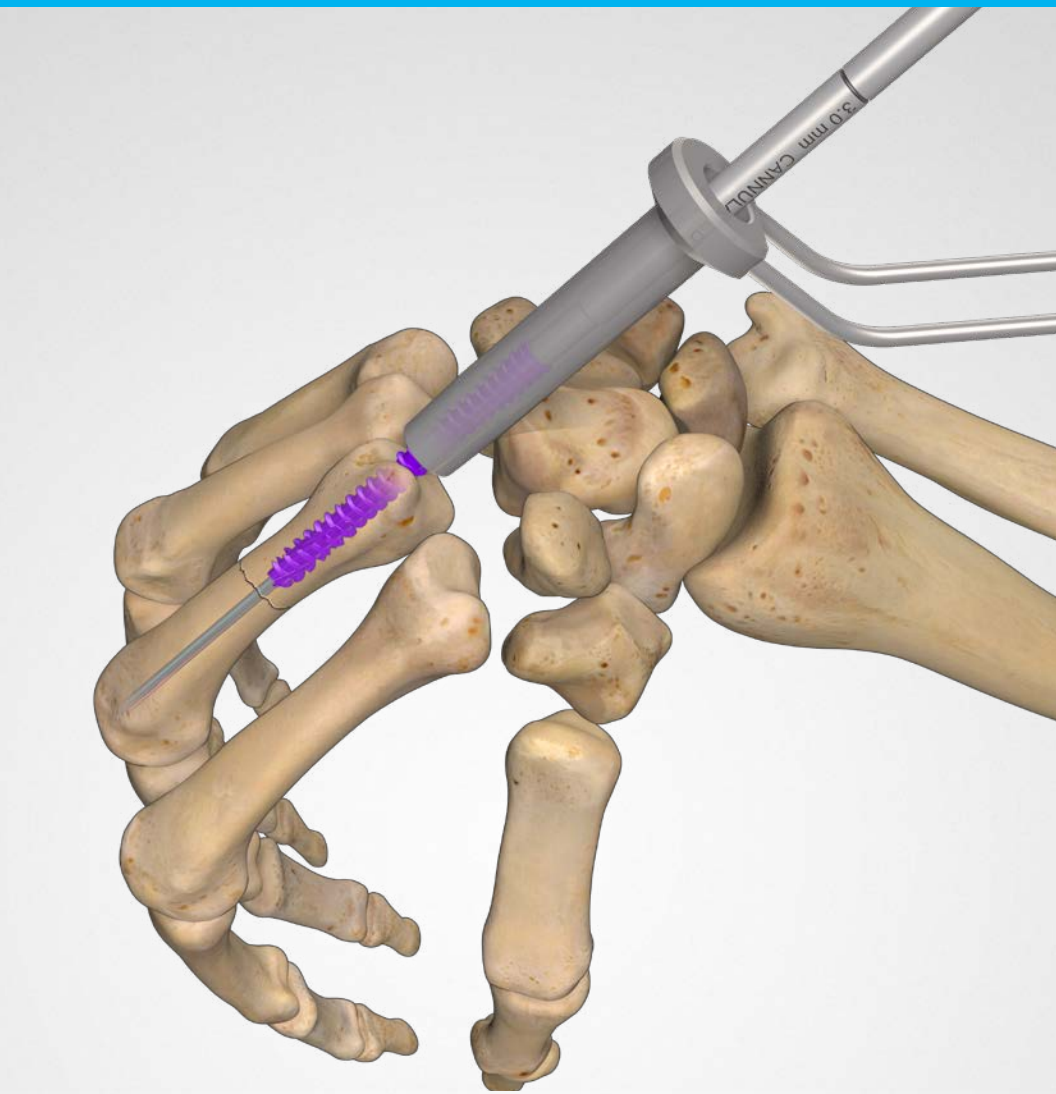
acumed®

Acutrak 2® Headless Compression Screw System

Supplemental Use Guide—Intramedullary Fixation of Metacarpal Fractures: Antegrade Approach



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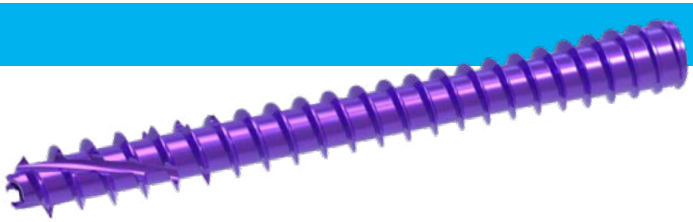

Acumed Acutrak 2® Headless Compression Screw System—Acutrak Intramedullary Fixation of Metacarpal Fractures: Antegrade Approach

Metacarpal fractures account for up to 10% of all fractures.[1] Traditionally, displaced transverse fractures are fixated with plate and screw constructs.

Antegrade Approach Overview

The approach is ideal for transverse or short oblique fractures in the proximal metacarpal shaft with the aim of avoiding injury of the articular cartilage of the metacarpal head and the extensor mechanism.

Traditionally, the retrograde approach for intramedullary screw fixation of a metacarpal fracture entails performing an arthrotomy through the dorsal joint capsule and either splitting the extensor tendon or incising the adjacent sagittal band. The fracture is reduced by introducing a guide wire retrograde, starting at the metacarpal head, down the shaft, and across the fracture site to the base of the metacarpal. The metacarpal head and canal are drilled, followed by screw placement. Antegrade screw fixation is performed through the articular surface at the base of the metacarpal, down the shaft, and across the fracture site. This technique avoids injury to the extensor mechanism and the articular surface of the metacarpal head.

This guide is intended for supplemental use only and is not intended to be used as a stand-alone surgical technique. Reference the Acumed Acutrak 2 Headless Compression Screw System Surgical Technique (SPF00-02) for more information.

	Definition
Warning	Indicates critical information about a potential serious outcome to the patient or the user.
Caution	Indicates instructions that must be followed in order to ensure the proper use of the device.
Note	Indicates information requiring special attention.

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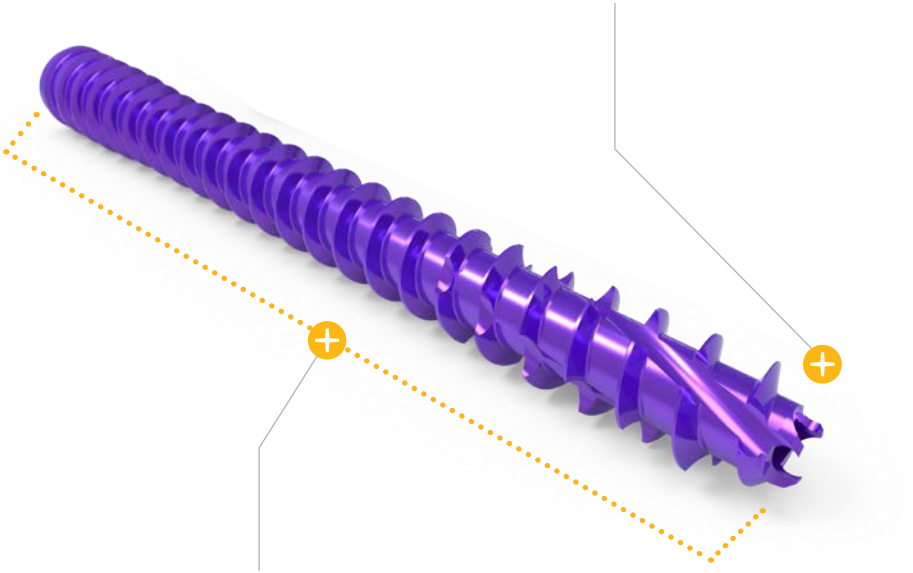
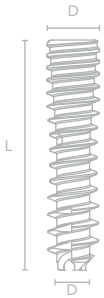
System Features

Cutting flutes are engineered to make the screw self-tapping and facilitate insertion into hard bone

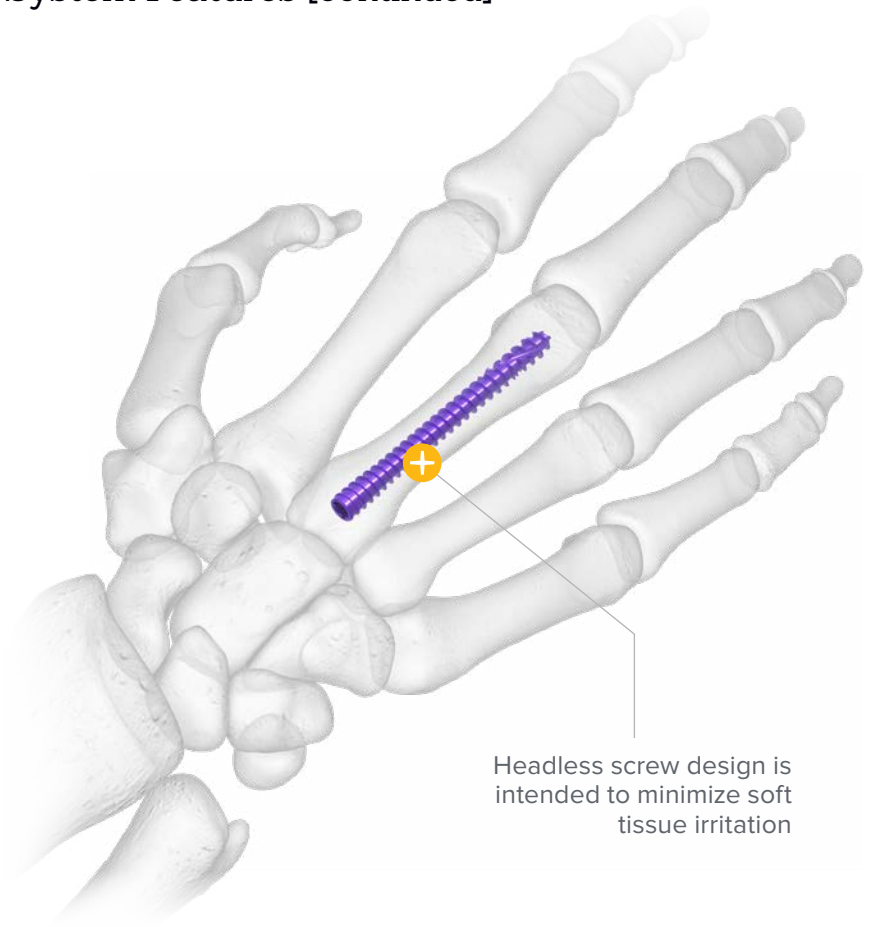


Fully threaded, continuously variable thread pitch allows each thread along the entire length of the screw to aid in the reduction and compression of the fracture



Acutrak 2 Screws	Diameter	Length
Micro	Tip: 2.5 mm Tail: 2.8 mm	1 mm increments 8–14 mm 2 mm increments 14–30 mm
Mini	Tip: 3.5 mm Tail: 3.6 mm	2 mm increments 16–30 mm
Standard	Tip: 4.0 mm Tail: 4.1 mm	2 mm increments 16–34 mm
4.7 mm	Tip: 4.5 mm Tail: 4.7 mm	2 mm increments 20–30 mm 5 mm increments 30–50 mm

System Features [continued]



	Mean Canal Width (Coronal)	Mean Canal Width (Sagittal)	Minimum Diameter Screw	Recommended Screw
Index Finger	3.2 mm	3.8 mm	4.0 mm	Standard or 4.7 mm
Middle Finger	3.2 mm	3.9 mm	4.0 mm	Standard or 4.7 mm
Ring Finger	2.8 mm	3.5 mm	3.5 mm	Mini or Standard
Small Finger	4.1 mm	3.7 mm	4.0 mm	Standard or 4.7 mm

See reference 2 on page 11

Intramedullary Fixation of Metacarpal Fractures: Antegrade Approach

Jerry Huang, MD and Don Hoang, MD

Figure 1

1 Patient Positioning

Patients are placed on an operating room table with the affected limb on a hand table. Fractures are typically close reduced. In subacute or chronic fractures, a mini-open approach can be used to access the fracture site to perform debridement of callus or interposed soft tissue.

Reduction can be achieved by a Jahss maneuver, with the MCP and PIP joints flexed at 90 degrees, followed by use of the proximal phalanx to push up on the metacarpal head combined with direct pressure over the apex of the fracture. By holding all the MCP joints in flexion, rotational alignment of the fracture can be verified.

Intramedullary Fixation of Metacarpal Fractures: Antegrade Approach [continued]

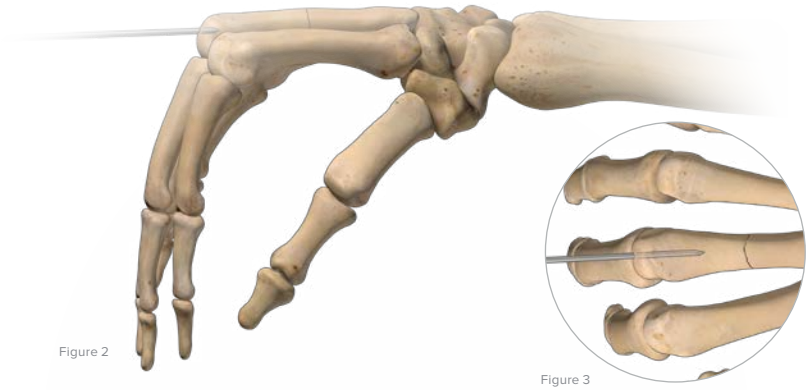


Figure 2

Figure 3

2 Guide Wire Placement

Divert the extensor tendon radially or ulnarly with a fingertip. The retrograde guide wire (WS-1106ST, WS-1407ST, or 80-0950) is introduced percutaneously through the palpable metacarpal head down the medullary canal. Alternatively, a mini-open incision can be made over the MCP joint. Under fluoroscopic imaging, reduce the fracture and introduce the appropriate size guide wire (WS-1106ST, WS-1407ST, or 80-0950) in an intramedullary retrograde fashion from the metacarpal head, down the shaft, and across the fracture site into the base.

Generally, the guide wire should start centrally down the medullary canal and be aimed dorsally at the base to skive off the dorsal aspect of the corresponding carpal bone. This is done to avoid appreciable defects in the capitate for the 3rd metacarpal, the trapezium for the 2nd metacarpal, and the hamate for the 4th and 5th metacarpals. Under fluoroscopic imaging, confirm fracture reduction and placement of the guide wire down the center of the medullary canal.

Intramedullary Fixation of Metacarpal Fractures: Antegrade Approach [continued]

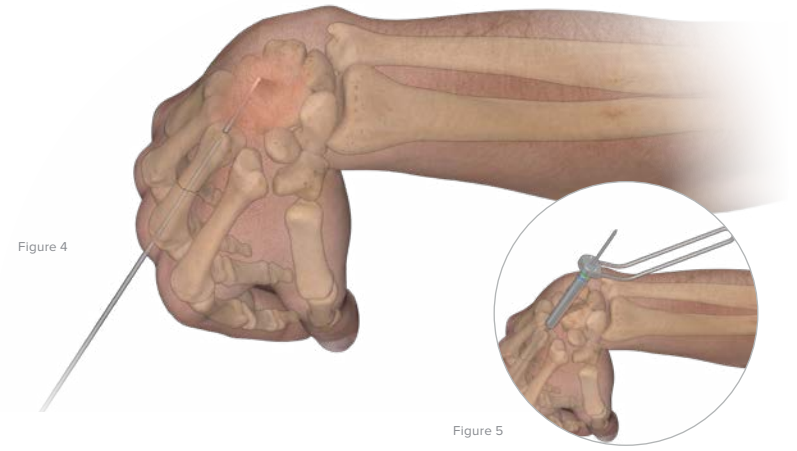


Figure 4

Figure 5

3 Proximal Metacarpal Access

Place patient's wrist in maximal flexion as the guide wire is advanced from distal to proximal. Once the guide wire exits out the dorsal aspect of the CMC joint, it can be easily palpated. Make a 5–10 mm incision over the area where the guide wire surfaces from the dorsum of the wrist. Dissection is performed to retract the soft tissues and the finger extensor tendons.

Optional use of a soft tissue protector (80-0519 or 80-0990) or Fraser tip (not included within the Acutrak 2 Headless Compression Screw System) over the guide wire may help ease the guide wire outside of the tissue. Advance the guide wire out the dorsum of the wrist until the distal aspect of the guide wire is out of the MCP joint and completely in the metacarpal only.

Intramedullary Fixation of Metacarpal Fractures: Antegrade Approach [continued]

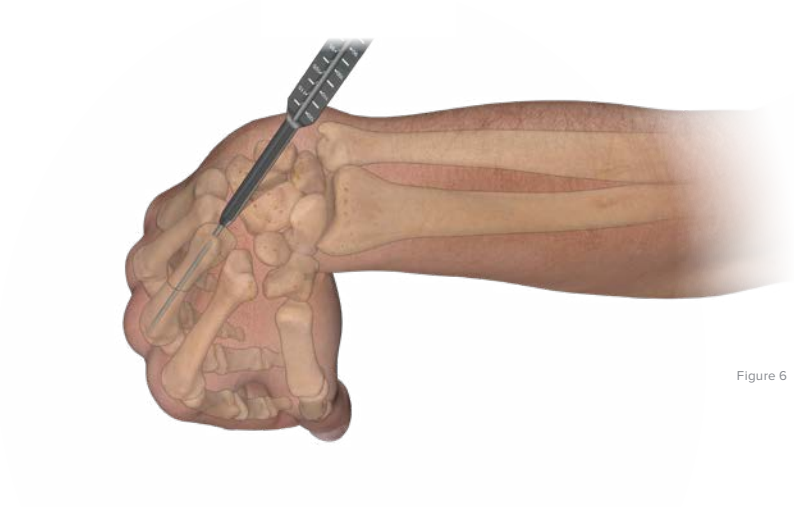


Figure 6

4 Determine Screw Length

Measure guide wire length by using the Acutrak 2 Screw Sizer (AT2-SMCZ), or the Large Acutrak 2 Screw Sizer (80-0996). Select a screw of the appropriate length, (subtracting 4–6 mm to allow for fracture compression and countersinking.

Intramedullary Fixation of Metacarpal Fractures: Antegrade Approach [continued]

Figure 7

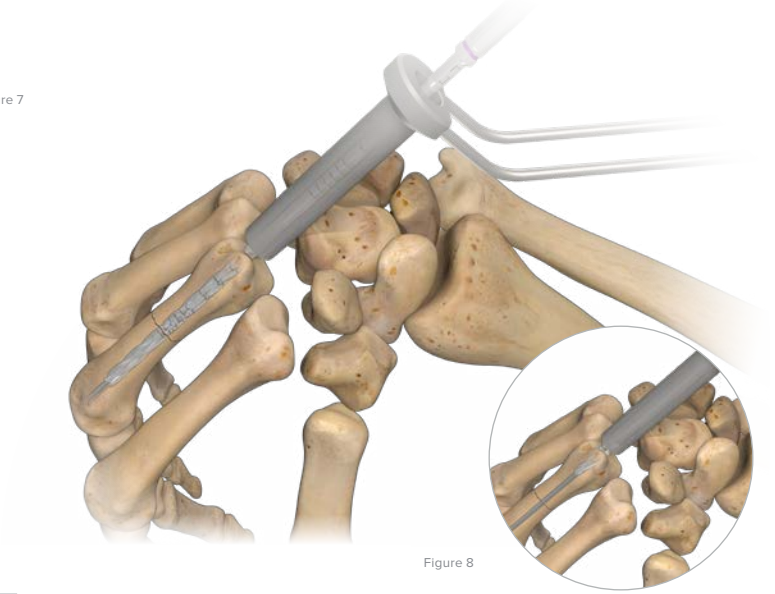


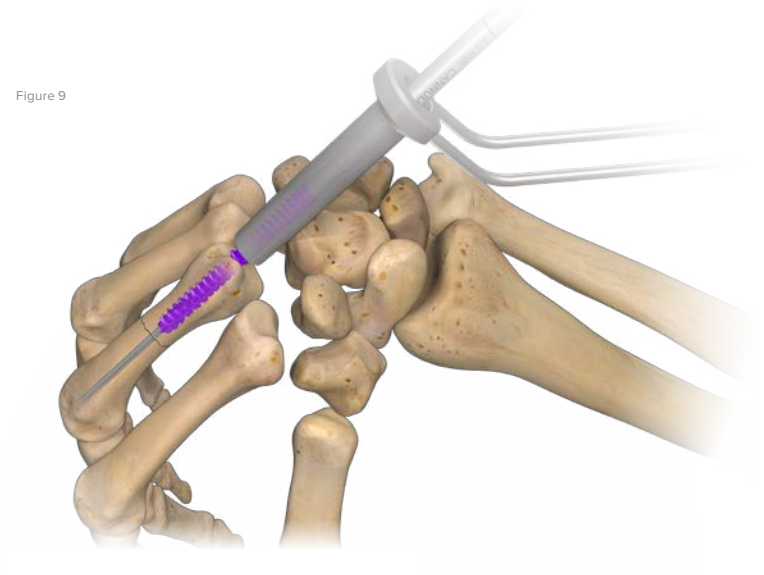
Figure 8

5 Drilling the Metacarpal

Place optional soft tissue protector (80-0519 or 80-0990) over the guide wire. Use the appropriate size long drill (AT2M-L1813, AT2-L2515, or 80-0946) to drill the metacarpal shaft past the fracture site. The near cortex should be drilled with the appropriately sized profile drill (AT2M-1813, AT2-2515, or 80-0945).

Intramedullary Fixation of Metacarpal Fractures: Antegrade Approach [continued]

Figure 9



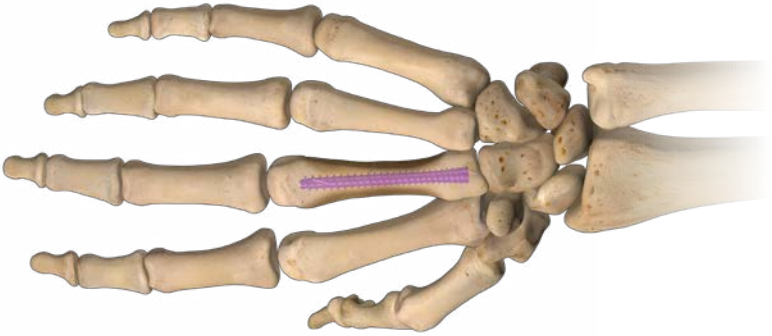
6 Screw Insertion

The self-tapping headless compression screw is then advanced antegrade over the guide wire with the appropriately sized cannulated hex driver tip (HT-1120, HT-1725, or 80-0958). It is helpful to hold the patient's fingers with the MCP and proximal interphalangeal joints flexed to 90 degrees to continue to control for rotational deformities while the screw advances.

Screw placement should be performed under fluoroscopic imaging to ensure maintenance of reduction. Fluoroscopy is also used to verify screw placement with enough threads across the fracture site and appropriate countersinking of the screw proximally. The guide wire is now removed.

Intramedullary Fixation of Metacarpal Fractures: Antegrade Approach [continued]

Figure 10



7 Skin Closure and Splinting

The wound is now irrigated. The extensor tendons are visualized to ensure no damage. Skin closure is performed typically with 4–0 nylon sutures. The hand is splinted in intrinsic plus position. Patients can be seen at 4–5 days post-operatively for splint removal and started on active range of motion exercises. The patient is fitted with a removable thermoplastic orthosis to be worn between exercises.

Reference

1. Hoang D, Huang J. Antegrade intramedullary screw fixation: a novel approach to metacarpal fractures. *J Hand Surg GO.* 2019;1(4):229-235.
2. Hoang D, Vu C, Jackson M, Huang J. An anatomical study of metacarpal morphology utilizing CT scans: evaluating parameters for antegrade intramedullary compression screw fixation of metacarpal fractures. *J Hand Surg.* 2020; advance online publication. https://doi.org/10.1016/j.jhsa.2020.08.007

Notes:

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Acumed Headquarters
5885 NE Cornelius Pass Road
Hillsboro, OR 97124
Office: +1.888.627.9957
Office: +1.503.627.9957
Fax: +1.503.520.9618
www.acumed.net

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