of thumb • Suzuki frame • Jess fixator • K wires

Introduction

Phalangeal fractures have greater tendency towards instability as the phalanges lack intrinsic muscle support and are adversely affected by the mechanical forces of the extrinsic flexors and extensors. However these fractures are also more likely to become stiff with immobilization [1].

Intra-articular fractures of the base of the proximal phalanx (PP) usually occur following an abduction force most commonly seen in sports injuries or a fall. Displaced fractures may not be reducible conservatively because of collateral ligament avulsion which worsens the fracture displacement with MP flexion. This can lead to higher rates of non-union with conservative management. PP shaft fractures have the poorest prognosis for regaining full ability as they occur in the flexor zone two. Since 90% of the proximal phalanx surface is covered by gliding structures these can easily become adherent to the fracture callus. PP condyle fractures usually occur with the lateral deviation force and may be associated with collateral ligament injury. This is a common sports injury, and a common missed diagnosis [2,3]. A proximal phalanx fracture will typically angulate with an apex volar deformity because the interossei will flex the proximal fragment due to their insertion at the proximal phalangeal base while the distal fragment is pulled into hyperextension by the central slip which inserts at the base of the middle phalanx and acts to extend the distal fragment.

Classification

Head fractures

Can be further classified into:

- Type I - stable with no displacement
- Type II - unstable unicondylar
- Type III - unstable bicondylar or comminuted

Neck/Shaft fractures

Can be:

- Transverse
- Short oblique
- Long oblique
- Spiral

Deformity is usually apex volar angulation:

- Proximal fragment in flexion (due to interossei)
- Distal fragment in extension (due to central slip)

Base fractures

Can be:

- Extra-articular
- Intra-articular
- Lateral base

Case Series

We have included 10 patients in our study with proximal phalanx fracture involving the thumb which is intra articular. These patients presented with history of trauma to the thumb causing pain, swelling and decreased movements. After clinical examination radiograph was advised both AP and lateral views. Radiographs revealed fracture of the proximal phalanx which was intra articular. Some cases had communition at the fracture site. Routine investigations were carried out for surgical management and the patients were admitted in ward. Out of the 10 patients who were operated 4 patients were applied Suzuki frame whereas the remaining 6 patients were treated with JESS fixation [4].

Suzuki frame requires 1mm long k wires which are placed one in the base of distal phalanx and the other at the base of proximal phalanx for fractures involving the head. In cases where fracture involves the base one k wire is

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inserted in the head of 1st metacarpal and the other wire is inserted at the head of proximal phalanx. The wires are then bent at 90 degrees and the ends are hooked to each other with rubber band to provide traction. The patient can mobilize his joint post operatively so joint stiffness s is minimal. Articular congruity is maintained over the course of 3 to 4 weeks.

Patients treated with jess fixation required 2 to 3 k wires along the phalanx which are then distracted with the help of a distractor. These patients had better intra articular congruity with no loss of reduction but they developed some stiffness over the course of 3 to 4 weeks [5].

The advantages of these techniques are that they do not require bulky dressing. We have given an example of treatment of both categories of patients.

- Patient treated with JESS fixation (Figures 1-5).
- Patient treated with Suzuki frame (Figures 6 and 7).

Figure 1. AP view of thumb

Figure 2. Oblique view of thumb.

Figure 3. Post OP AP view of thumb fixed with jess.

Figure 4. Post OP oblique view.

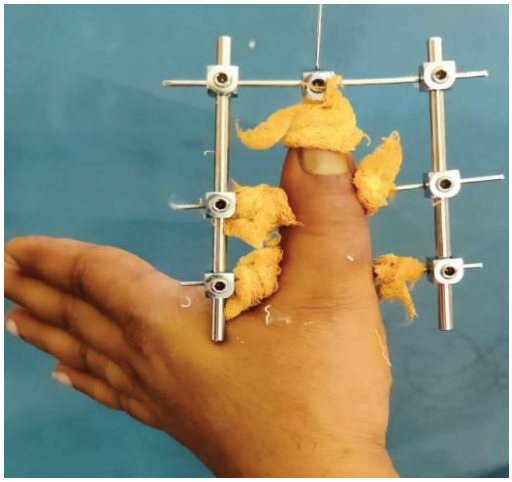

Figure 5. Post OP clinical image.

A

B

Figure 6. Pre OP images.

A

B

Figure 7. Post OP images.

Conclusion

In our study we found that patients treated with Suzuki frame application had better functional outcome with no stiffness in any of the patients. All the patients had good articular congruity. No signs of infection were noted in any of the 10 patients.

Complications of not treating this fracture are:

Loss of motion

- Most common complication
- Predisposing factors include prolonged immobilization, associated joint injury, and extensive surgical dissection
- Treat with rehab and surgical release as a last resort

Malunion

- Malrotation, angulation, shortening
- Apex volar angulation effectively shortens extensor tendon and limits extension of PIPJ
- Surgery indicated when associated with functional impairment
- Corrective osteotomy at malunion site (preferred)
- Metacarpal osteotomy (limited degree of correction)
- Nonunion
- Uncommon
- Most are atrophic and associated with bone loss or neurovascular compromise

Surgical options

- Resection, bone grafting, plating
- Ray amputation or fusion.

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