Case Study:

Use of the InFrame™ Intramedullary Threaded Micro Nail for an Oblique, Distal Neck Fracture of the 3rd Proximal Phalanx

David Shenassa, MD

Sports Medicine Associates of South Florida

Weston, FL

EXSOMED™

Innovations in Hand Surgery

David Shenassa, MD
Sports Medicine Associates of South Florida, Weston, FL

Pre-op

Case Presentation

Patient was a 16-year-old male who suffered an oblique, distal neck fracture to his 3rd proximal phalanx from a high impact injury while playing football. A minimally invasive, percutaneous approach that achieved rotational stability was desired to allow immediate range of motion so that he could get back to practice as soon as possible.

Pre-op Plan

Dr. Shenassa typically considers extra-articular K-wire pinning for oblique fracture patterns but wanted to achieve active and passive range of motion (ROM) as quickly as possible, without complications such as infection and stiffness. K-wires also result in poor fixation and usually require a secondary removal surgery. Dr. Shenassa chose InFrame intramedullary fixation because the cannulated, fully threaded micro nail comes in a 2.0mm diameter design with a robust length offering, allowing various construct patterns that would achieve rotational stability in a minimally invasive approach. The unique dual diameter guidewire simplifies implant placement by removing the need for a dedicated reamer, resulting in a more accurate and efficient placement compared to other implants and surgical approaches. Biomechanical testing has demonstrated the superior rigidity with InFrame compared to K-wires, headless compression screws, and plates and screws, allowing immediate active range of motion and reduced recovery time.

Operative Findings and Approach

Dr. Shenassa anatomically reduced the fracture using a closed, percutaneous approach with InFrame. He normally uses an antegrade approach but went retrograde because the fracture was located near the neck of the proximal phalanx. First, he inserted the dual diameter guidewire across the fracture site from the radial distal cortex to the ulnar midshaft cortex under fluoroscope to stabilize

Post-op

the fracture and accurately align the desired final implant position. Next, he used the depth gauge to determine that a 16mm micro nail was needed for the 3rd proximal phalanx. The larger diameter of the guidewire was used to push the guidewire distally until the smaller diameter was across the fracture. He then threaded the cannulated InFrame micro nail until bi-cortical purchase was achieved at both the distal and midshaft ends. Once he verified the final position of the first implant under fluoroscope, Dr. Shenassa 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 guidewire from the ulnar distal cortex to the radial midshaft cortex under fluoroscope and used a 12mm micro nail. The intramedullary space was large enough for Dr. Shenassa to create an "X" configuration with the two InFrame implants, creating rotational stability. Total surgery time was approximately 20 minutes.

Follow-up

At two weeks, the patient experienced minimal pain and achieved full active and passive ROM. He resumed full, unrestricted activities during football practice, which would not have been possible to replicate if K-wires or other modalities were used.

Discussion

Dr. Shenassa's operative goals were to achieve stable fixation with rotational stability, allowing immediate range of motion. The use of InFrame allowed him to address the distal neck fracture of the proximal phalanx with an "X" frame construct due to the 2.0mm diameter design and length offering that was narrow enough to fit the intramedullary canal and short enough to provide distal to midshaft cortex stability with rotational control, in only 20 minutes of total surgery time. The delivery mechanism for InFrame was also vital to an efficient operative time because it simplifies a more precise implant placement.

The unique dual diameter guidewire removes the need for a dedicated reamer and allows the accurate placement along multiple vectors, personalizing the construct based on each patient's individual fracture pattern. The strong fixation and earlier ROM allowed his patient to minimize downtime and return to practice faster than other implants and surgical approaches.