

Case Study:

Use of the INnate™ Intramedullary Threaded Nail for Time Efficient Operation of Spiral and Oblique Fractures of the 3rd, 4th, and 5th Metacarpals, Allowing Patient's Orbital Fracture to be Repaired in Same Surgery



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Pre-op



Intra-op



Case Introduction

Patient was a retired 69-year-old female who sustained 3rd, 4th, and 5th closed midshaft metacarpal fractures, as well as an orbital fracture from a fall, walking up stairs.

Case Presentation

Patient presented one week after incident with midshaft fractures on the 3rd (spiral), 4th, and 5th (oblique) metacarpals, in her right (dominant) hand. Apex dorsal angulation of 10-15° was present on at least one metacarpal and there was shortening on the 5th metacarpal. Patient was able to make a loose composite fist with slight extensor lag and there was skin discoloration in the affected area. Pre-op Pain Visual Analogue Score (VAS) was 5/10. She also presented with an orbital fracture. Patient was placed in a volar resting splint and scheduled for surgery.

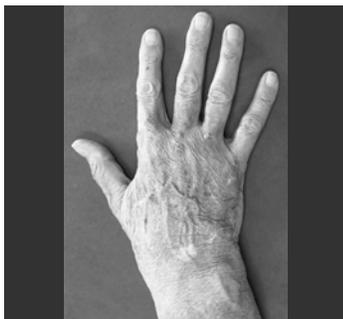
Pre-op Plan

As a smoker with multiple co-morbidities (including smoking status of ½ packs per day), this patient was considered high risk, and the decision was made by Dr. MacKay to coordinate with ENT to repair the metacarpals and orbital fracture in one surgery. Given these factors, a time efficient operation was preferable. Additionally, patient expressed desire for limited down time. In all metacarpals, the goal was to preserve bone length, prevent soft tissue complications, and minimize operative time. Dr. MacKay decided to use INnate Threaded Nails for intramedullary fixation, to provide immediate length stability and early range of motion (ROM).

Operative Findings and Approach

For each metacarpal, Dr. MacKay first split, longitudinally, the extensor tendon and longitudinal capsulotomy was performed. Once reduction was obtained, a longitudinal

Post-op



K-wire was placed in the dorsal third of the metacarpal head, and while distracting the metacarpal to the desired height, the length was measured using the INnate depth gauge. Dr. MacKay selected a 4.5mm x 55mm INnate nail for the 3rd digit, a 3.6mm x 50mm INnate nail for the 4th digit, and a 3.6mm x 45mm INnate nail for the 5th digit. Under the guidance of fluoroscopy, Dr. MacKay then used the cannulated drill to drill over the guide wire and threaded each cannulated INnate nail until the heads were beneath articular cartilage, to achieve distal purchase in the subchondral bone. Proximal purchase was achieved at the isthmic level within each intramedullary canal. Rotational and longitudinal alignment was assessed at multiple times during the case. The fracture repair was deemed stable enough, intraoperatively, to allow for immediate active and passive ROM with a total surgery time of 25 minutes, to complete all three metacarpals.

Follow-up

Patient was seen at 2 weeks post-op with VAS Pain score of 4/10 and loose composite fist. At 10.6 weeks post-op, patient had achieved radiographic union, full active ROM, and no pain. Strength numbers recorded as follows: Grip- right 22 lbs, left 39 lbs; Key Pinch- right 7 lbs, left 6 lbs; Tip Pinch- right 2 lbs, left 2 lbs; 3-Jaw Pinch- right 3.5 lbs, left 5.5 lbs. Due to COVID-19, patient was unable to attend any physical therapy sessions, post-op. Despite no physical therapy, patient achieved full ROM, 100% return to normal activity, no complications, and was satisfied with the outcome.

Discussion

INnate allowed Dr. Mackay to achieve his goals for the patient and avoid common risks associated with traditional techniques and options for metacarpal fracture surgeries: soft tissue complications, potential infection with K-wires,



and hardware prominence, to name just a few. Immediate length stability and mobilization were achieved, with full ROM and 100% return to normal activity for the patient, despite no physical therapy. Additionally, INnate minimized operative time, allowing ENT to repair patient's orbital fracture in the same surgery.

