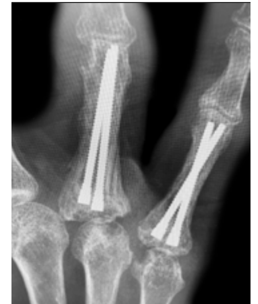
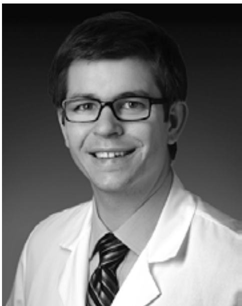
Case Study

Use of the InFrame™ Intramedullary Threaded Micro Nails for Oblique Fractures to the Fourth and Fifth Proximal Phalanges





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Case Presentation

Patient was a 61-year-old male who suffered a proximal, oblique fracture to his fourth and fifth proximal phalanges from a fall. An operationally efficient and minimally invasive approach, resulting in rotational stability and immediate range of motion (ROM) was desired.

Preop Plan

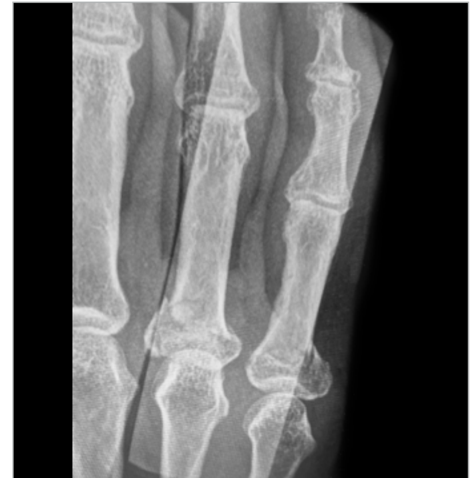
Dr. Masden considered K-wires due to the minimally invasive approach, but wanted to avoid poor fixation, high infection rates, and immobilization. Although plates and screws provided rigid fixation, the open technique resulted in soft tissue damage, causing stiffness, tendon adhesions, and limited ROM. Dr. Masden also considered headless compression screws (HCS) as an intramedullary approach to avoid damage to the periosteum, but was concerned that the compression could cause angular deformities upon insertion.

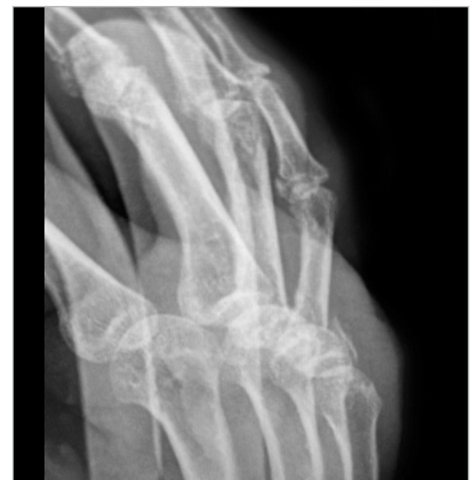
Dr. Masden proceeded with InFrame™ because the cannulated, fully threaded micro nail allowed for a simple and efficient placement through a percutaneous, intramedullary approach. The 2.0 mm diameter design provided Dr. Masden with the flexibility to create specific constructs for each proximal phalanx fracture while achieving rotational stability and bone purchase at the proximal and distal cortex. The unique dual diameter guide wire facilitated precise and efficient placement by removing the need for reaming and allowing InFrame to be inserted over the trailing end of the guide wire with ease. Biomechanical testing has demonstrated the superior rigidity with InFrame compared to K-wires, headless compression screws, and plates and screws, allowing immediate active ROM and reduced recovery time.

Operative Findings and Approach

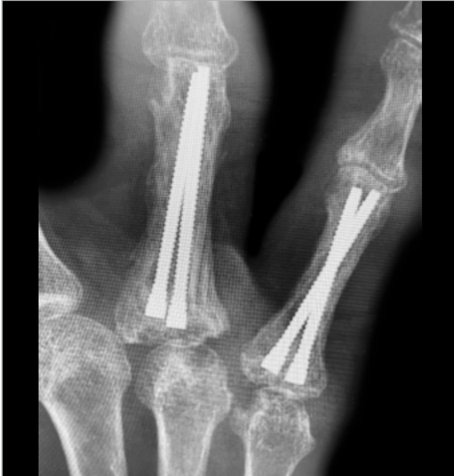
The patient suffered oblique base fractures to his fourth and fifth proximal phalanges that needed to be addressed with stable fixation upon anatomic reduction. Once reduction was achieved, Dr. Masden inserted the dual diameter guide wire across the fracture site from the ulnar proximal cortex to the radial distal cortex under fluoroscope to stabilize the fracture and accurately align the desired final implant position. Next, he used the depth gauge to determine that a 32 mm micro nail was needed for the fifth proximal phalanx. The larger diameter of the guide wire was used to push the guide wire distally until the smaller diameter was across the fracture. He then threaded the cannulated InFrame™ micro nail until bicortical purchase was achieved at both the distal and proximal ends. Once he verified the final position of the first implant under fluoroscope, Dr. Masden used the same methodology to place the second InFrame micro nail but in a different plane from the first implant. He then inserted the second dual diameter guide wire from the radial proximal cortex to the ulnar distal cortex under fluoroscope and used a 30 mm micro nail to create an "X" configuration, resulting in rigid fixation and rotational stability. Dr. Masden utilized the same surgical technique to implant two InFrame implants in the fourth proximal phalanx but used a 36 mm and 34 mm micro nail. To address this fracture, he used a "V" construct to create rigid fixation and rotational stability. Total surgery time was approximately 1 hour.

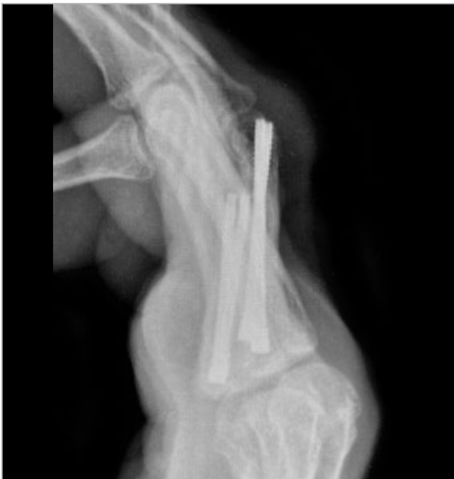
Preoperative





Postoperative





Follow-up

The patient achieved full ROM immediately after surgery, which would have been difficult to replicate with other fixation techniques or implants. At two weeks post-op, he did not have any physical restrictions and did not miss a single day of work.

Discussion

By using InFrame™ in an intramedullary approach, Dr. Masden accomplished his operative goal of minimizing his operative time and soft tissue disruption. This allowed the patient to achieve immediate ROM due to the rigid fixation and rotational stability provided by the construct patterns created with InFrame. The 2.0 mm diameter design and robust length offerings allowed Dr. Masden to create optimal constructs that were specific to each proximal phalanx fracture, “X” and “V” for the fifth and fourth, respectively. The innovative delivery mechanism for InFrame is also important because it simplifies the implant placement by removing the need for a dedicated reamer. This feature prevents guide wire dislodgement while providing efficient and accurate placement of multiple implants. Follow-ups are usually easy and straightforward because patients do not require formal therapy, as mobilization is immediate, allowing patients to return to their daily activities faster than with other implants and surgical approaches.

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