

Case Study

Use of the INnate™ Intramedullary Threaded Nail for Osteotomy of Fourth and Fifth Metacarpals for Angular Malunion



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Orthopedic surgeon Dr. Manke, originally from Michigan, graduated from Wayne State University School of Medicine. Dr. Manke completed his residency at the Medical College of Virginia in Richmond. He specializes in upper extremity surgery including total and reverse shoulder arthroplasty, complex arthroscopic and open shoulder reconstruction, elbow, wrist, and hand arthroscopy as well as complex fracture repair.

Case Presentation

Patient was a 28-year-old male police officer who suffered an impact injury to his metacarpals after punching a wall. He did not feel the injury was severe enough to receive immediate attention but approximately eight weeks after the injury, he noted the deformity of the hand and the loss of terminal extension to the digits. He did not want to take too much time off from work to have his hand repaired but was having difficulty holding his weapon.

Patient had midshaft spiral oblique fractures to his fourth and fifth metacarpals. He needed stable fixation, rotational alignment, and immediate range of motion to get back to work as soon as possible. He also needed to be pain-free in order to execute his duties as a police officer.

Preop Plan

Dr. Manke considered plates and screws, but this technique would have provided less-stable fixation and concern for tendon adhesions. He also considered K-wires, but he was concerned about complications such as infection, and the patient did not want to return for a secondary surgery. Dr. Manke proceeded with operative dissection to perform osteotomies required to take down malunion that had occurred. He then selected an intramedullary fixation approach, using an INnate™ threaded nail.

Operative Findings and Approach

Dr. Manke first performed a longitudinal incision with open takedown of the malunion. Once reduction was obtained, a longitudinal 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. He used a percutaneous approach with INnate to stabilize the multiple metacarpal fractures and again used the INnate depth gauge to determine that a 4.5 mm diameter threaded nail was needed for the fifth metacarpal and a 3.6 mm diameter threaded nail was needed for the fourth metacarpal (due to a narrower isthmus).

Dr. Manke then used the cannulated drill to drill over the guidewire and threaded the cannulated INnate nail until the head was beneath the articular cartilage, to achieve distal purchase in the subchondral bone. Proximal purchase was achieved at the isthmus level within each intramedullary canal. The implants were placed while holding reduction and bone graft was placed from the malunion takedown. Rotational and longitudinal alignment were assessed at multiple times during the case. The fracture repair was deemed stable enough, intraoperatively, to allow for immediate active and passive range of motion (ROM), with a total surgery time of 30 minutes.

Preoperative



Postoperative



Follow-up

In less than eight weeks postop, the patient achieved full ROM, both clinical and radiographic evidence of union, and full return to work, which would have been difficult to replicate with other fixation techniques or implants.

Discussion

A non-compression nail with canal-fill allowed Dr. Manke to address spiral oblique fractures to maintain height and provide rotational stability. INnate has various lengths and diameters that allow canal-fill and affords excellent fixation and rotational stability. The implant does not require additional resources, and follow-ups are typically easy and straightforward because patients often do not need formal therapy, as mobilization is immediate. In Dr. Manke's opinion, this allows patients to minimize their downtime and return to work or daily activities faster than other implants and surgical approaches.



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