

Open Reduction and Internal Fixation of 5th Metacarpal Fracture

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Introduction

Current standard of care techniques for metacarpal fracture repairs using traditional metal implants are well documented and often lead to pain and secondary procedures. K-Wires have been associated with skin infection, osteomyelitis, and tendon injury, with rates up to 15%¹. Metallic plate fixation has been associated with rates of digital stiffness of 10% and need for hardware removal in 8%². While the intramedullary technique for metacarpal fractures has improved results, inherent issues associated with metal implants still exist. The use of OSSIOfiber® Trimmable Fixation Nails adds additional benefit by reducing the published risks associated with metallic implants in intramedullary metacarpal fixation, including hardware removal for nickel allergy, screw deformity, and screw breakage³.

Case Presentation

A 23-year-old, right-hand dominant, male presented with a tender and swollen hand sustained from a fall three days prior. His initial presentation showed a closed, minimally displaced fracture of the 5th metacarpal neck with some comminution. There was reasonable alignment and no significant rotation or angulation on initial clinical examination. A splinting and early motion protocol was initiated.

On follow-up evaluation, x-ray showed increased displacement, and a reported cross-over of the small finger onto the ring finger on digital flexion. Surgical management was discussed, and the patient elected to proceed with closed versus open reduction with internal fixation.

Pre-op Planning

X-Rays showed a comminuted and displaced 5th metacarpal neck fracture. Intramedullary retrograde fixation with an OSSIOfiber® Trimmable Fixation Nail was recommended to provide rigid fixation and allow early motion without the potential complications associated with metallic implants.



Figure 1: Initial AP



Figure 2: Initial LAT



Figure 3: Initial Oblique

Surgical Technique

In the Operating Room, a retrograde intra-medullary approach was chosen to minimize incision, dissection, tendon irritation, and fracture exposure. The fracture was indirectly reduced and a 4.0x50mm OSSIOfiber® Trimmable Fixation Nail was used for primary fixation.

1. Dissection: A longitudinal incision was made over the 5th metacarpal phalangeal joint and distal aspect of the metacarpal. The extensor tendon was split, and the articular surface of the 5th metacarpal head was visualized. Care was taken not to damage the articular surface.
2. Fixation Site Preparation: The provided K-Wire was placed above the equator of the 5th metacarpal head. The fracture was reduced manually, and the K-Wire was advanced through the metacarpal intramedullary canal. Intra-operative imaging confirmed reduction and pin placement.
3. Tunnel Preparation: The cannulated drill for the OSSIOfiber® 4.0mm Trimmable Fixation Nail was used to prepare the intra-medullary canal. The K-Wire was removed, and the fracture held reduced.
4. Implant Insertion: The Nail was advanced across the fracture site and buried beneath the subchondral bone of the 5th metacarpal head. Fluoroscopic and visual examination demonstrated reduction of the fracture and stability with passive motion.

Post-Op Planning and Follow-Up Outcomes

The patient was placed in a custom ulnar gutter splint at the end of surgery and completed early at-home and therapist directed motion exercises. Post-Operative visits showed routine healing of the 5th metacarpal fracture. Full motion was achieved within 4 weeks of surgery and the splint removed after 5 weeks. Healing was progressing at 3 months and activity advanced to “as tolerated.” Restrictions on the use of the hand were lifted at this point and the 1-year follow-up showed a healed and remodeled 5th metacarpal with maintained motion. Patient’s grip strength has returned to near equal in comparison to his left hand. The patient reported no adverse effects after the surgery.



Follow-Up Figure 1:
3 month AP



Follow-Up Figure 2:
3 month LAT



Follow-Up Figure 3:
3 month Obl

Post-Op Planning and Follow-Up Outcomes (cont'd)



Follow-Up Figure 1:
1 year AP



Follow-Up Figure 2:
1 year LAT



Follow-Up Figure 3:
1 year Obl

Summary

The OSSIOfiber[®] Trimmable Fixation Nail allowed for early stable fixation in this patient without the potential complications of metallic implants. The fracture healed routinely and there were no reported or observed adverse events or complications. Future use of the OSSIOfiber[®] cannulated nails and compression screws will provide for broader application within hand and upper extremity surgery while avoiding the pitfalls of the traditional metallic implants.

1. Stahl S, Schwartz O. Complications of K-wire fixation of fractures and dislocations in the hand and wrist. Arch Orthop Trauma Surg 2001;121:527–530.
2. Fusetti C, Della Santa DR. Influence of fracture pattern on consolidation after metacarpal plate fixation. Chir Main 2004;23:32–36.
3. Warrender WJ, Ruchelsman DE, Livesey MG, Mudgal CS, Rivlin M. Low Rate of Complications Following Intramedullary Headless Compression Screw Fixation of Metacarpal Fractures. Hand (N.Y.) 2020; 15(6): 798–804.

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