

# A Two-Pin Method for Improved Exposure in Shotgun Hemi-Hamate Arthroplasty

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## Abstract

This technical note introduces a two-pin technique designed to improve exposure during the shotgun approach for hemi-hamate arthroplasty, a surgical procedure commonly used to treat comminuted intra-articular and chronic proximal interphalangeal (PIP) joint fractures. A 1.0 mm Kirschner wire (K-wire) is inserted into the middle phalanx (P2) distal to the fracture, and a second K-wire is placed into the head of the proximal phalanx (P1). These pins stabilize the joint, facilitate soft tissue retraction, and improve visualization of the fracture site. The graft is harvested from the dorsal distal hamate and shaped to fit the PIP joint before fixation. This method addresses key challenges in visualization and stabilization associated with the shotgun approach. Early feedback suggests improved surgical efficiency, increased accuracy of reduction, and potentially better functional outcomes. The described two-pin technique is simple and reproducible, significantly enhancing exposure and stability during hemi-hamate arthroplasty. Further studies are needed to confirm its long-term effects.

**Keywords:** Fracture Fixation; Arthroplasty; Hamate Bone; Surgery; Joint Instability

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## Background

Hemi-hamate arthroplasty is a proven surgical method for treating comminuted intra-articular and chronic fractures of the proximal interphalangeal (PIP) joint (1). Accurate exposure and stabilization are crucial for achieving optimal results. The shotgun approach is often used because it provides direct access to the joint. However, visualization and exposure challenges can still occur. This technical note presents a two-pin technique to improve exposure during the shotgun approach for hemi-hamate arthroplasty (2, 3).

## Anatomy

The PIP joint is a hinge joint formed by the articulation of the head of the proximal phalanx (P1) with the base of the middle phalanx (P2). The volar plate, collateral ligaments, and extensor and flexor tendons mainly maintain its stability. The hamate, located on the ulnar side of the distal carpal row, serves as a suitable donor site for harvesting a graft because of its articular congruence with the PIP joint (4, 5).

## Indications/Contraindications

Indications for hemi-hamate arthroplasty include intra-articular comminuted fractures of the PIP joint that cannot be fixed, chronic fracture-dislocations with significant joint incongruity, and patients experiencing functional limitations due to damage to the PIP joint. Active hand infections, severe soft tissue damage preventing adequate reconstruction, systemic diseases affecting bone healing, such as severe osteoporosis, and patient non-compliance with postoperative rehabilitation are contraindications for hemi-hamate arthroplasty (1, 2, 6).

## Technique

The patient was positioned supine with the hand placed on a radiolucent hand table. A sterile tourniquet was applied to maintain a bloodless field. A mid-axial incision was centered on the PIP joint and extended obliquely across the P1 and P2. The flexor sheath was carefully opened, and the flexor tendons were retracted laterally to expose the volar plate and fracture site. The volar plate and collateral ligaments were released to dislocate the joint and expose the fracture site. After the shotgun approach, a 1.0 mm Kirschner wire (K-wire) was inserted into the P2 distal to the fracture (Figure 1). A second K-wire was inserted into the head of the P1 (Figure 2). The pin was positioned centrally to allow stable anchorage and to facilitate retraction of the soft tissues, improving visualization of the fracture site in all positions.



**Figure 1.** A first Kirschner wire (K-wire) inserted into the middle phalanx (P2) distal to the fracture site





**Figure 2.** The second Kirschner wire (K-wire) inserted into the head of the proximal phalanx (P1)

The combination of proximal and distal pins allowed for controlled distraction and retraction, enhancing visualization of the articular surface and fracture anatomy. The hemi-hamate graft was harvested from the dorsal distal aspect of the hamate. The graft was contoured to match the articular surface of the PIP joint and secured with two headless compression screws (Figure 3). Fluoroscopy confirmed proper alignment and fixation. In this step, two pins were removed, the volar plate and tendon sheet were repaired using non-absorbable sutures, and the skin was closed with interrupted nylon sutures. A dorsal splint was applied to maintain joint alignment.



**Figure 3.** Both Kirschner wires (K-wires) left in place until the end of the operation and graft fixation

### Expected Outcomes

The two-pin technique offers a refined approach to hemi-hamate arthroplasty, addressing key limitations of the shotgun approach. By providing enhanced exposure and soft tissue handling, the method facilitates precise reduction and fixation of fracture fragments and may

reduce surgical time. Early clinical feedback suggests improved surgical efficiency and potentially better functional outcomes such as range of motion (ROM), grip strength, joint stability, and pain levels. However, its adoption warrants further validation through comparative studies and long-term follow-up data.

The technique's strengths lie in its simplicity and reproducibility. Surgeons familiar with the conventional shotgun approach can easily incorporate the two-pin modification into their practice. Nevertheless, considerations such as soft tissue handling and the learning curve associated with pin placement must be acknowledged.

### Complications

No complications have been observed with the two-pin technique in the cases performed to date. Further research with larger case series and longer follow-ups is necessary to validate the efficacy and safety of this technique. Comparative studies are encouraged to assess their outcomes relative to conventional methods and refine their application in clinical practice.

### Conflict of Interest

The authors declare no conflict of interest in this study.

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