

Hemi-Hamate Arthroplasty for Chronic Proximal Interphalangeal Joint Fracture-Dislocation with Volar Lip Deficiency Following a Cricket Injury: A Case Report

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Learning Point of the Article:

Hemi-hamate arthroplasty may provide stable osteochondral reconstruction and useful motion in selected chronic PIP fracture-dislocations with substantial volar articular deficiency, particularly when delayed presentation limits conventional fixation options.

Abstract

Introduction: Chronic fracture-dislocations of the proximal interphalangeal (PIP) joint are challenging injuries that may result in persistent stiffness, instability, and impaired hand function. Reconstruction of the deficient volar articular surface is essential for restoring joint congruity and function in selected cases. Hemi-hamate arthroplasty provides an osteochondral reconstruction option for substantial volar lip defects of the middle phalanx.

Case Report: A 29-year-old male presented with a 1-month-old fracture-dislocation of the PIP joint of the right ring finger following a cricket-ball injury. He had initially been treated with a finger cast and subsequently underwent physiotherapy but continued to have restricted range of motion and difficulty with activities of daily living. Pre-operative PIP joint motion was 20°–75°. Intraoperatively, a chronic fracture-dislocation with a volar lip defect was identified. Fibrous tissue and callus were debrided, and the deficient articular surface was reconstructed using an osteochondral graft harvested from the dorsal distal hamate. The graft was contoured to match the defect at the base of the middle phalanx and fixed under image intensifier guidance. Postoperatively, PIP joint motion improved to 0°–110°. Grip strength was 31.3 kg, while the Disabilities of the Arm, Shoulder and Hand score was 4.55, with work and sports module scores of 6.25 and 12.5, respectively.

Conclusion: Hemi-hamate arthroplasty provided restoration of PIP joint motion and a favorable functional outcome in this case of chronic ring-finger PIP joint fracture-dislocation with a volar lip defect. The technique may be considered in selected chronic PIP fracture-dislocations in which reconstruction of the deficient volar articular surface is required.

Keywords: Hemi-hamate arthroplasty, proximal interphalangeal joint, fracture-dislocation, ring finger, osteochondral graft, hand surgery.

Introduction

Fracture-dislocations of the proximal interphalangeal (PIP) joint [1] represent complex injuries of the finger in which restoration of articular congruity, stability, and functional motion is essential. When treatment is delayed, the injury may become

increasingly difficult to manage due to fibrosis, callus formation, articular incongruity, and persistent limitation of motion.

The volar lip of the middle phalanx [2] plays an important role in maintaining PIP joint stability. Substantial loss of this articular surface can compromise joint congruity and make conventional

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Figure 1: Pre-operative radiographs of the right ring finger. (a) Anteroposterior and (b) lateral radiographs demonstrating the chronic proximal interphalangeal (PIP) joint fracture-dislocation with a volar articular defect at the base of the middle phalanx and associated loss of PIP joint congruity.

reduction or soft-tissue procedures insufficient for reconstruction.

Hemi-hamate arthroplasty uses an osteochondral graft [3,4] harvested from the hamate to reconstruct the deficient volar articular surface of the middle phalanx. By restoring the articular contour, the procedure aims to provide a stable and congruent PIP joint while preserving useful digital motion.

We report a case of a chronic fracture-dislocation of the PIP joint of the right ring finger treated with hemi-hamate arthroplasty, with post-operative assessment demonstrating substantial improvement in PIP joint motion and favorable functional scores.

Case Report

A 29-year-old male presented with a 1-month history of an injury to the right ring finger sustained while playing cricket. The injury occurred when the patient was struck by a cricket ball. Following the injury, he consulted several doctors and was treated with a finger cast. He subsequently underwent aggressive physiotherapy.

Despite these measures, he continued to experience restricted movement of the right ring finger and difficulty with activities of daily living. The hospital record documented a 1-month-old fracture-dislocation of the PIP joint of the right ring finger (Fig. 2).

On pre-operative assessment, PIP joint flexion and extension were recorded as 20°–75°. The measurements recorded above and below the PIP

joint were 7 cm and 8 cm, respectively. The patient had persistent limitation of PIP joint motion. Pre-operative radiographs demonstrated a chronic PIP fracture-dislocation with substantial volar articular surface deficiency and dorsal subluxation of the middle phalanx (Fig. 1).

In view of the chronic fracture-dislocation and persistent functional limitation, operative reconstruction was planned.

Surgical technique

The patient underwent hemi-hamate arthroplasty of the right ring-finger PIP joint under regional anesthesia. The patient was positioned supine with the right upper limb placed on a hand table. The limb was prepared and draped in the standard sterile manner and a tourniquet was inflated.

A volar Bruner incision was made over the PIP joint. The digital neurovascular bundles were identified and protected. The flexor tendon sheath was opened, and the flexor tendons were retracted. The volar plate was then incised to expose the PIP joint.

A chronic fracture-dislocation with a volar lip defect was identified. Fibrous tissue and callus were thoroughly debrided. The base of the middle phalanx was prepared to create a recipient bed for the graft.

A separate dorsal incision was made over the hamate. An osteochondral graft was harvested from the dorsal distal hamate. The graft was contoured to match the defect at the base of the middle phalanx and was subsequently inset and fixed under image intensifier guidance (Fig. 3). Joint stability was confirmed intraoperatively before wound closure. An extension-block slab was applied at the completion of the



Figure 2: Pre-operative clinical presentation. (a) Dorsal view and (b) volar view of the right hand demonstrating the pre-operative appearance of the ring-finger proximal interphalangeal joint fracture-dislocation.



Figure 3: Intraoperative findings and reconstruction. (a) Intraoperative exposure demonstrating the chronic proximal interphalangeal (PIP) joint fracture-dislocation and volar articular defect. (b) Intraoperative fluoroscopic image demonstrating the reconstructed PIP joint following hemi-hamate graft placement and fixation.

procedure.

Post-operative management

Postoperatively, the finger was maintained in an extension-block slab. The documented post-operative plan included immobilization for 6–8 weeks, followed by finger mobilization and active PIP joint movement. After removal of the slab, active and active-assisted physiotherapy was advised. A Capener splint or finger cot was recommended following slab removal. The patient was advised to avoid using the right ring finger for work and to avoid driving for 2–3 months.

Clinical outcome

Post-operative assessment demonstrated improvement in PIP joint motion. The PIP joint achieved a range of 0°–110°, compared with the pre-operative range of 20°–75°.

The pre-operative flexion arc was therefore 55°, while the post-operative flexion arc was 110°, representing a 55° increase in the measured arc of motion.

Post-operative grip strength was 31.3 kg.

Functional assessment using the Disabilities of the Arm, Shoulder and Hand (DASH) [5] questionnaire demonstrated a total score of 4.55. The work module score was 6.25, and the sports module score was 12.5.

Discussion

Chronic PIP joint fracture-dislocations [6] can be difficult to treat because delayed presentation may result in persistent articular incongruity, fibrosis, callus formation, and restricted joint motion. In the present case, the patient presented

approximately 1 month after a cricket-ball injury despite previous immobilization and physiotherapy. He continued to have restricted PIP joint motion and difficulty with activities of daily living.

Intraoperative assessment demonstrated a chronic fracture-dislocation associated with a defect of the volar lip. Fibrous tissue and callus were debrided, and the base of the middle phalanx was prepared for reconstruction.

The treatment of chronic PIP fracture-dislocations must address both joint stability and the articular surface. When there is substantial loss of the volar articular surface, reconstruction with an osteochondral graft can restore the contour of the joint and provide a stable articular platform [7].

In this case, a hemi-hamate osteochondral graft [8] was harvested from the dorsal distal hamate [9] and contoured to reproduce the deficient portion of the middle phalanx. The graft was then fixed under image intensifier guidance, and joint stability was confirmed intraoperatively.

The post-operative outcome was favorable. PIP joint motion [10] improved from 20° to 75° preoperatively to 0°–110° postoperatively. The flexion arc consequently increased from



Figure 4: Immediate post-operative appearance. Clinical photograph demonstrating the operative site and wound immediately following hemi-hamate arthroplasty.



Figure 5: Three-month post-operative functional outcome. (a) Active extension, (b) active flexion, and (c) functional fist formation of the right ring finger at 3-month follow-up.

55° to 110°. In addition, the patient demonstrated a grip strength of 31.3 kg and a DASH score of 4.55.

This case demonstrates that hemi-hamate arthroplasty can be considered for reconstruction of selected chronic PIP fracture-dislocations associated with a volar articular defect. Restoration of the articular surface in this patient was associated with substantial improvement in PIP joint motion and a favorable functional outcome.

Conclusion

Hemi-hamate arthroplasty provided a useful reconstructive option in this case of a chronic fracture-dislocation of the right ring-finger PIP joint with a volar lip defect. Following reconstruction, PIP joint motion improved from 20°–75° to

0°–110°, with a post-operative grip strength of 31.3 kg and a DASH score of 4.55.

The procedure may be considered in selected chronic PIP fracture-dislocations in which restoration of the deficient volar articular surface is required.

Clinical Message

Chronic PIP joint fracture-dislocations with substantial volar articular surface deficiency can result in persistent stiffness and functional limitation. Hemi-hamate arthroplasty allows reconstruction of the deficient articular surface using an osteochondral hamate graft and may restore useful PIP joint motion and hand function.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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