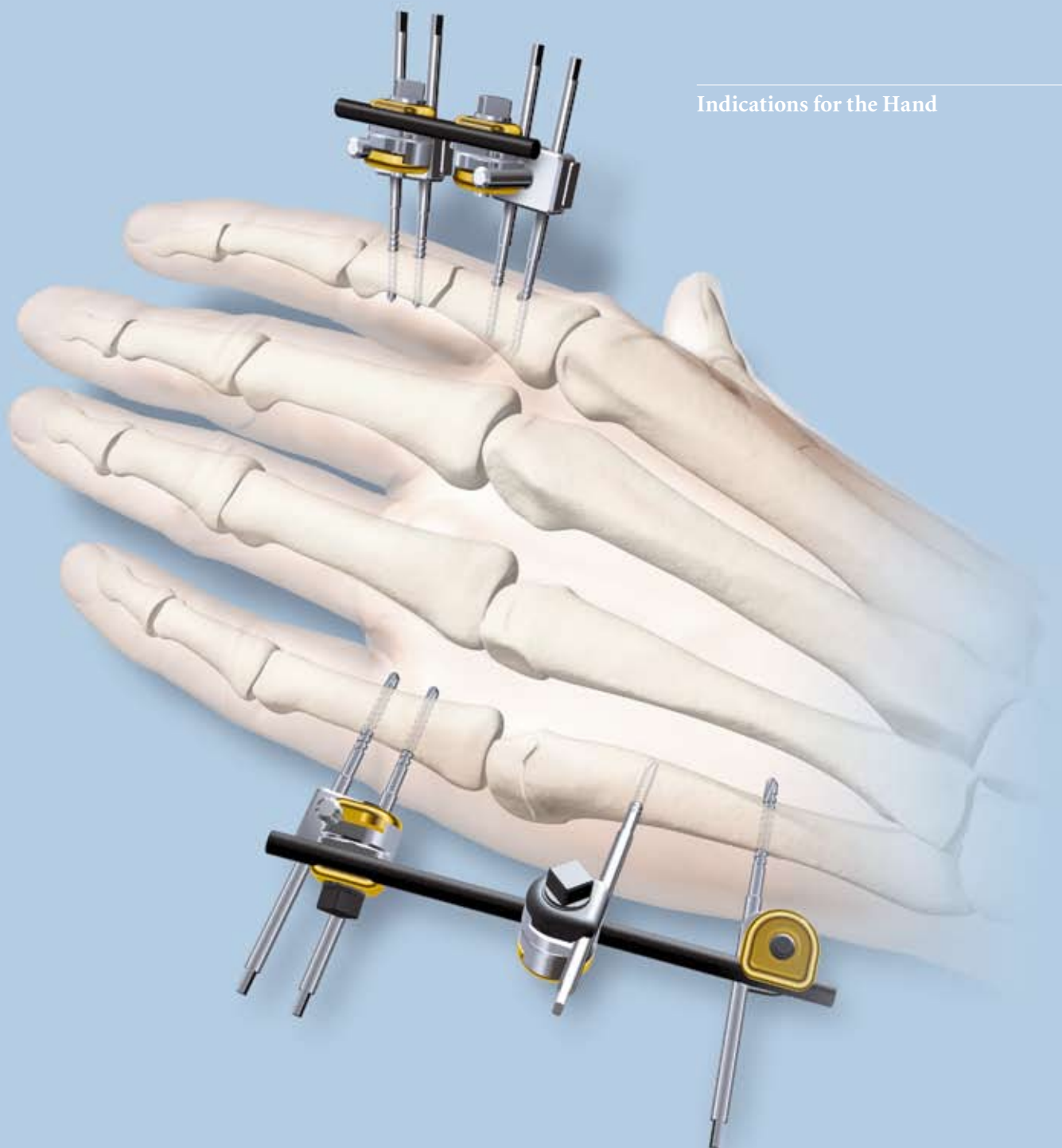


Hoffmann II Micro External Fixation System

Operative Technique

Indications for the Hand



Components



1 Hoffmann II Micro Multi-Pin Clamp

2 Hoffmann II Micro 90° Multi-Pin Clamp

3 Hoffmann II Micro Rod to Rod Coupling

4 Hoffmann II Micro Pin to Rod Coupling

5 Hoffmann II Micro to Hoffmann II Compact Rod to Rod Coupling

6 3mm Carbon and Stainless Steel Rods

7 2mm and 1.65mm Self-Drilling/ Self-Tapping Half-Pins

8 2mm Blunt Half-Pin

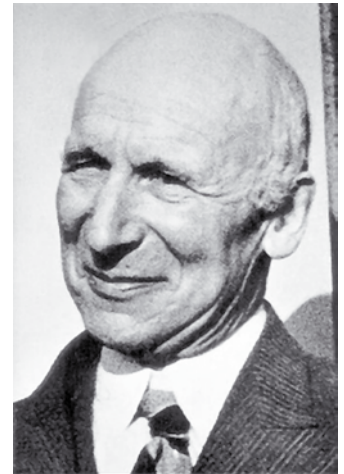
9 Hoffmann II Micro Instrumentation

Introduction

In 1938, Raoul Hoffmann, a Swiss surgeon from Geneva, Switzerland, designed a revolutionary External Fixation System. The basic features of this system were its modular design and the ability to reduce fractures or to make post operative corrections to the alignment of fragments in three planes with the frame in situ. The Original Hoffmann System underwent considerable design improvements over the years. Then in the late 90's, a group of renowned design surgeons¹ and Stryker engineers developed the innovative Hoffmann II and Hoffmann II Compact Systems. These systems signified a giant step forward in the treatment of bone fractures with modular external fixation frames.

Indeed, thanks to the light weight and non bulky components, the Hoffmann II Systems provide surgeons with versatility, simplicity, and ease of use.

The Hoffmann II Micro System capitalizes on the experience acquired during several decades with the original Hoffmann System and with the Hoffmann II Large and Hoffmann II Compact Systems. It is made of stainless steel and carbon composite materials to provide low profile high resistance features, and it has been designed to answer the growing needs of small bone injuries by ensuring ease of use and versatility.



Raoul Hoffmann

¹ Dr. Gernot Asche, Andy Burgess M.D., Prof. Franz Burny, Mr. Charles M. Court-Brown, Prof. Erkki O. Karaharju, Loren Latta Ph.D., Prof. David Seligson M.D., Dr. Gregory Zych M.D.

Indications & Contraindications

Relative Indications

The Hoffmann II Micro System is indicated for hand fractures. It is particularly suited for the following indications:

- Articular fractures
- Comminuted Fractures
- Severe open fractures (Grade 3)
- Rolando fractures
- Non unions and delayed unions
- Fractures associated with infection
- Acute Corrective Osteotomies
- Bennett's fractures
- Burns and Contractures
- Pathologic fractures
- Small Joint Arthrodesis

Relative Contraindications

Since external fixation devices are often used in emergency situations to treat patients with acute injuries, there are no absolute contraindications for use. The surgeon's education, training and professional judgement must be relied upon to choose the most appropriate device and treatment for each individual patient. Whenever possible, the device chosen should be of a type indicated for the fracture being treated and/or for the procedure being utilized.

Conditions presenting an increased risk of failure include:

- Insufficient quantity or quality of bone which would inhibit appropriate fixation of the device.
- Compromised vascularity that would inhibit adequate blood supply to the fracture or operative site.
- Previous history of infections.
- Any neuromuscular deficit which could interfere with the patient's ability to limit weight bearing.
- Any neuromuscular deficit which places an unusually heavy load on the device during the healing period.
- Malignancy in the fracture area.
- Mental, physical or neurological conditions which may impair the patient's ability to cooperate with the postoperative regimen.
- Patients with a compromised immune system.
- Pre-existing internal fixation that prohibits proper pin placement.
- Patients with a compromised immune system.
- Non compliant patients who would not be able to ensure proper pin care.
- Pre-existing internal fixation that prohibits proper pin placement.
- Bone pathology precluding pin fixation.

Operative Technique

Due to the high versatility of the Hoffmann II Micro System, a virtually unlimited number of frame configurations can be constructed, thus providing surgeons the ease of use to treat a variety of indications.

This Technical Guide provides step by step surgical techniques for three basic frame assemblies. These assemblies can then be adapted to other indications.



Operative Technique

General Half Pin Insertion and Frame Building Guidelines

Frame Building Guidelines

The Hoffmann II Micro Multi-Pin Clamp is designed for ease and precision of pin insertion. The Clamp has oval pin slots which allow the Half Pins to be inserted in one plane in a variety of angles.

The Hoffmann II Micro Pin to Rod Coupling offers independent pin placement.

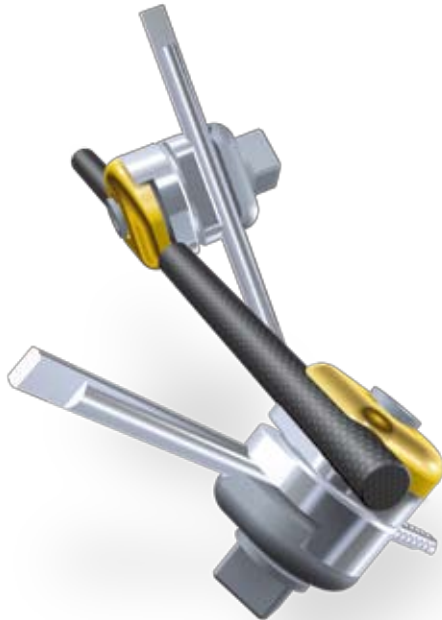
Multi-Pin Clamps and Couplings should be placed at least 5mm to 10mm away from the skin to allow for post-operative swelling and proper pin site care.

To reduce forces on the bone, it is recommended to hold the Half Pins with standard surgical pliers while tightening the Clamps and Couplings.

The Hoffmann II Micro to the Hoffmann II Compact Rod to Rod Coupling can be used to connect the two systems together, and can be tightened with the 5mm Wrench 3mm/4mm Pin Driver.

Note:

The Clamps and Couplings are designed not to be disassembled during the cleaning and sterilization process.



Insertion Guidelines

Two types of Half Pins are offered in the system: Blunt/Self-Tapping and Self-Drilling/Self-Tapping. Pre-drilling is necessary when using Blunt/Self-Tapping Half Pins. It is optional to pre-drill when using Self-Drilling/Self-Tapping Half Pins.

- Use a 1.6mm K-Wire to pre-drill a 2.0mm Half Pin
- Use a 1.2mm K-Wire to pre-drill a 1.65mm Half Pin

Blunt/Self-Tapping Half Pins are offered in 2.0mm thread diameter only. Self-Drilling/Self-Tapping Half Pins are offered in 2.0mm and 1.65mm thread diameters. All Half Pins have a 2.0mm shaft diameter.

Pay attention to soft tissues. A (mini) open insertion technique is recommended to avoid unnecessary damage to the soft tissues. A Drill/Insertion Guide is provided in the system to facilitate this technique.



shaft Ø2mm

thread ø1.65mm



self-drilling tip

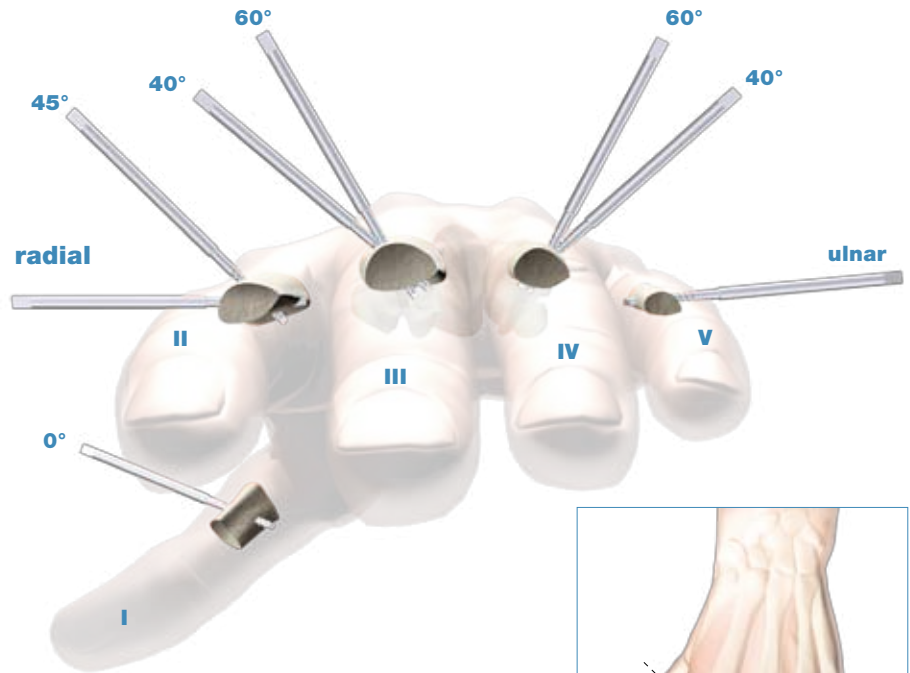


blunt tip

Operative Technique

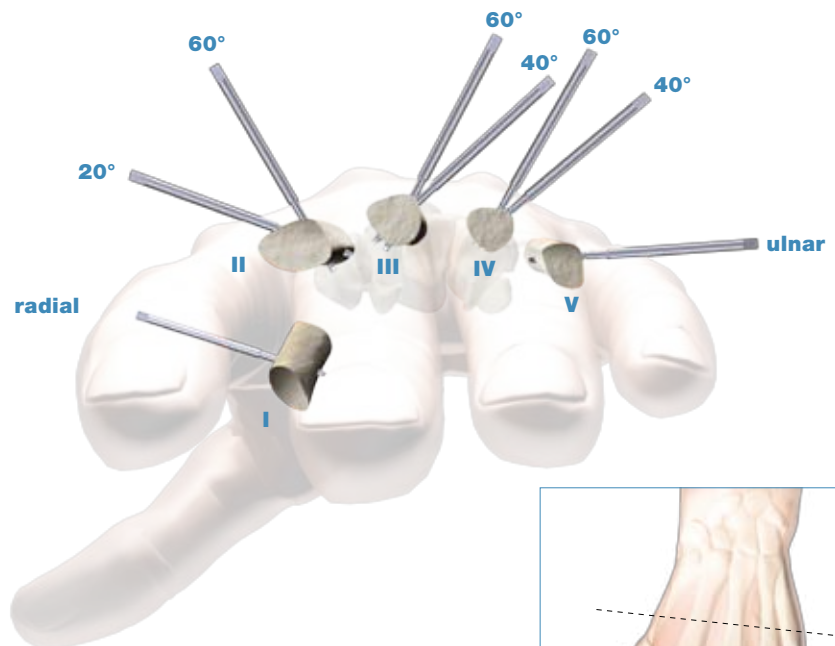
Placement in the Phalanges

- I** Insert Half Pins from the radial side in the frontal plane.
- II** Insert 0° to 45° from the frontal plane on the dorsal-radial side.
- III** Insert 40° to 60° from the frontal plane on the dorsal-radial side.
- IV** Insert 40° to 60° from the frontal plane on the dorsal-ulnar side.
- V** Insert from the ulnar side in the frontal plane.



Placement in the Metacarpals

- I** Insert Half Pins from the radial side in the frontal plane.
- II** Insert 20° to 60° from the frontal plane on the dorsal-radial side.
- III** Insert 40° to 60° from the frontal plane on the dorsal-ulnar side.
- IV** Insert 40° to 60° from the frontal plane on the dorsal-ulnar side.
- V** Insert from the ulnar side in the frontal plane.



Note:

When inserting pins, insure bi-cortical purchase.

Operative Technique

Frame 1



Mid shaft fracture of the proximal phalanx of the index finger (Digit II).

Material used:

- 2 - Multi-Pin Clamps
- 2 - Rod to Rod Couplings
- 1 - Connecting Rod
(Carbon or Stainless steel),
- 4 - 2mm Apex Half-Pins
(Self-Drilling or Blunt),
- 1 - Drill/Pin Insertion Guide,
- 1 - 1.6mm K-Wire,
- 1 - 2mm Pin Driver,
- 1 - 4mm Nut Wrench



Step 1: Drill the first proximal hole at least 5mm from the fracture site using the Drill/Pin Insertion Guide and the 1.6mm K-wire. If self-drilling/self-tapping Half Pins are used, it is possible to insert the Half Pins without pre-drilling as described in this step.

Note:

The drill/ pin insertion angle is 0° to 45° from the frontal plane radially. Use image intensification to determine proper pin placement, and ensure bi-cortical purchase.



Step 2: Manually insert the Half Pin (blunt or self-drilling/self-tapping) using the 2mm Pin Driver and Drill/ Pin Insertion Guide.



Operative Technique

Frame 1

Step 3: Place one Multi-Pin Clamp over the Half Pin and keep it at the desired distance from the skin.

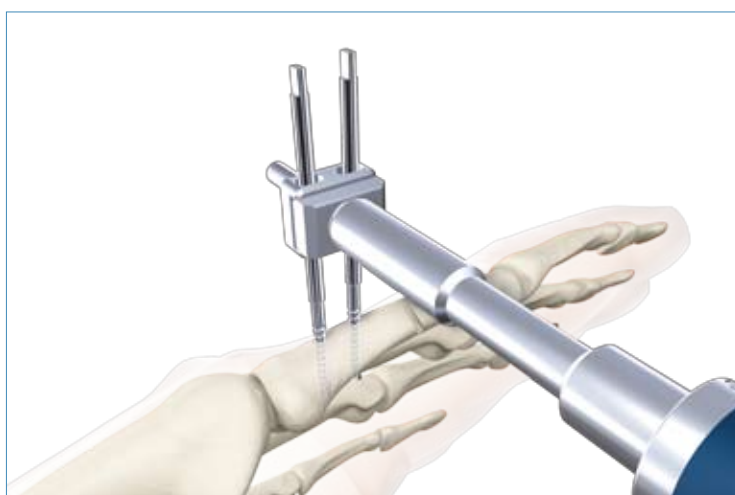


Step 4: Using the Multi-Pin Clamp as a guide and the Drill/Pin Insertion Guide to protect soft tissue, drill the second proximal hole with the 1.6mm K-wire. Again, if self-drilling/self-tapping Half Pins are used, it is possible to insert the Half Pins without pre-drilling as described in this step.



Step 5: Manually insert the second 2mm Half Pin through the Multi-Pin Clamp using the 2mm Pin Driver and the Drill/Pin Insertion Guide.

Step 6: Tighten the Multi-Pin Clamp to the Half Pins at the desired position using the 4mm Nut Wrench.



Operative Technique

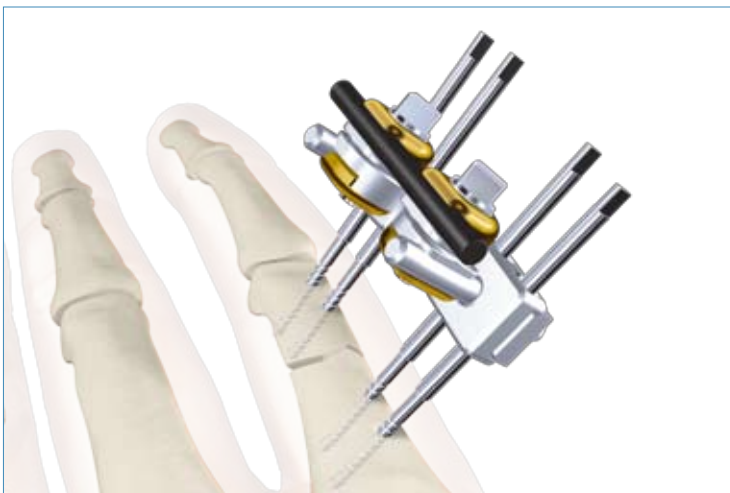
Frame 1



Step 7: Build the same Pin/Clamp construct on the distal side of the fracture following steps 1 through 6.

Note:

Insert the distal Half Pin which is closest to the fracture first.



Step 8: Two Rod to Rod Couplings are “clicked” on the clamp posts. Then, the Connecting Rod (carbon or stainless steel) is “clicked” into the two Rod to Rod Couplings. Reduce the fracture manually.



Step 9: While holding the fracture reduction in place, tighten the Rod to Rod Couplings using the 4mm Nut Wrench.



The frame is complete.

Operative Technique

Frame 2

Metaphyseal fracture of the proximal phalanx of the index finger (Digit II).

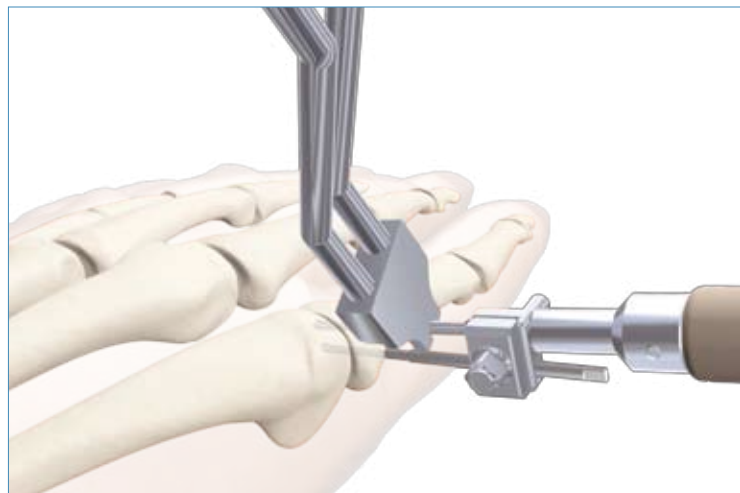
Material used:

- 2 - Multi-Pin Clamps
- 2 - Rod to Rod Couplings
- 1 - Connecting Rod (Carbon or Stainless steel),
- 4 - 2mm Apex Half-Pins (Self-Drilling or Blunt),
- 1 - Drill/Pin Insertion Guide,
- 1 - 1.6mm K-Wire,
- 1 - 2mm Pin Driver,
- 1 - 4mm Nut Wrench.



Step 1: The proximal Half Pins (blunt or self-drilling/self-tapping) are manually inserted parallel to the joint using the 2mm Pin Driver and Drill/ Pin Insertion Guide. Due to the design of the Clamp, the Half Pins can be placed parallel or convergent within the Clamp.

Use the Drill/Pin Insertion Guide and the 1.6mm K-wire to pre-drill if using blunt Half Pins. If self-drilling/ self-tapping Half Pins are used, it is possible to insert the Half Pins without pre-drilling.



Note:

The drill/insertion angle is 0° to 45° from the frontal plane radially. Use image intensification to determine proper pin placement, and ensure bi-cortical purchase.

Step 2: Tighten the Multi-Pin Clamp to the Half Pins at the desired position using the 4mm Nut Wrench.



Operative Technique

Frame 2



Step 3: Construct a Half Pin/Multi-Pin Clamp assembly distal to the fracture as shown in the figure. Make sure to tighten the Clamp onto the Half Pins.



Step 4: Two rod to rod couplings are “clicked” on each of the clamp posts. Then, the Connecting Rod (carbon or stainless steel) is “clicked” into the two Rod to Rod Couplings, and the fracture is reduced.



Step 5: Holding the fracture reduction in place, tighten the Rod to Rod Couplings using the 4mm Nut Wrench.



The frame is complete.

Operative Technique

Frame 3

Intra-Articular fracture of the fifth metacarpal with severe soft-tissue damage.

Note:

This frame offers additional freedom of independent pin placement which is dictated by the soft-tissue damage and the fracture. This also gives an option to more easily treat the wounds while the frame is in situ.

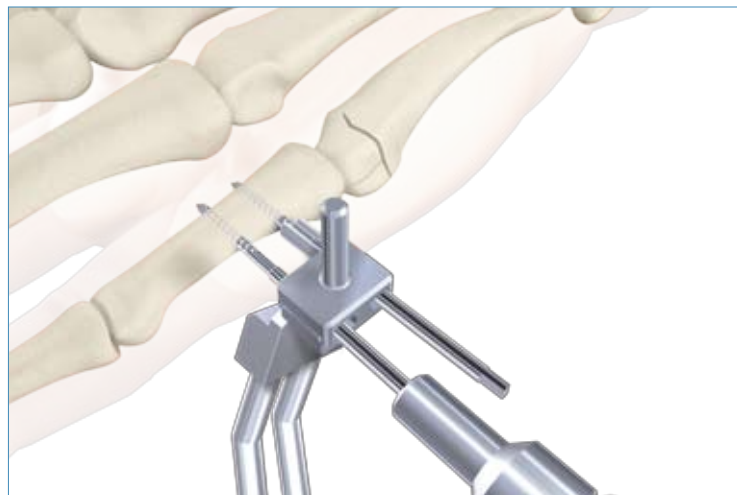
Material used:

- 1 - Multi-Pin Clamps
- 1 - Rod to Rod Couplings
- 2 - Pin to Rod Couplings
- 1 - Connecting Rod (Carbon or Stainless steel),
- 4 - 2mm Apex Half-Pins (Self-Drilling or Blunt),
- 1 - Drill/Pin Insertion Guide,
- 1 - 1.6mm K-Wire,
- 1 - 2mm Pin Driver,
- 1 - 4mm Nut Wrench.

Step 1: Manually insert the distal Half Pins (blunt or self-drilling/self tapping) into the fifth proximal phalanx using the 2mm Pin Driver and the Drill/Pin Insertion Guide. Place the Half Pins and Clamp parallel to the long axis of the bone. Use the Drill/Pin Insertion Guide and the 1.6mm K-wire to pre-drill if using blunt Half Pins. If self-drilling/self-tapping Half Pins are used, it is possible to insert them without pre-drilling.

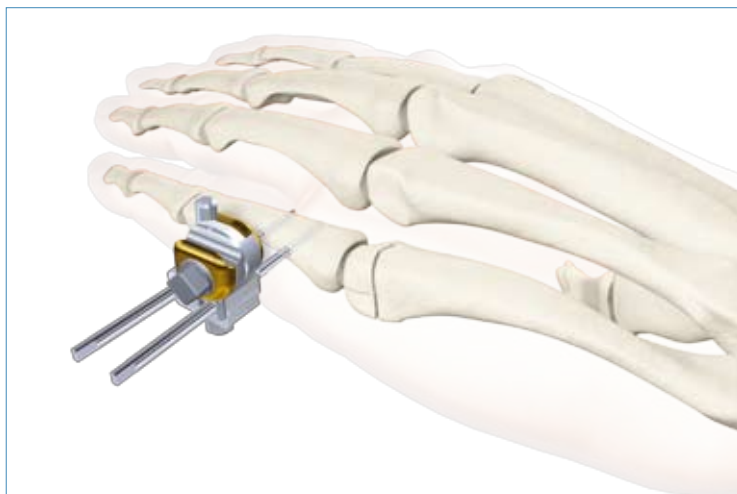
Insert the Half Pins from the ulnar side in the frontal plane. Use image intensification to determine proper pin placement, and ensure bi-cortical purchase.

Step 2: Tighten the Multi-Pin Clamp to the Half Pins at the desired position using the 4mm Nut Wrench.



Operative Technique

Frame 3



Step 3: Attach a Rod to Rod Coupling to the Clamp.



Step 4: Insert one Half Pin in the fifth metacarpal proximal to the fracture respecting the soft-tissue injuries. Attach a Pin to Rod Coupling to the Half Pin. Then, connect a 3mm Connecting Rod (Carbon or Stainless Steel) between the Rod to Rod Coupling and the Pin to Rod Coupling.



Step 5: Attach the second Pin to Rod Coupling to the proximal end of the Connecting Rod.

Operative Technique

Frame 3

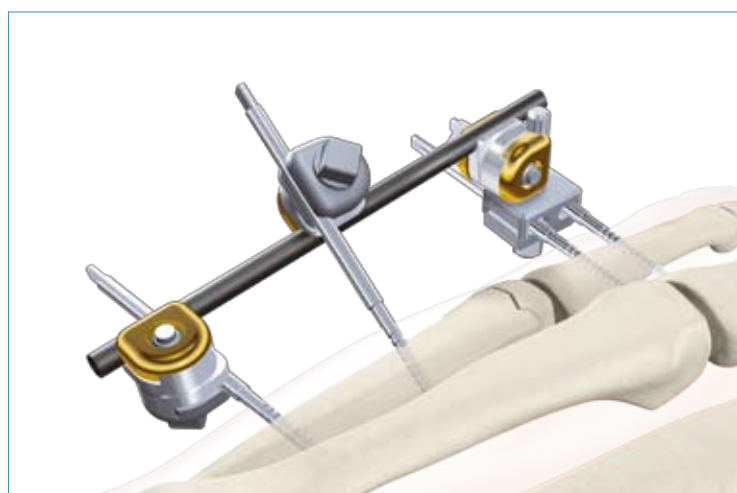
Step 6: Insert the Half Pin into the shaft of the metacarpal using the Drill/ Pin Insertion Guide and the Pin to Rod Coupling as guides. Then, manually reduce the fracture.



Step 7: While holding the fracture reduction in place, tighten the Rod to Rod Coupling and Pin to Rod Couplings using the 4mm Nut Wrench.



The frame is complete.



Ordering Information - Implants



Couplings and Clamps

	REF	Description	Diameter
	4960-1-010	Rod to Rod Coupling	3mm / 3mm
	4960-1-020	Pin to Rod Coupling	1.65mm–2mm / 3mm
	4960-1-060	Rod to Rod Coupling	5mm / 3mm
	4960-2-020	Multi-Pin Clamp	—
	4960-2-030	90° Multi-Pin Clamp	—

Note:

The Clamps and Couplings are designed not to be disassembled during the cleaning and sterilization process.

Connecting Rods



	REF	Description	Diameter	Total Length
	5079-6-030	Carbon Connecting Rod	3mm	30mm
	5079-6-040	Carbon Connecting Rod	3mm	40mm
	5079-6-050	Carbon Connecting Rod	3mm	50mm
	5079-6-060	Carbon Connecting Rod	3mm	60mm
	5079-6-090	Carbon Connecting Rod	3mm	90mm
	5079-6-120	Carbon Connecting Rod	3mm	120mm
	5079-6-150	Carbon Connecting Rod	3mm	150mm
	5079-5-030	Stainless Steel Connecting Rod	3mm	30mm
	5079-5-040	Stainless Steel Connecting Rod	3mm	40mm
	5079-5-050	Stainless Steel Connecting Rod	3mm	50mm
	5079-5-060	Stainless Steel Connecting Rod	3mm	60mm
	5079-5-090	Stainless Steel Connecting Rod	3mm	90mm
	5079-5-120	Stainless Steel Connecting Rod	3mm	120mm
	5079-5-150	Stainless Steel Connecting Rod	3mm	150mm

Warning:



Bone Screws referenced in this material are not approved for screw attachment or fixation to the posterior elements (pedicles) of the cervical, thoracic or lumbar spine.

Ordering Information - Implants


2mm Self Drilling/Self Tapping Apex Half-Pins

	REF	Shaft Diameter	Total Length	Thread Length
	5080-2-012	2mm	45mm	12mm
	5080-2-020	2mm	45mm	20mm


1.65mm Self Drilling/Self Tapping Apex Half-Pins

	REF	Shaft Diameter	Total Length	Thread Length
	5080-1-612	1.65/2mm	45mm	12mm
	5080-1-620	1.65/2mm	45mm	20mm

2mm Blunt Apex Half-Pins

	REF	Shaft Diameter	Total Length	Thread Length
	5065-3-615	2mm	36mm	15mm
	5065-4-520	2mm	45mm	20mm

K-Wires

	REF	Description	Diameter	Total Length
	390142	K-Wire	1.0mm	150mm
	390152	K-Wire	1.2mm	150mm
	390162	K-Wire	1.4mm	150mm
	390164	K-Wire	1.6mm	150mm

Ordering Information - Instruments

	REF	Description
	4960-9-040	Drill/Pin Insertion Guide
	4960-9-030	4mm Nut Wrench
	4960-9-020	2mm/1.65mm Pin Driver
	4940-9-030	5mm Wrench/3mm-4mm Pin Driver
	5084-4-044	4mm Spanner Wrench
	4960-9-904	Storage Case Lid
	4960-9-903	Storage Case Upper Insert
	4960-9-902	Storage Case Lower Insert
	4960-9-901	Storage Case Base

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