

Case Study

Use of the InFrame™ Intramedullary Threaded Micro Nail for a Transverse, Comminuted Fracture of the Fifth Proximal Phalanx



W. Brad Stephens, MD

Tallahassee Orthopedic Clinic
Tallahassee, FL

Dr. W. Brad Stephens, a graduate of University of South Florida College of Medicine, completed a hand fellowship while at the University of Alabama at Birmingham. He specializes in hand and orthopedic surgery.

Case Presentation

Patient was a 22-year-old female who suffered a proximal, transverse fracture with comminution to her fifth proximal phalanx from a high impact injury while playing a recreational sport. A minimally invasive approach with stable fixation and rotational stability was desired to achieve immediate range of motion (ROM) and minimal down time.

Preop Plan

Dr. Stephens typically addresses transverse fracture patterns with extra-articular K-wire pinning, due to the minimally invasive approach, but wanted immediate mobility to avoid complications such as stiffness. He considered lag screws but the canal was too small for more than one implant and ROM recovery usually takes approximately three to four weeks. Dr. Stephens chose InFrame™ because the 2.0 mm diameter design allowed him to use more than one InFrame intramedullary micro nail to create a construct that achieved rigid fixation with rotational stability. The unique dual diameter guide wire facilitates the accurate and efficient placement of the fully threaded micro nail by removing the need for reaming and allowing the 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 an ulnar deviation and extension deformity with an intra-articular fracture fragment at the metacarpophalangeal joint (MCP) to her fifth proximal phalanx that needed to be addressed upon anatomic reduction. Once reduction was achieved, Dr. Stephens 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 30 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, correcting the ulnar deviation and extension deformity. Once he verified the final position of the first implant under fluoroscope, Dr. Stephens 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 ulnar midshaft cortex under fluoroscope and used a 16 mm micro nail. Although the initial micro nail provided stable fixation, Dr. Stephens created a “Y” configuration with the second, shorter implant to capture the radial base fracture fragment at the MCP joint. Total surgery time was approximately 10 minutes.

Preoperative



Postoperative



Follow-up

At two weeks, the patient did not experience any pain but suffered from slight stiffness. She was very close to regaining full ROM and everything else looked great.

Discussion

With InFrame™, Dr. Stephens was able to not only achieve rigid fixation with rotational stability from a “Y” frame construct, but also to complete the surgery in only 10 minutes. The 2.0 mm diameter design and robust range of lengths allowed Dr. Stephens to create an optimal construct to achieve bicortical, threaded fixation, resulting in rotational stability and immediate ROM. For InFrame, the delivery mechanism is also vital because it removes the need for a dedicated reamer, thereby simplifying the placement while improving accuracy. The strong fixation and earlier ROM allows patients to minimize their downtime and return to work or daily activities faster than other implants and surgical approaches.



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www.acumed.net

Acumed USA Campus
5885 NE Cornelius Pass Road
Hillsboro, OR 97124
+1.888.627.9957

OsteoMed USA Campus
3885 Arapaho Road
Addison, TX 75001
+1.800.456.7779

Acumed Iberica Campus
C. Proción, 1
Edificio Oficor
28023 Madrid, Spain
+34.913.51.63.57

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