

Case Study:

Use of the InFrame™ Intramedullary Threaded Micro Nail for an Oblique, Comminuted Fracture of the 1st Proximal Phalanx



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Case Presentation

Patient was a 17-year-old male who suffered a midshaft oblique fracture with comminution to his 1st proximal phalanx from a crush injury while lifting an engine. Rigid fixation with rotational stability was desired to allow immediate range of motion (ROM) and resumption of daily activities.

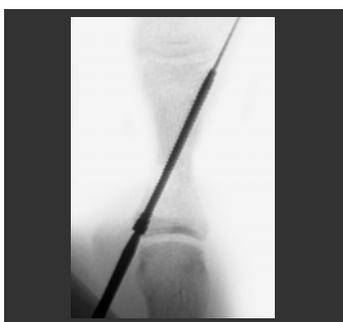
Pre-op



Pre-op Plan

Dr. Stephens normally considers two or three percutaneous perpendicular lag screws for oblique fracture patterns but wanted to achieve early ROM while avoiding complications such as stiffness. K-wires were also considered but avoided due to poor rotational stability and the need for immobilization. Plates and screws were also an option but are associated with poor ROM outcomes and a high degree of tissue exposure. Headless compression screws (HCS) were not a viable option due to the angular deformities that compression can cause during insertion.

Intra-op



Dr. Stephens chose the InFrame Intramedullary Threaded Micro Nail that comes with a unique dual diameter guidewire that achieves accurate and efficient placement of the implant. The innovative guidewire removes the need for reaming and allows the micro nail to be inserted over the trailing end of the guidewire with ease. The 2.0mm diameter design allows various implantation constructs, satisfying almost any fracture pattern, including oblique and comminuted phalangeal fractures, while enhancing rotational stability via bi-cortical bone purchase. Biomechanical testing has demonstrated the superior rigidity with InFrame compared to K-wires and plates, allowing immediate active ROM and reduced recovery time.

Operative Findings and Approach

Post-op

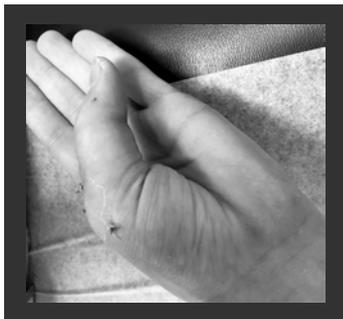


The patient suffered an open fracture with bone loss from the ulnar side, requiring the extension of his traumatic wound to achieve anatomic reduction because it was very unstable. After reduction, Dr. Stephens inserted the dual diameter guidewire across the fracture site from the ulnar proximal cortex 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 28mm micro nail was needed for the 1st proximal phalanx. The larger diameter of the guidewire was used to drive 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 proximal ends. 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 inserted the second dual diameter guidewire, with at least a spacing of 0.5mm or more in all planes between the previously placed implant and the newly placed guidewire, from the radial proximal cortex to the ulnar distal cortex under fluoroscope and used a 34mm micro nail. The intramedullary space was large enough for Dr. Stephens to create an "X" configuration with the two InFrame implants, creating rotational stability. Total surgery time was approximately 25 minutes.

Follow-up

At two weeks, the patient did not experience any pain and was able to flex and extend his thumb. He had some stiffness, which is expected because of the open fracture, crush injury but is in therapy.

Follow-up



Discussion

The use of InFrame allowed Dr. Stephens to address the proximal phalanx fracture with an “X” frame construct, providing cortex to cortex stability with rotational control, in only 25 minutes of total surgery time. InFrame has a robust length offering that allows surgeons to create optimal construct configurations based on the specific fracture patterns to achieve bi-cortical, threaded fixation. This results in rotational stability and earlier ROM. The delivery mechanism for InFrame is also important because it simplifies a more precise implant placement. The innovative 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 allows patients to minimize their downtime and return to work or daily activities faster than other implants and surgical approaches.