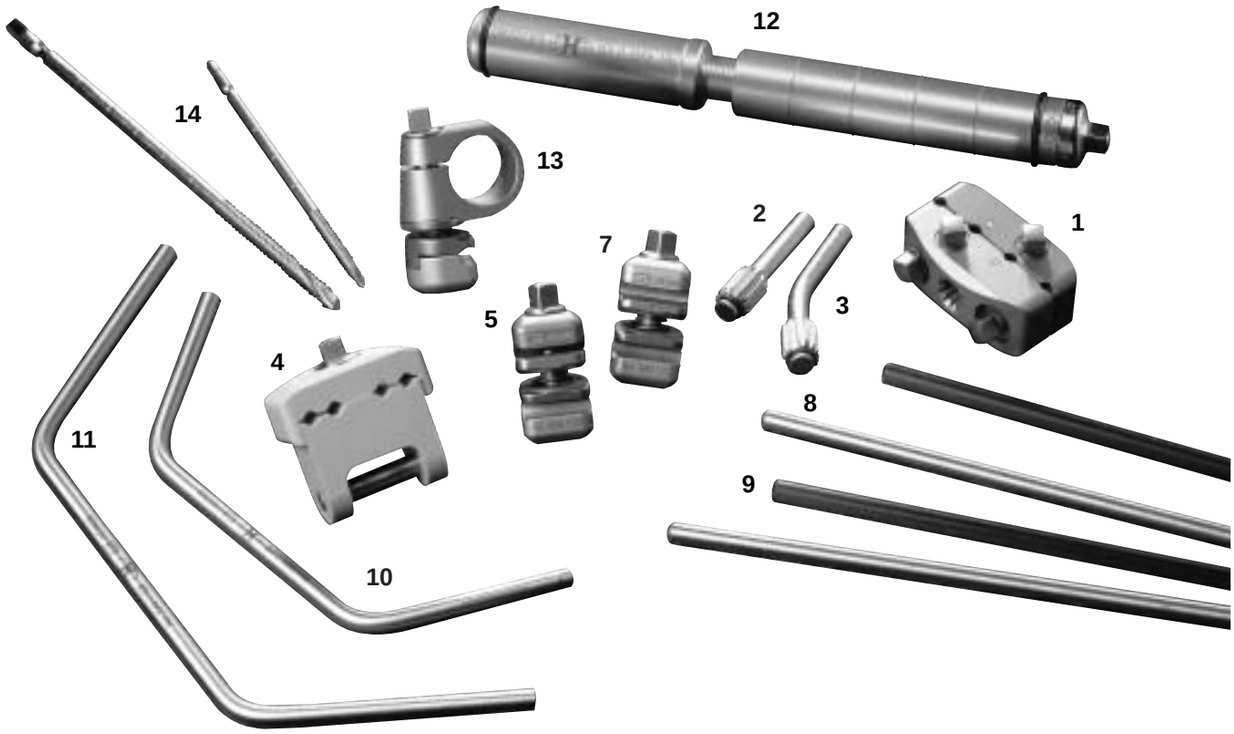
Hoffmann® II Compact™

EXTERNAL FIXATION SYSTEM

TECHNICAL GUIDE

stryker® Trauma



1. Pin Clamp Assembly
2. Straight Post
3. 30° Angled Post
4. Peri-Articular Pin Clamp
5. Pin-to-Rod Coupling 3-4/5mm Diameter
6. Rod-to-Rod Coupling 8/5mm Diameter (not shown)
7. Rod-to-Rod Coupling 5/5mm Diameter
8. Stainless Steel Rods 5mm Diameter
9. Carbon Fibre Rods 5mm Diameter
10. Curved Rod Semi-Circular (Small)
11. Curved Rod Semi-Circular (Medium)
12. Compression/Distraction Rod
13. Compression/Distraction Rod-to-Tube Coupling
14. Self-Drilling/Self-Tapping Pins 3 or 4mm Diameter (also available blunt pins)

Introduction

Fractures of the distal radius are common in adults and remain a challenge for the orthopedic surgeon. The advent of external fixation as a technique for distal radius fracture management has significantly improved treatment results and external fixation is now considered a routine tool in the treatment of complex wrist trauma.
Stryker® Howmedica was among the pioneers of external fixation in the wrist with the introduction of the Hoffmann C-Series wrist and upper extremity fixator. With the advent of new technologies and superior surgical materials, Stryker® Howmedica has built upon the success of the Original Hoffmann® fixator by introducing the Hoffmann®II External Fixation System. Recognizing the need for further enhanced upper extremity surgery, Howmedica has now extended the Hoffmann II External Fixation System by introducing the Hoffmann®II Compact™, specifically designed for distal radius fractures.
The Hoffmann II Compact Upper extremity fixator has been designed to complement the anatomy of the distal radius by allowing independent movement of its clamps in multiple planes. One of the main goals has been to reduce complexity of frame design, while providing total versatility and ease of use. The Hoffmann II Compact can be used with single or multi-pin clamps in a variety of frame configurations according to surgeon preference and fracture needs. Intra-articular fractures with radio-carpal involvement can be treated with a bridging or trans-articular construction, whereas, extra-articular fractures can be treated with a non-bridging or peri-articular frame. The Hoffmann II Compact is truly designed to meet the needs of the patient and the surgeon.

Indications

- Distal radius fractures (intra and extra) articular
- Intercarpal fracture dislocations
- Unstable forearm fractures
- Unstable elbow dislocation
- Multiple extremity fractures
- Radial osteotomies
- Foot and ankle fractures
- Paediatric fractures

Frame Types

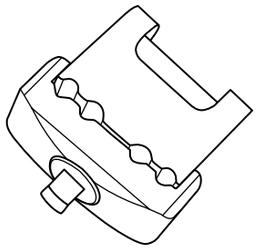
- Standard unilateral bridging frame
- Standard bi-lateral bridging frame
- Independent pin placement frame
- Peri-articular fixation frame
- Radial osteotomy frame
- Foot fixation frame
- Pediatric fixation frame

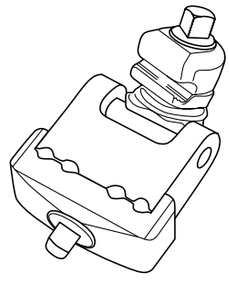
Contraindications

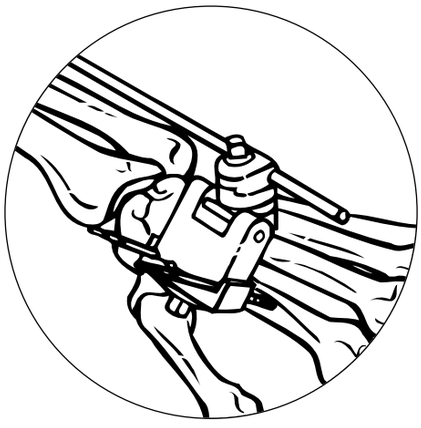
- If uncertainty exists with regard to the anatomic location of the neurovascular structures due to post-traumatic destruction, the device should be used with extreme caution. Under these circumstances, the pins should be inserted under image intensifier
- The presence of extensive internal fracture fixation devices
- Pre-emptive medical condition
- Poor bone quality

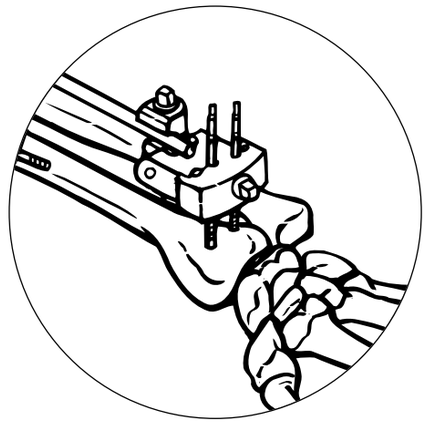
Acknowledgments:
The Hoffmann®II Compact™ technique guide was compiled from the kind contributions of leading surgeons in many countries;
the principal authors were:
Margaret McQueen, MD, FRCS, Ed (Orth), UK.
Andrew W. Egelseder, Jr., MD, U.S.A.

This publication sets forth detailed recommended procedures for using Stryker® Howmedica devices and instruments. It offers guidance that you should heed, but, as with any such technical guide, each surgeon must consider the particular needs of each patient and make appropriate adjustments when and as required.









Peri-Articular Pin Clamp

In 1929, L. Ombrédanne of Paris, France introduced the concept of external fixation in fractures of the distal radius. His main philosophy was what he termed as "ostéosynthèse à distance temporaire", advocating temporary osteosynthesis with external retention of the fragments via an external fixation frame.
Ombrédanne's fixator, unlike other later external fixation concepts, did not bridge the joint and allowed fixation of the distal radius fragment in a Peri-Articular mode.
The Hoffmann®II Compact™ Peri-Articular pin clamp was created to allow fixation of the distal radius in a non-bridging mode whenever possible.

The Peri-Articular pin clamp is:
- **Radiolucent, allowing a visualization of the fracture site on the X-Rays**
- **Lightweight**
- **Versatile 4 pin position**
- **Designed for use with 3mm Apex® pins only**
- **Top locking capability via a 5mm square head screw**
- **Integrated 5mm stainless steel rod allowing connection to an Hoffmann®II Compact Rod-to-Rod coupling**

The features of this original item allow:
- **Simple adjustment of volar tilt**
- **Simple adjustment of radial slant**
- **Easy alignment of the distal fragment to its original anatomic position**
- **Free flexion/extension while fixator is in place**
- **Avoids over-distraction of the wrist joint**

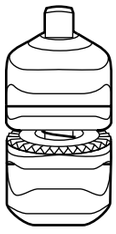


Figure 1

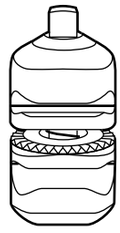


Figure 3

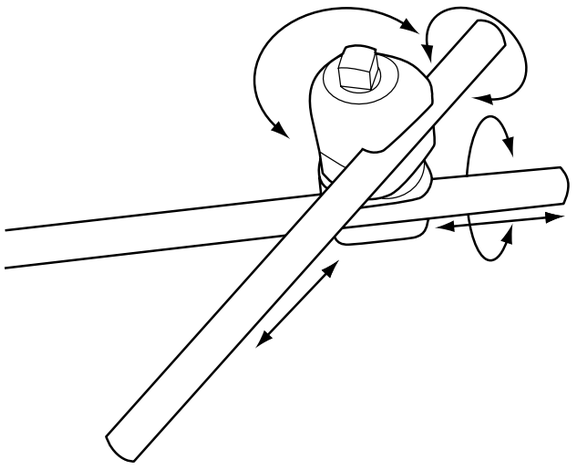


Figure 2

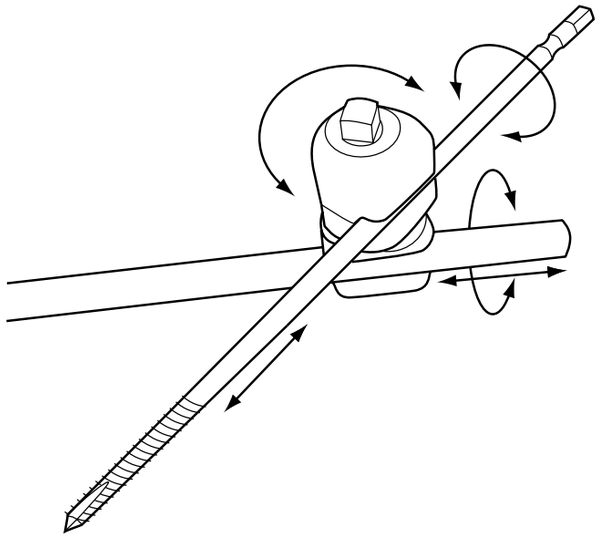


Figure 4

Rod-to-Rod Couplings

Provide maximum stability, component flexibility and ease of use. The Rod-to-Rod Coupling allows three dimensional rotation, incorporating a non-slip, snap-fit design that facilitates rapid assembly of the frame. The Coupling snaps onto the 5mm Connecting Rod and is locked in place with the 5mm Square Head Screw (Figures 1 and 2). Rod-to-Rod Couplings are color-coded yellow/yellow.

Pin-to-Rod Couplings

Like the Rod-to-Rod Coupling, the Pin-to-Rod Coupling provides maximum stability, flexibility, and ease of use.

The Pin-to-Rod Coupling employs the same non-slip, snap-fit design to clamp onto 5mm Connecting Rods and 3mm or 4mm Apex® Half Pins.

Pin-to-Rod Clamps are color-coded yellow/grey (Figures 3 and 4).

This allows the placement of independent pins wherever necessary.

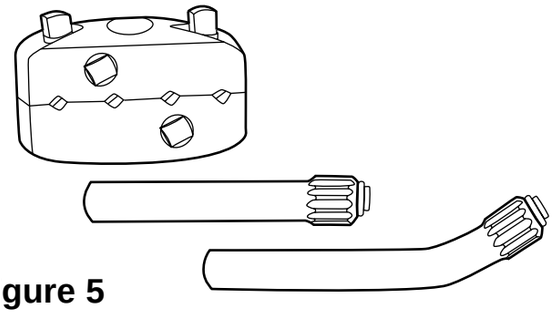


Figure 5

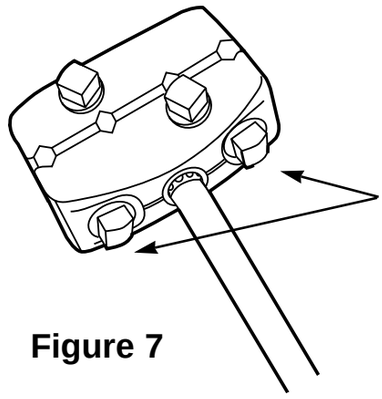


Figure 7

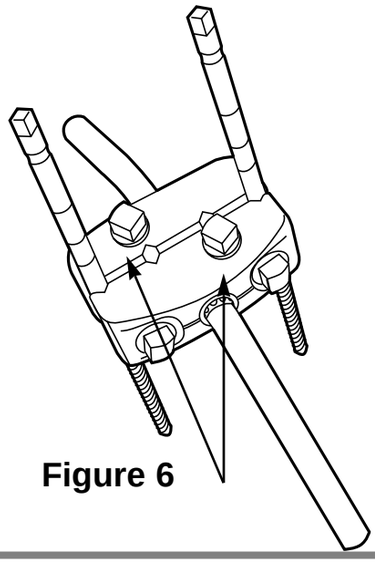


Figure 6

Multi-Pin Clamp

Multi-Pin Clamps are available if parallel Pin placement is desired. The Clamp will hold up to four 3mm or 4mm Self-Drilling/Self-Tapping or blunt Apex® Half Pins.

Straight or 30° Angled Posts are used along with the Clamp to provide attachment to the Rod-to-Rod Couplings and Connecting Rods.

The 30° Angled Post may be placed in 12 different positions within the Multi-Pin Clamp to provide a more compact, fracture-specific frame (Figure 5).

Posts are locked into place by tightening the two 5mm Square Head Screws on the top of the Clamp (Figure 6).

Multi-Pin Clamps are secured to Half Pins by tightening the two 5mm Square Head Screws on the lateral side of the Clamp (Figure 7). Like other Pin-to-Rod Couplings, Multi-Pin Clamps are colour-coded yellow/grey.

NOTE: Do not mix Pin diameters within the same Clamp. Half Pins used within the same Clamp must have the same diameter.

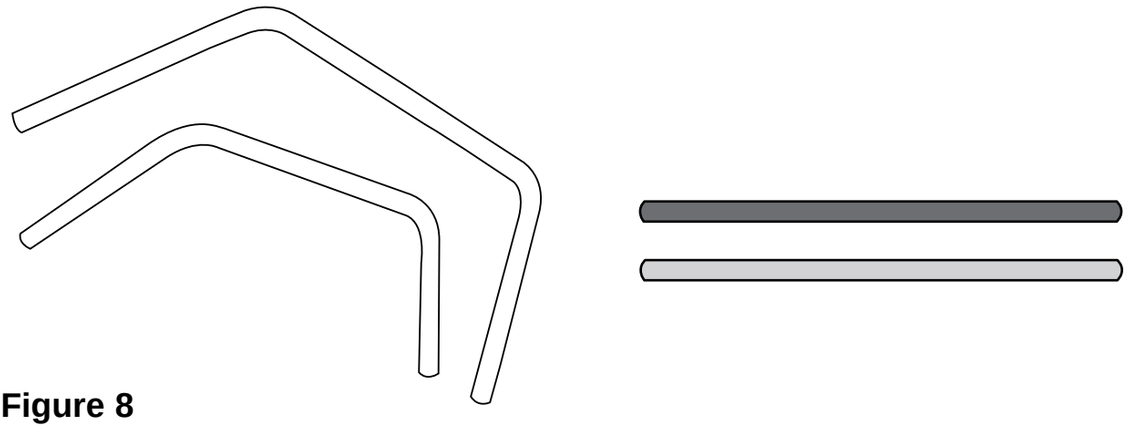


Figure 8

Connecting Rods

Straight Connecting Rods are available in Stainless Steel and Carbon. All Rods are 5mm in diameter, and range in length from 65mm to 300mm. Two unique Curved Stainless Steel Rods are also available providing even wider options of frame constructs (Figure 8).

Stainless Steel and Carbon Connecting Rods provide varying degrees of frame elasticity allowing the surgeon to adapt the external fixation frame to the patient's fracture needs (elasticity, X-Ray transparency).

NOTE: Do not bend the Carbon Connecting Rods. Carbon rods are single use products.

Figure 9

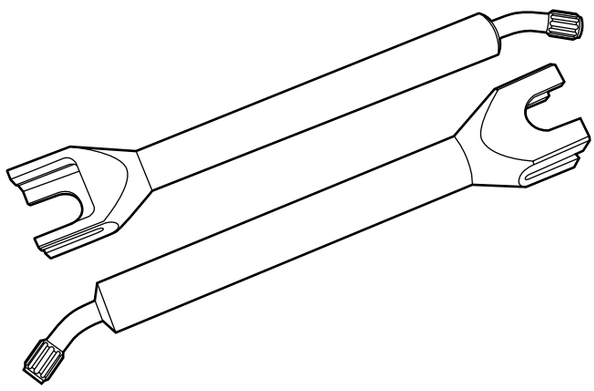


Figure 10

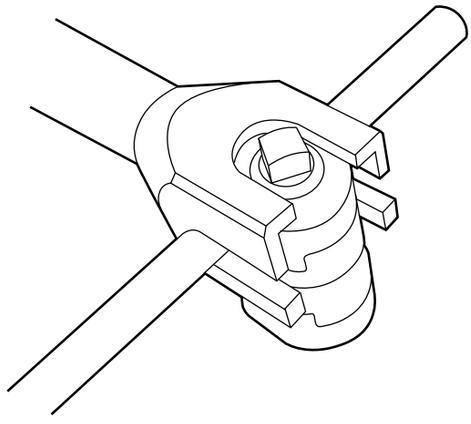


Figure 11

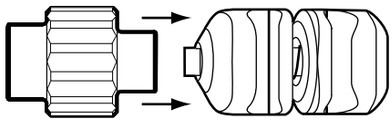
5mm Wrench

Hoffmann®II Compact™ uses the 5mm Spanner Wrench and 5mm Wrench/3–4mm Pin Driver (Figure 9).

Stabilisation/Reduction Wrench

This wrench is used to hold the Rod-to-Rod and Pin-to-Rod Couplings during tightening, and is also used in conjunction with the Multi-Pin Clamps as a fracture reduction tool (Figure 10) and (Figure 20).

Using the open end of the Wrench, slide it over the Clamp and hold it steady while tightening the Clamp with the 5mm Spanner or Wrench/Pin Driver (Figure 11).



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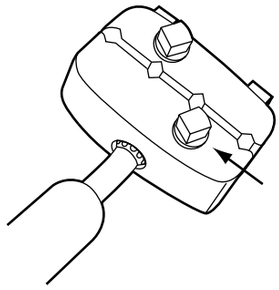

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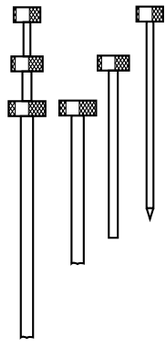

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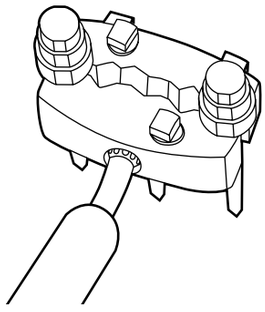

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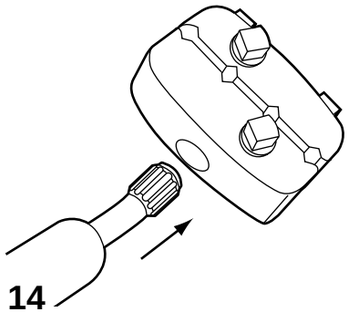


Figure 14

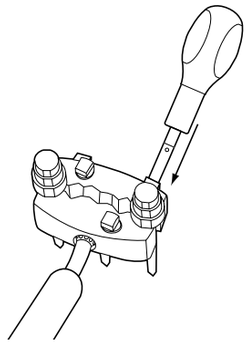


Figure 17

Thumbwheels

The Thumbwheels fit the 5mm Square Head Screw to facilitate finger tightening of the clamps (Figure 12).

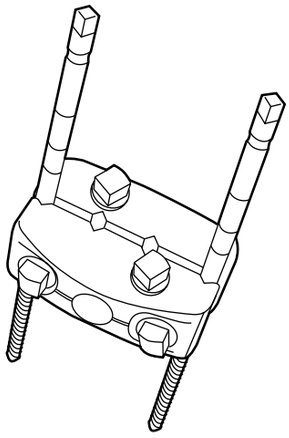
Drill Guides

The Original Hoffmann® 3mm and 4mm Drill Guides are compatible with Hoffmann®II Compact™ (Figure 13).

Drill Guide for Multi-Pin Clamp

When placing Pins parallel for the Multi-Pin Clamp, insert a Stabilization/Reduction Wrench into the post hole opposite the Half Pin Tightening Screw (Figure 14). Secure the Clamp to the Wrench by tightening the Post Hole Screw (Figure 15). Load up to two Original Hoffmann Predrill Assemblies into the Multi-Pin Clamp (Figure 16). Tighten the Multi-Pin Clamp to the Sleeves with both Half Pin Tightening Screws (Figure 17). Drill/Pin insertion can now be completed.

NOTE: Do not mix pin diameters within the same clamp. Half pins used within the same clamp must have the same diameter.



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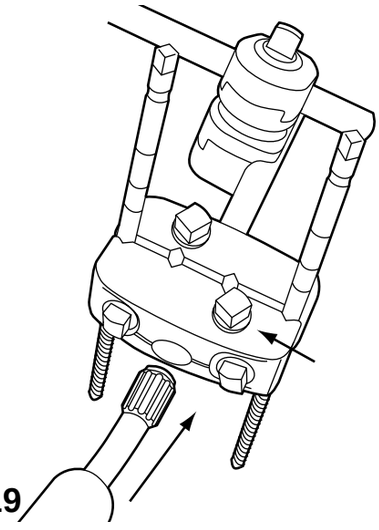

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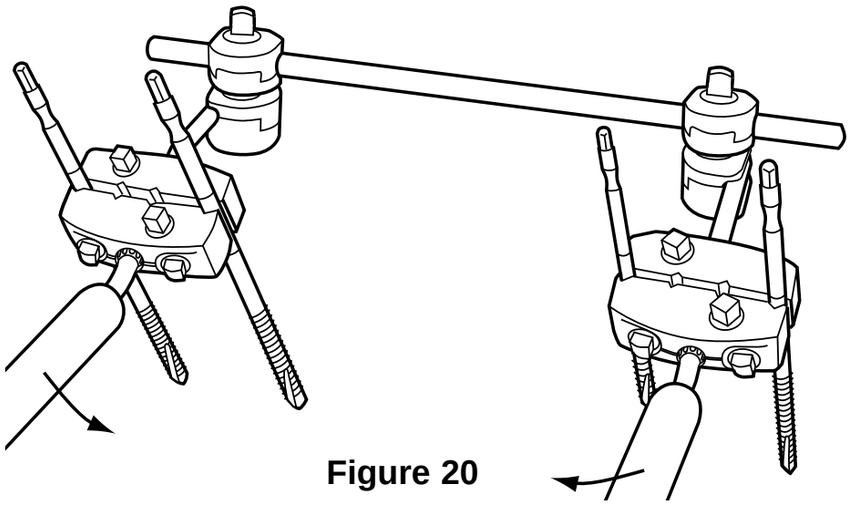
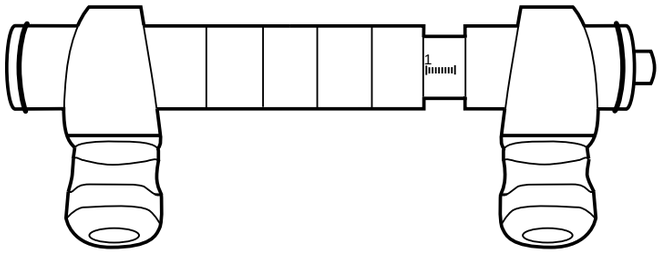


Figure 20

To use as a reduction tool, Apex® Half Pins and the Multi-Pin Clamps are put in place (Figure 18).
Build the frame, but leave all components loose.
Insert the Stabilization/Reduction Wrench (Figure 19) in the post hole and reduce the fracture, tighten all components (Figure 20). Remove Wrenches and assemble frame.
Finally, tighten all the components.



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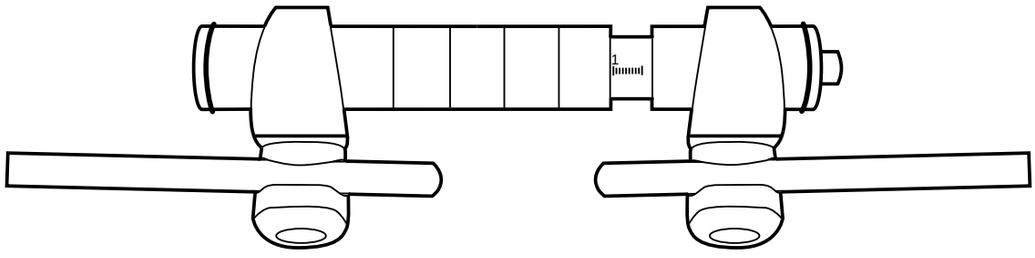


Figure 22

Compression/ Distraction Tube

The C/D Tube may be incorporated into the frame to provide fine adjustments in the fracture reduction (Figure 21). The C/D Tube may be distracted to a maximum of 4.5cm. One complete revolution of the 5mm Square Head Screw equals one millimetre displacement. Turn anti-clockwise for Distraction and clockwise for Compression.

Rod-to-Tube Clamps

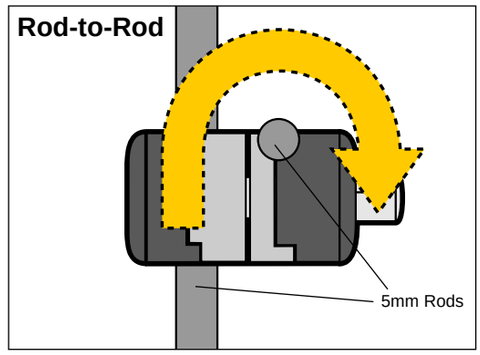
These Clamps are used to connect the C/D Tube to 5mm Connecting Rods or Multi-Pin Clamp Posts.
The Rod-to-Tube Clamps employ the same no-slip, snap-fit mechanism as the Pin-to-Rod and Rod-to-Rod Couplings (Figure 22).

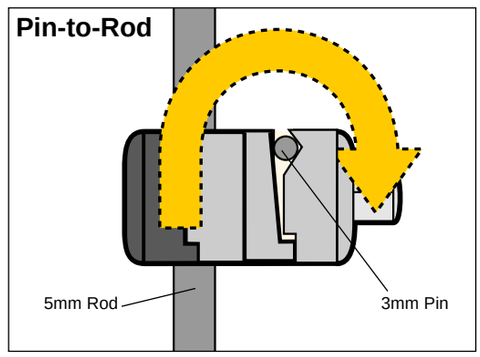
Mechanical Performance of the Couplings†

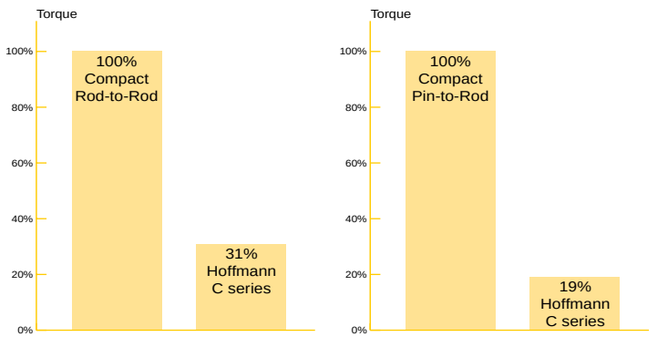
One of the critical aspects of external fixation is the rotation of components around the connecting rods. This determines the stability of the frame.

In a modern external fixation frame, the possibility of using various degrees of elasticity exists, however it is important to maintain stability to avoid complications and a loss of fracture reduction.

The Hoffmann®II Rod-to-Rod and Pin-to-Rod couplings provide superior resistance to rotation through an incorporated anti-rotational design.

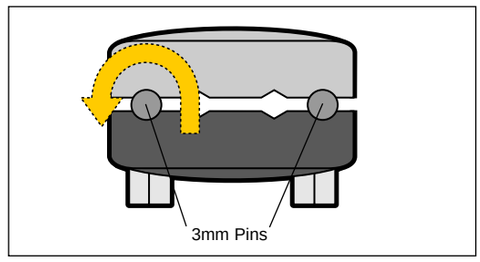


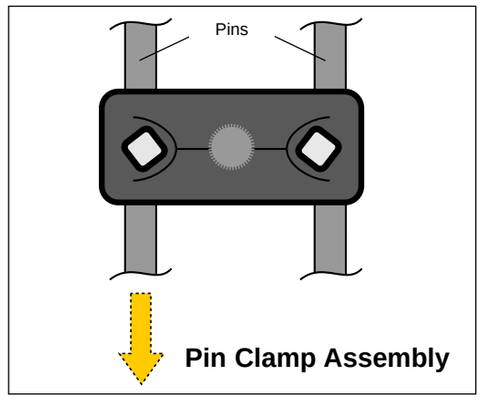


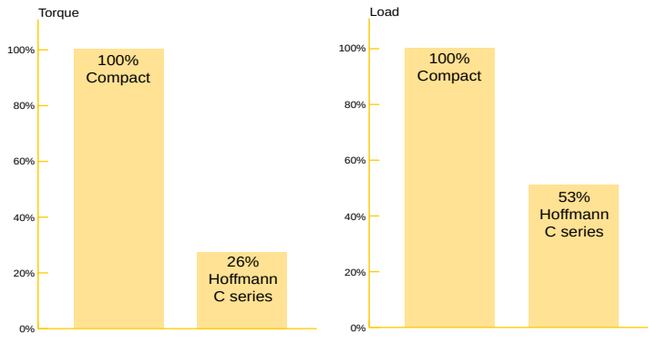


Mechanical Performance of the Pin Clamp Assembly†

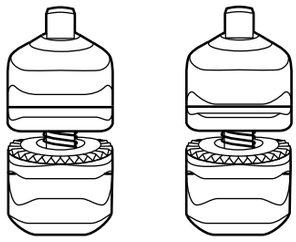
Another important aspect in the stability of the external fixation frame is the interface between the pins and the clamping elements.
The new Hoffmann®II Compact™ pin clamp design provides superior resistance to pin rotation and pin pull-out compared to the original Hoffmann C-Series.







†Data on file at Stryker® Howmedica USA.
Tests performed by Loren Latta, Director of Research, University of Miami's Orthopaedic Biomechanics Lab, Mt Sinai Medical Center of Greater Miami.



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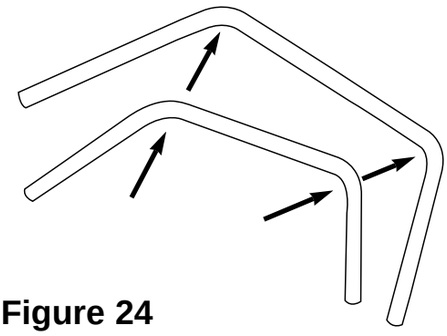


Figure 24

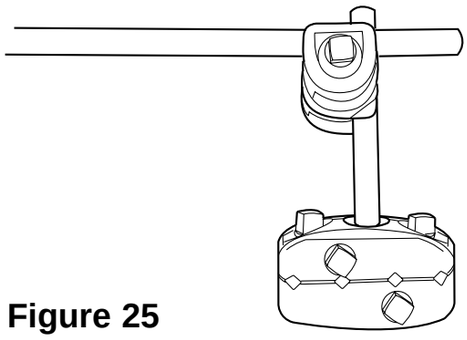


Figure 25

Hoffmann®II Compact™ Frame

Recommendations

1. Fully open the Rod-to-Rod and Pin-to-Rod Couplings prior to attachment of the component to the frame (Figure 23).
2. Do *not* place Rod-to-Rod or Pin-to-Rod Couplings on the curved portions of the Curved Rod or 30° Angled Post (Figure 24).
3. All 5mm Square Head Screws should be positioned facing away from the patient and other frame components to make tightening more accessible (Figure 25).
4. When possible, place the Rod-to-Rod and Pin-to-Pin Clamps on the *inside* of the frame and *facing* the fracture to increase stability (Figure 25).
5. Connecting Rods should always be kept as short as possible in order to maximize frame stability.
6. Do *not* bend Hoffmann®II Compact™ Carbon Connecting Rods.
7. Always use Stryker® Howmedica Apex® External Fixation Pins with the Hoffmann II Compact External Fixation System.
8. As with all external fixation frames, the frame must be adapted to the weight and fracture patterns of the patient.
9. The Rod-to-Rod and Pin-to-Rod Couplings must be opened completely prior to cleaning and sterilization.
10. The posts must be removed from the Multi-Pin Clamp Assembly prior to cleaning and sterilization.
11. Precise reduction is not required prior to Pin insertion. The frame can be assembled and the final reduction performed with the frame *in situ* before all components are locked in place.
12. Hoffmann II Compact is *only* compatible with Stryker® Howmedica's Original Hoffmann®II, yellow Monotube® Triax™, Hoffmann C Series and Mini Hoffmann.
13. Always ensure that all components have been tightened.

Distal Radius Fracture Technique

OPERATIVE TECHNIQUE

Introduction

Fractures of the distal radius are common in adults and remain a challenge for the orthopedic surgeon. The advent of external fixation as a technique for distal radius fracture management has significantly improved treatment results and external fixation is now considered as a routine tool in the treatment of complex wrist trauma.

Bridging the wrist joint is the most common method. The technique consists in placing 2 pins in the second metacarpal and 2 in the proximal radius. Generally ligamentotaxis is applied to maintain the reduced position of the distal fragments by continuous traction on the fracture fragments through the ligaments.

This method generally achieves good anatomical results (Figure 26). Another option in extra-articular fractures and non displaced intra-articular fractures of the distal radius is the use of a non-bridging frame using a peri-articular clamp.

The non-bridging concept appeared in the early years of the 20th century with a French surgeon called L. Ombrédane (1929, Paris). Ombrédane's fixator unlike other later external fixation concepts did not bridge the joint and allowed fixation of the distal radius fragment in a peri-articular mode.

The Hoffmann®II Compact™ peri-articular pin clamp allows fixation of the distal radius in a non-bridging mode whenever possible (Figure 27).

Further advantages of a non-bridging frame are, reliable restoration and maintenance of volar tilt and carpal alignment as well as free movement of the wrist during the period of fixation.

Bridging

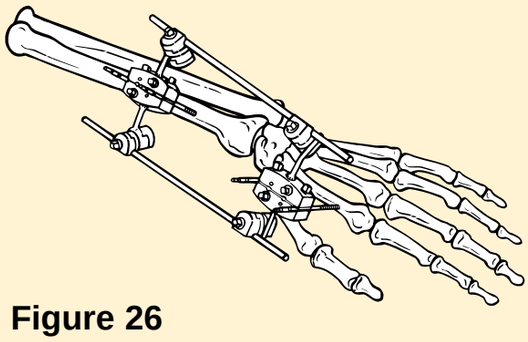


Figure 26

Non-Bridging

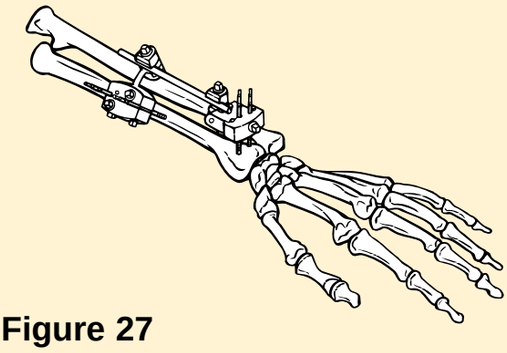


Figure 27

Indications

In the upper extremity, specific indications for the Hoffmann®II Compact™ include fractures (whether AO Classification type A,B, or C fractures or Frykmann classification type I through VIII fractures) that are unstable secondary to intra-articular involvement, extra-articular involvement with some degree of radial sensory nerve dysfunction and loss of grip strength, unacceptable tilt, or shortening, eg the 'Colles' fracture with dorsal angulation and shortening. Other upper extremity indications for the Hoffmann II Compact include intercarpal fracture-dislocations (requiring intra- and/or postoperative stabilization), unstable forearm fractures associated with massive soft-tissue loss (eg, secondary to gunshot wounds or arterial injuries) or unstable elbow dislocations, and multiple extremity fractures. The latter, including humerus, elbow, forearm, and hand fractures, may be managed with external fixation on an emergent basis while attention is directed to the other, more urgent injuries, such as vascular trauma.

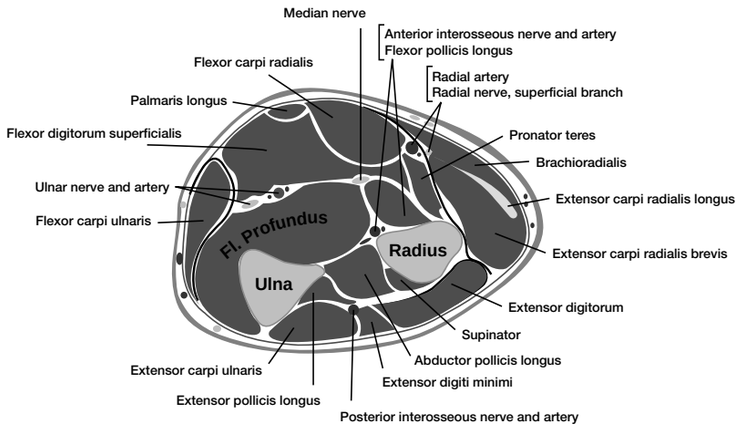
The longevity of the treatment is predicated on the indication. Peri-Articular fractures of the distal radius generally require 6 – 8 weeks of external fixation, whereas diaphsyeal fractures of the distal radius (humerus) may require 2 – 3 months of immobilization in an external fixator.

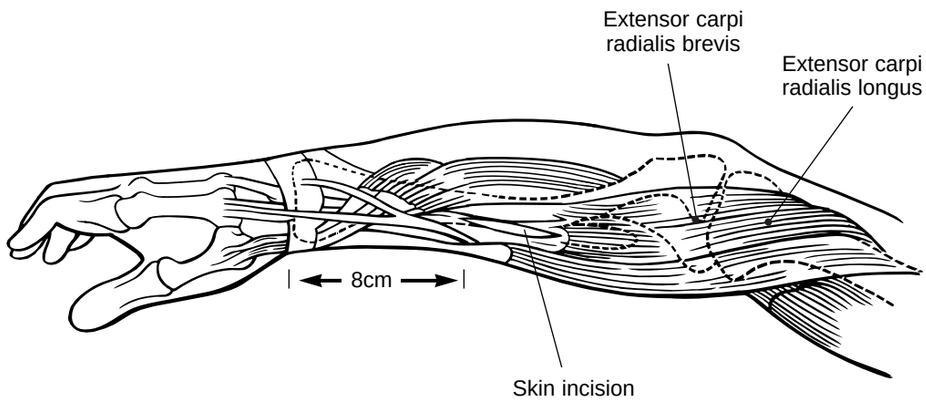
Other indications for the Hoffmann II Compact exist in the lower extremity, particularly in the foot where there is a tendency for fracture shortening, e.g. unstable metatarsal fractures not amenable to open reduction and internal fixation. Massive bone loss from crush or gunshot injuries can be effectively managed by the Hoffmann II Compact, which provides the necessary distraction and access for reconstructive procedures. In addition, for soft tissue injuries about the ankle and foot that are not associated with fractures, the Hoffmann II Compact can maintain the foot in a dorsiflexed position and allow suspension to prevent or decrease swelling. The Hoffmann®II standard fixator for tibia fractures may be used in combination with the Hoffmann II Compact to incorporate the foot and prevent soft-tissue motion about the fracture site.

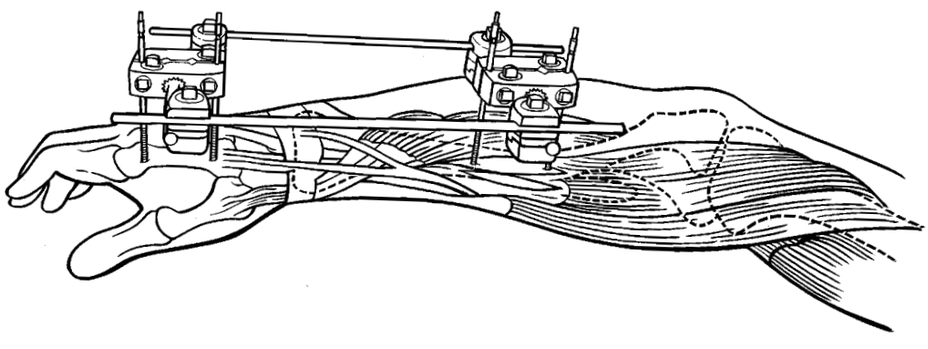
In summary, the Hoffmann II Compact has a place in the management of fractures and soft tissue injuries whenever wound access is necessary, inherent instability prevails, or rapidity of application and urgent stabilization is a factor.

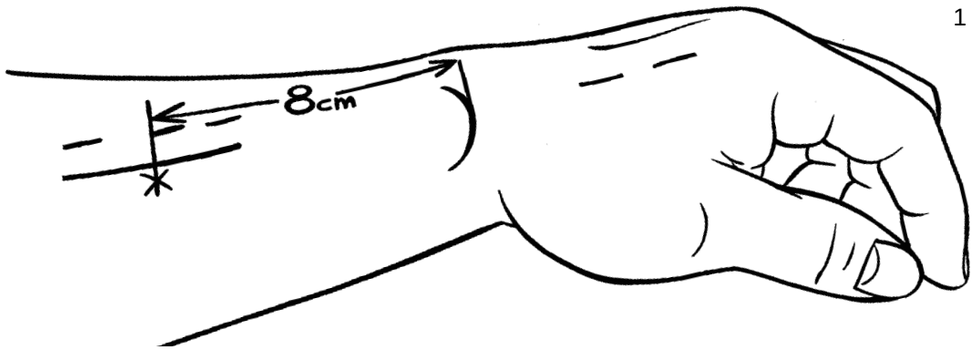
Joint Bridging Technique
TECHNICAL GUIDE: THE HOFFMANN®II COMPACT™ SYSTEM

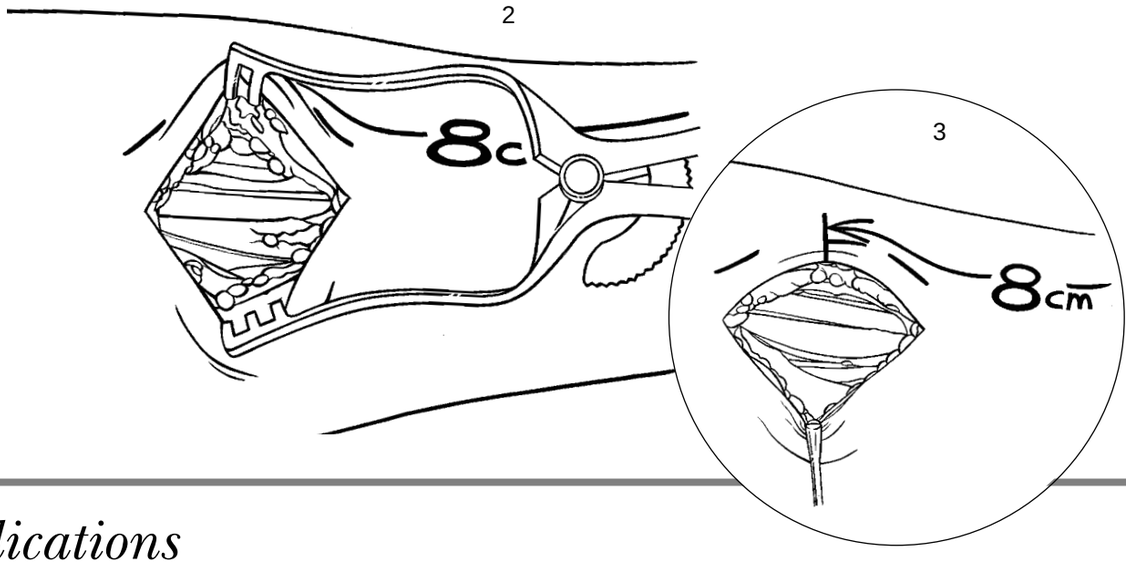
W. Andrew Eglseder, Jr, MD
From the Section of Orthopedics, Program in Trauma,
The R. Adams Cowley Shock Trauma Center,
The University of Maryland Medical System,
Baltimore, Maryland









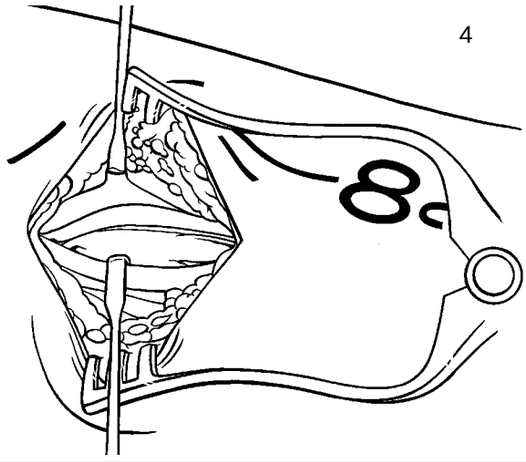


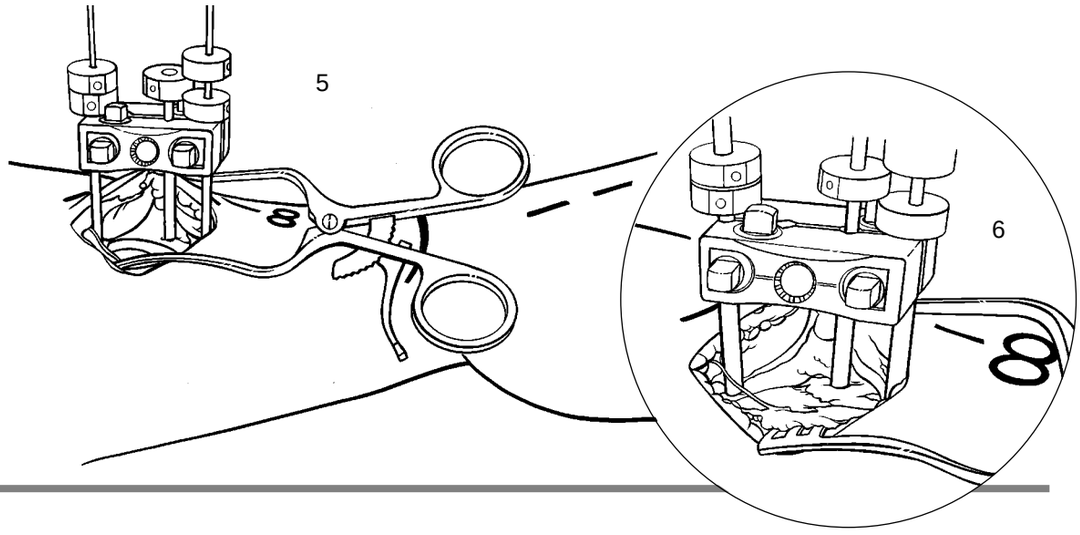
Indications

Treatment of distal radius fractures begins with the evaluation of the initial radiographs. Injury radiographs will demonstrate the degree of dorsal tilt and angulation, giving an indication of the degree of stability and potential success of closed treatment. The greater the degree of dorsal tilt, comminution, and displacement, the greater will be the indication for operative intervention. Preliminary closed reduction films, preferably in traction, will allow evaluation of the articular alignment, again indicating the degree of step-off and the need (if any) for intra-articular realignment. Once reducibility is confirmed, the level of care and need for surgical intervention will be determined. The external fixator affords an attractive treatment option for those patients with the potential for recurring deformity and displacement. Through reduction obtained by ligamentotaxis, the external fixator (worn for 6 to 8 weeks) allows optimization of hand and arm function, without requiring casting.

The external fixator is applied under sterile conditions using a tourniquet. Pins are placed via a limited open approach in the forearm (Figure 1): demonstrates the markings 8cm proximal to the radial styloid and a 4-5cm incision marking along the lateral or radial aspect of the forearm, which is centered over where the dorsal sensory nerve which exits between the extensor carpi radialis longus and brachoradialis. Three slightly dorsal incisions are made for half pins as well as two incisions over the index metacarpal.

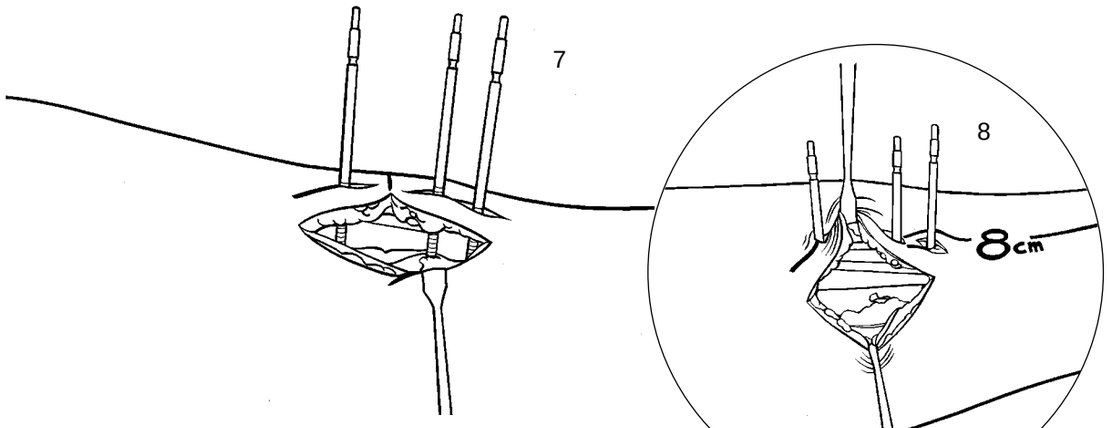
A 5cm incision is made along the dorsal radial aspect of the forearm (Figure 2). The lateral antebrachial cutaneous nerve is identified and usually retracted ulnarly; the cephalic vein is identified and retracted anteriorly (Figure 3).

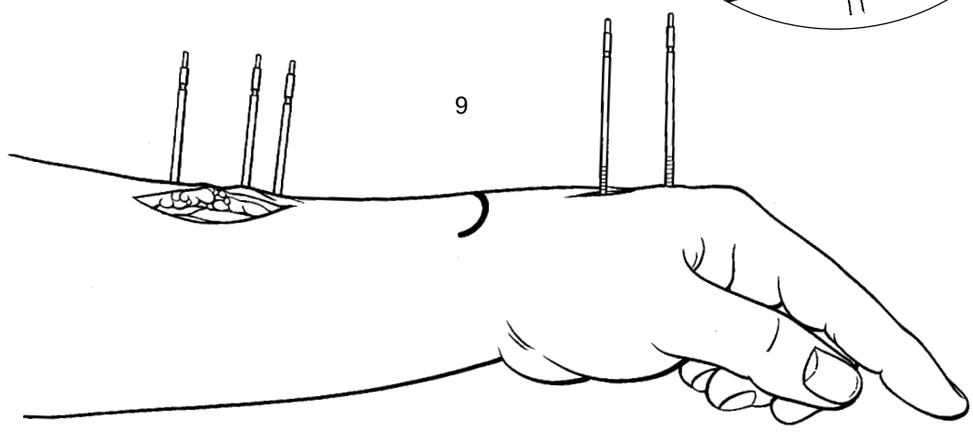




The dorsal sensory nerve is then visualized exiting between the extensor carpi radialis longus and the brachioradialis, 8cm proximal to the styloid (Figure 4). The interval between the extensor carpi radialis longus and extensor carpi radialis brevis is developed, with the most distal aspect in the interval being the abductor pollicis longus (Figure 5).

Three separate dorsal incisions are made approximately 1cm dorsal to the initial incision with the pins placed from distal to proximal in the first, second, and fourth holes (Figure 6). Under direct visualization and through the primary incision, pin holes are predrilled with a 2.2mm drill bit. Three pins are used because, occasionally, one pin will require removal and the two remaining pins will afford stability through the remaining life of the fixator.

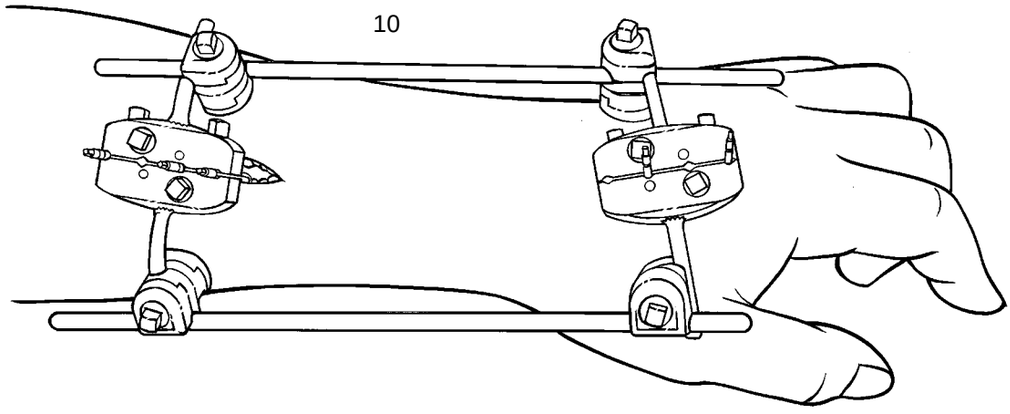




The 3mm half pins are then inserted through the seperate dorsal incisions (Figure 7). Again, the pins are placed between the tendons and under direct visualization (Figure 8), preventing violations of the tendons or the nerves. Because the force of displacement tends to be in dorsal-palmer rather than the radial-ulnar plane, the pins are placed in a greater dorsal-palmer orientation, a more biomechanically advantageous position. Such positioning of the external fixator, i.e. away from the radial aspect of the arm, gives the patient fewer difficulties in the activities of daily living, such as bringing hand to the face.

Under direct visualization, the index metacarpal pins are placed in the first and third hole positions via separate incisions, at about 30° off perpendicular. The pin depth (i.e. pin penetration of the second cortex) is confirmed using an image intensifier (Figure 9).

10



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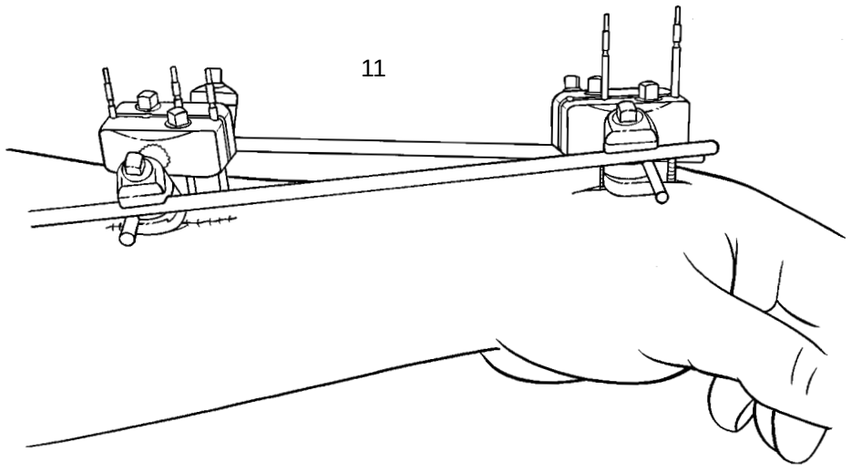

Once the pins are placed, the tourniquet is deflated and the forearm incision is closed. The pin clamps are applied and the more dorsal rod is provisionally placed. Closed reduction is carried out and the clamps are tightened (Figure 10). Alignment is checked under the image intensifier, and, if it is found to be acceptable, the second rod is placed. The reduction manoeuver found to be most effective is the Gupta method, which involves flexion at the fracture site and the proximal carpal row and extension at the midcarpal row (Figure 11). This allows for locking the fragments in place as well as putting the hand in a more functional position. If additional stability is required, K-wires may be added through the radial styloid before placement of the second more radial rod.

Range of motion is begun on the day of surgery or the following day. Pin care – three times a day with a mixture of hydrogen peroxide and normal saline - begins the day after surgery. Range of motion is encouraged, with particular attention to supination and shoulder range of motion. Follow-up radiographs will dictate the timing for fixator removal (average approximately 7 weeks).

Distal Radius Fractures Non-Joint-Bridging Technique
TECHNICAL GUIDE: THE HOFFMANN®II COMPACT™ SYSTEM

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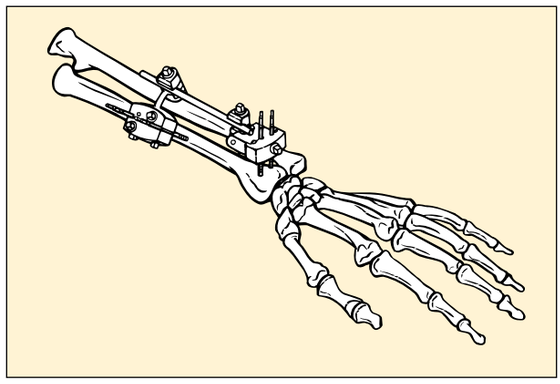


Indications and use of the peri-articular clamp

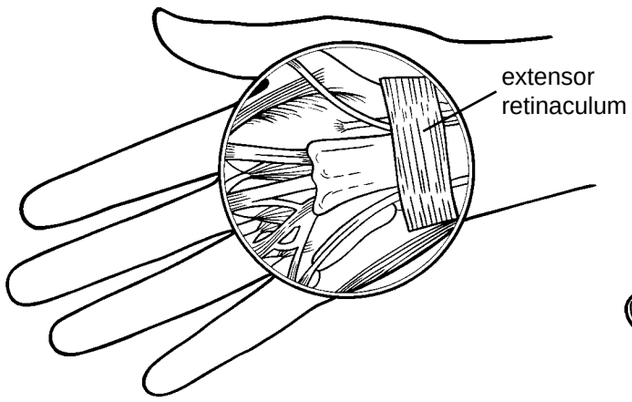
- Unstable extra-articular fractures of the distal radius
- Open and comminutive extra-articular fracture
- Unstable distal radial fractures with undisplaced single articular extension
- Distal radial osteotomies

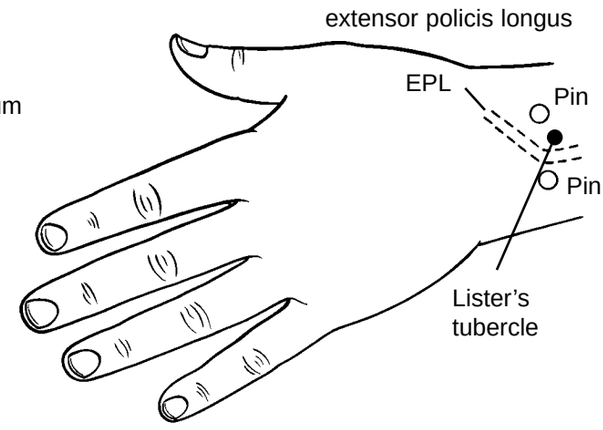
This technique can only be used where there is sufficient space in the distal part of the fracture to insert the pins of the frame. This usually requires 1cm of volar cortex and an intact or reconstructed joint surface [1].

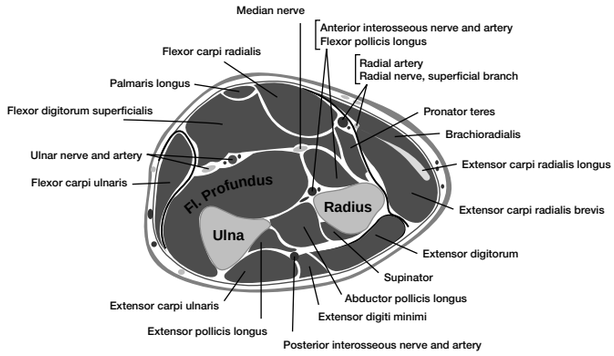
1. Management of open fractures - C. Court-Brown, M. McQueen, A. A. Quaba - Martin Dunitz Edition

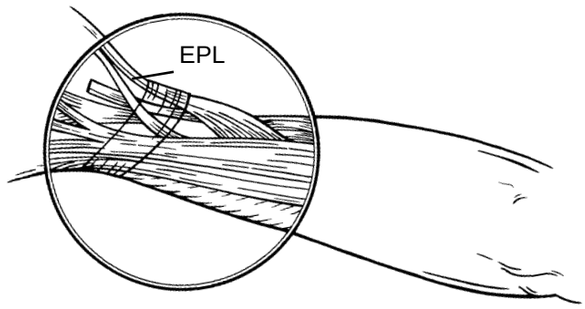
A non-bridging frame requires the following components

2	Peri-Articular Pin Clamps (or 1 Peri-Articular Pin Clamp for the Distal part of the Radius and 1 Standard Multi Pin Clamp with one post for the diaphyscal part of the Radius)
2	Rod-to-Rod Couplings
1	5mm Connecting Rod
4	3mm Apex® Pins









The surgical procedure

The patient is in a supine position on the table with a tourniquet control. An image intensifier is brought to the table in order to control A-P and lateral views and achieve reduction and pin placement.

The first step is the insertion of the distal pins. Particular care should be taken with pin placement to avoid damage to soft tissues such as tendons or nerves.

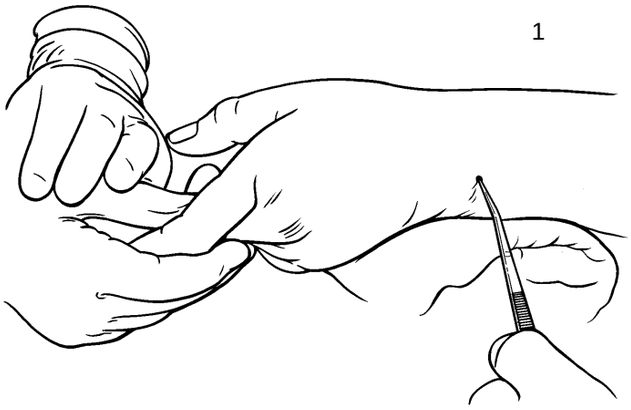
Insertion of the distal pins

A lateral X-Ray is taken to identify the placing of the drill for its insertion. A point on the skin is marked by an instrument which corresponds with the chosen point of drill entry into the distal fragment (Figure 1).

A short transverse skin crease incision is made down to the extensor retinaculum at the level of the marked point, centered on Lister's tubercle (Figure 2). The extensor pollicis longus tendon (EPL) is identified and dissection is continued with two short longitudinal incisions on either side of EPL to bone (Figure 3).

A 2.2mm drill bit is then placed onto bone through the incision on the ulnar side of EPL and the correct starting position confirmed with an X-Ray (Figure 4).

1



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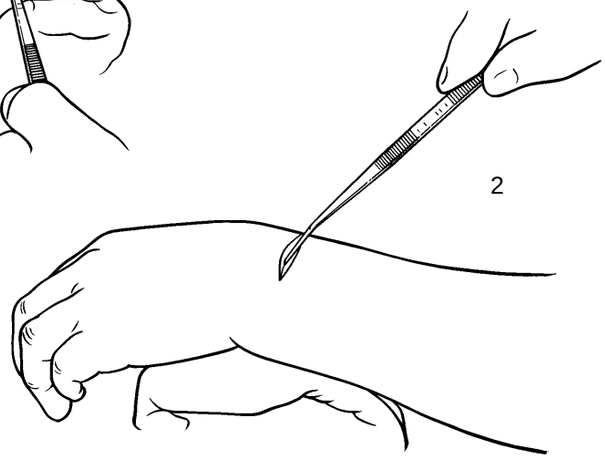

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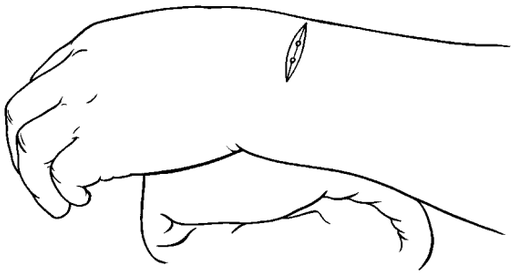

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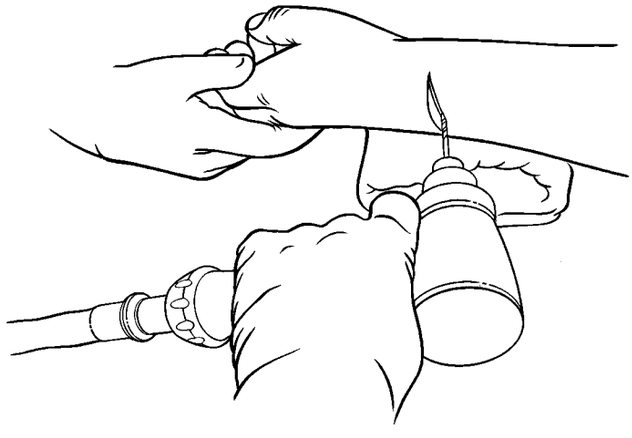
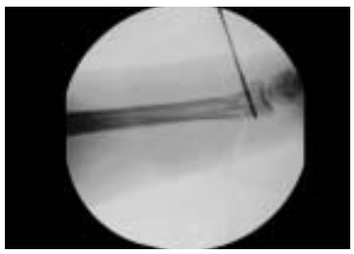


IT IS IMPORTANT THAT THE PINS ARE INSERTED PARALLEL TO THE JOINT SURFACE IN THE LATERAL VIEW.

The drill angle is checked to ensure that the drill will be parallel to the joint surface and the pin track is then pre-drilled ensuring penetration of the volar cortex. Care must be taken to prevent over-penetration of the drill in order to avoid damage of the volar structures.

Drill



Pin

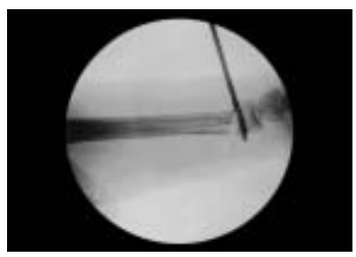
Pin

The drill is then withdrawn and a 3mm Apex® pin inserted by hand, ensuring that it is parallel to the joint surface and that it engages the volar cortex.

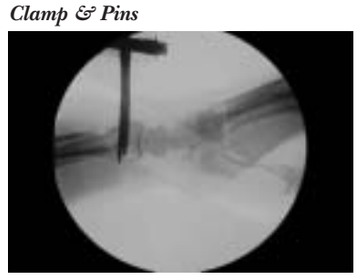
The second Apex® pin is inserted in the same manner **radial to the EPL**. It must be parallel to the first pin in both the AP and lateral planes (Figure 5). The periarticular pin clamp may be inserted over the first pin and used as a guide for the correct spacing between the pins. A drill guide and a pin guide should be used to protect soft tissues.

Drill 2nd

2nd Pin



Clamp & Pins



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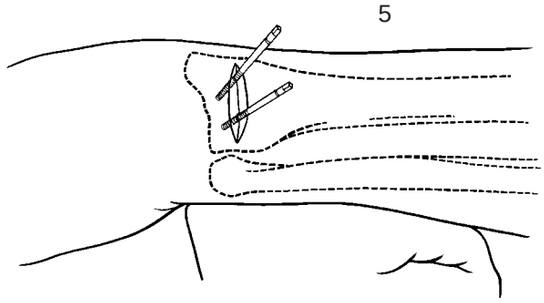

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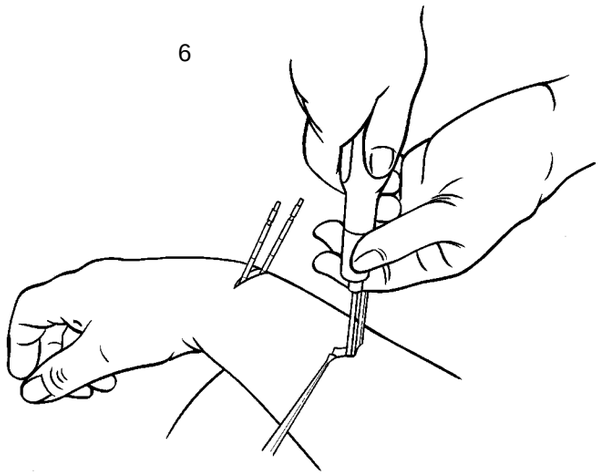
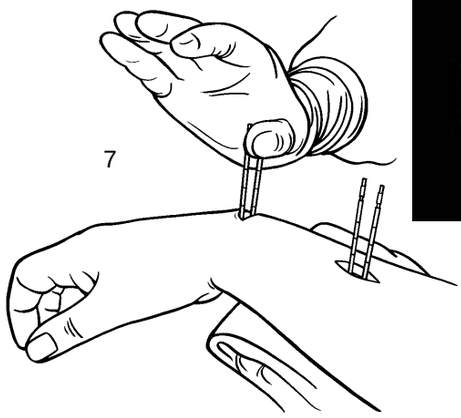
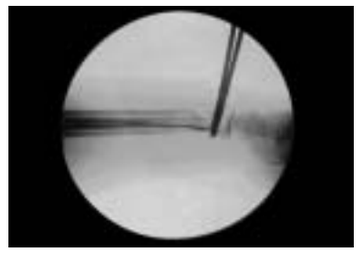
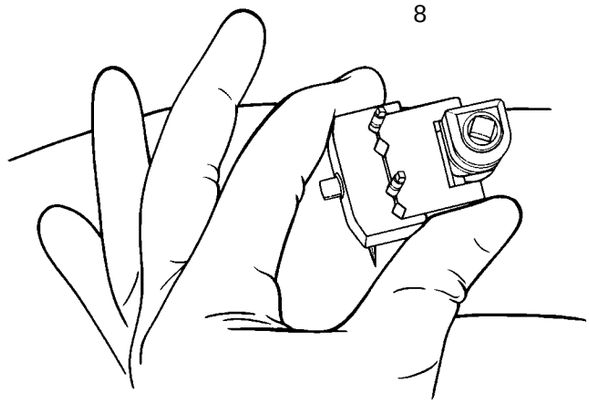


Insertion of the proximal pins

The two proximal pins should be inserted approximately 5cm proximal to the most proximal extent of the fracture. A 3-4cm longitudinal incision is made over the dorsum of the radius and the soft tissues dissected down to bone taking care to protect the sensory branch of the radial nerve. The first proximal 3mm Apex® pin is inserted by hand after predrilling both cortices with a 2.2mm drill (Figure 6). The chosen clamp is then inserted over the first pin to act as a guide for the second pin which is inserted in the same manner. It is recommended that drill guides and pin guides be used to protect the soft tissues.





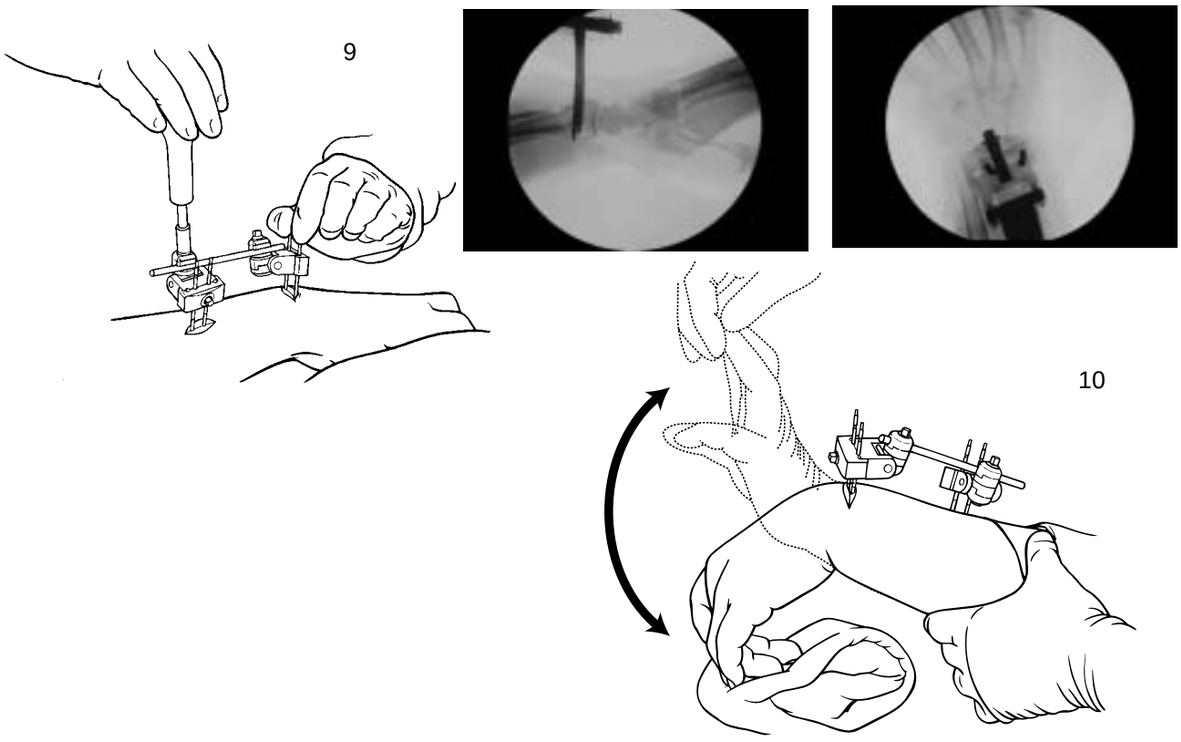


Reduction of the fracture

Prior to tightening the connection between the rod and its coupling, the fracture is reduced. This is achieved by using the distal pins as a “joystick” to correct the dorsal anguation. This should be (Figure 7) performed gradually and gently to avoid compromizing the grip of the Apex® pins in bone. The radial angle may be corrected if necessary by (Figure 8) rotation of the periarticular clamp. The 5mm screws on the rod to rod couplings are then tightened with the wrench thus locking the bar to the clamps (Figure 9). Final AP and lateral X-Rays are taken to confirm a good reduction. Passive extension and flexion of the wrist is performed to ensure no restriction of movement by the frame (Figure 10).

Assembly of the frame

The peri-articular pin clamp and proximal pin clamp are introduced over both distal or proximal pins and tightened using the top locking 5mm diameter screw and the 5mm wrench. The Rod-to-Rod couplings are connected (“clicked”) to the clamps proximally and distally with a spring-loaded snap-fit mechanism. Where a standard multi-pin clamp is used proximally it is necessary to introduce a straight or 30° angled post in the star shaped hole in the clamp in order to connect the rod to rod coupling to the multi-pin clamp. The carbon fibre 5mm connecting rod is then “clicked” onto the Rod-to-Rod coupling proximally and distally.



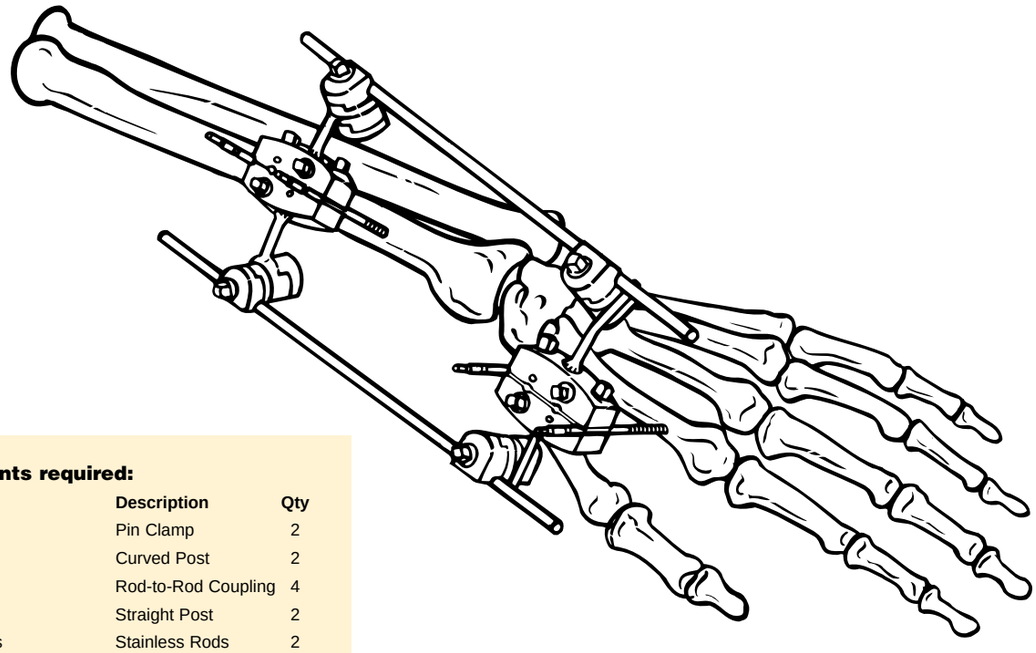
Postoperative management

Regular active finger and wrist motion are recommended from the first post-operative days. Weekly post-operative X-Ray control for the first three weeks is needed to check maintenance of reduction.

Regular pin track cleaning should be performed.

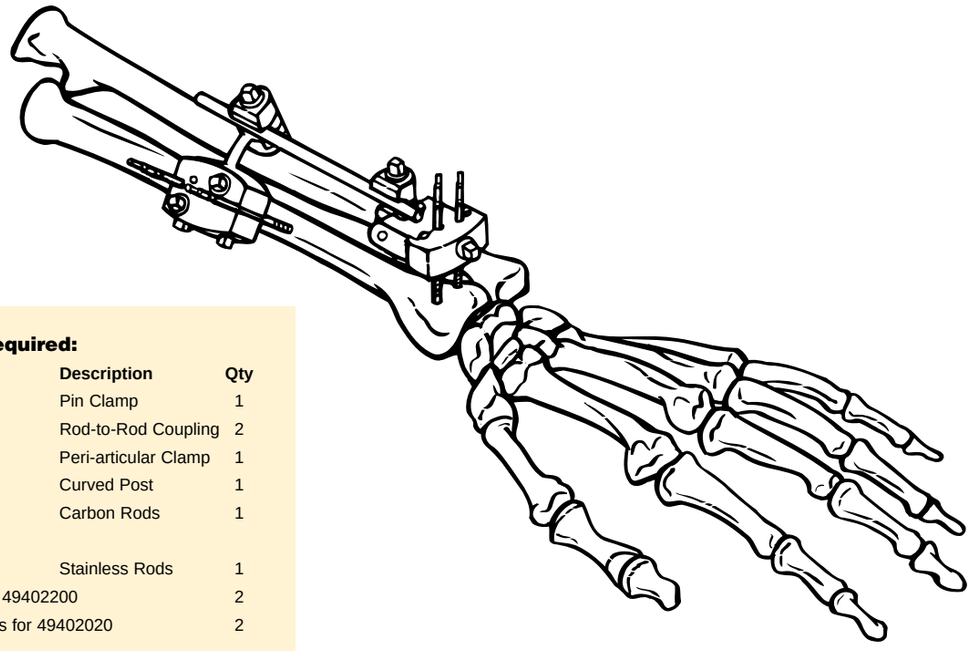
The fixator is removed at the sixth post-operative week, provided fracture healing is confirmed.

Hoffmann®II Compact™ Frame Guide



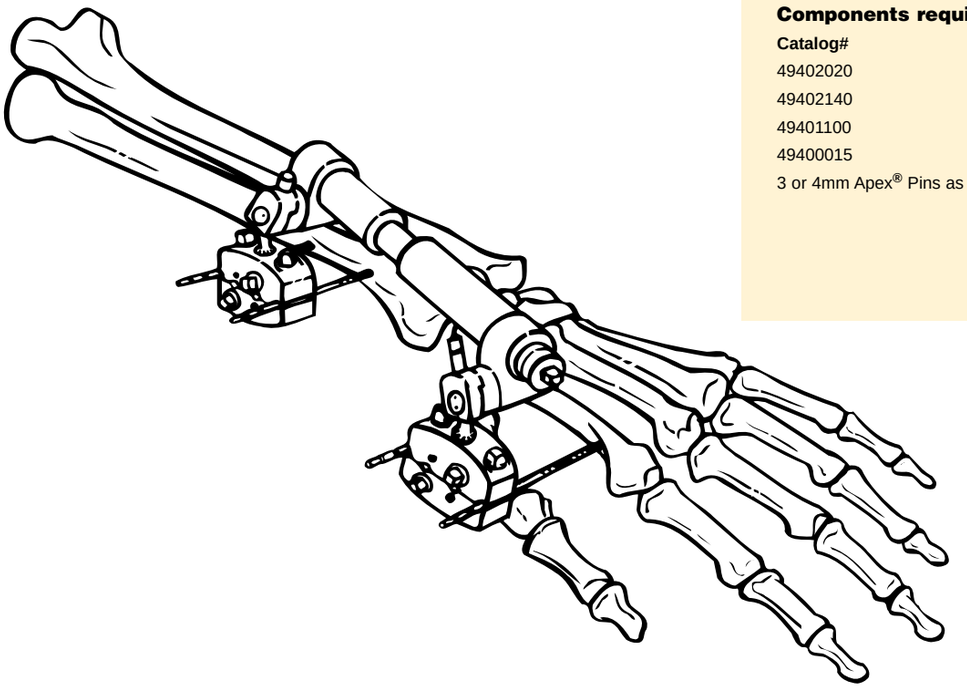
Components required:

Catalog#	Description	Qty
49402020	Pin Clamp	2
49402140	Curved Post	2
49401010	Rod-to-Rod Coupling	4
49402120	Straight Post	2
5049-5 series	Stainless Rods	2
or		
5049-5 series	Carbon Rods	2
3 or 4mm Apex® Pins as indicated		4



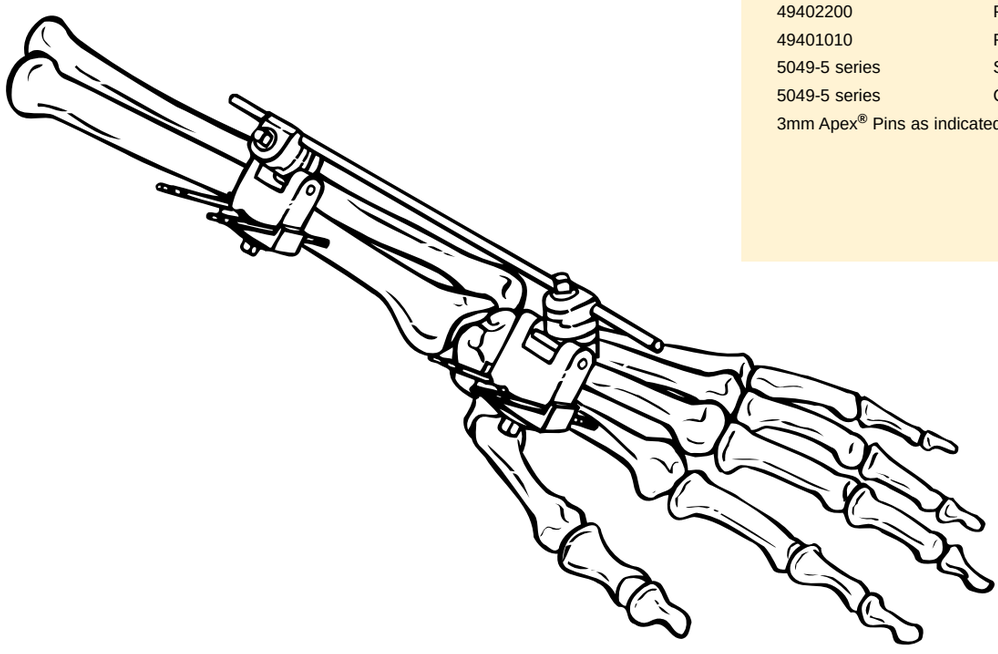
Components required:

Catalog#	Description	Qty
49402020	Pin Clamp	1
49401010	Rod-to-Rod Coupling	2
49402200	Peri-articular Clamp	1
49402140	Curved Post	1
6049-5 series	Carbon Rods	1
or		
5049-5-5 series	Stainless Rods	1
3mm Apex® Pins for 49402200		2
3 or 4mm Apex® Pins for 49402020		2



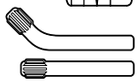
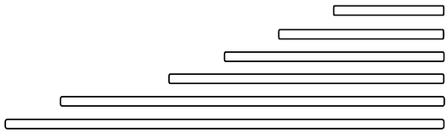
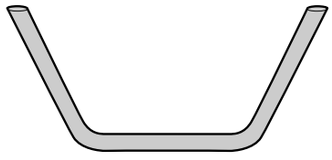
Components required:

Catalog#	Description	Qty
49402020	Pin Clamp	2
49402140	30 Degree Post	2
49401100	Rod-to-Tube Coupling	2
49400015	Comp/Dist Rod	1
3 or 4mm Apex® Pins as Indicated		4

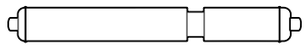


Components required:

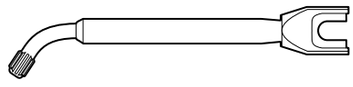
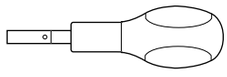
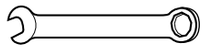
Catalog#	Description	Qty
49402200	Periarticular Clamp	2
49401010	Rod-to-Rod Coupling	2
5049-5 series	Stainless Rod	1
5049-5 series	Carbon Rod	1
3mm Apex® Pins as indicated		4

	Catalogue Number	Description
	4940-2-020	Pin Clamp Assembly with no Post
	4940-2-200	Peri-Articular Clamp
	4940-1-020	Pin-to-Rod Coupling 3-4/5mm
	4940-1-010	Rod-to-Rod Coupling 5/5mm
	4940-1-058	Rod-to-Rod Coupling 5/8mm
	4940-2-140	30° Angled Post, Stainless Steel
	4940-2-120	Straight Post, Stainless Steel
	5049-5-505	Carbon Connecting Rod 5mm x 65mm
	5049-5-510	Carbon Connecting Rod 5mm x 100mm
	5049-5-515	Carbon Connecting Rod 5mm x 150mm
	5049-5-520	Carbon Connecting Rod 5mm x 200mm
	5049-5-525	Carbon Connecting Rod 5mm x 250mm
	5049-5-530	Carbon Connecting Rod 5mm x 300mm
	5049-5-065	Stainless Steel Connecting Rod 5mm x 65mm
	5049-5-100	Stainless Steel Connecting Rod 5mm x 100mm
	5049-5-150	Stainless Steel Connecting Rod 5mm x 150mm
	5049-5-200	Stainless Steel Connecting Rod 5mm x 200mm
	5049-5-250	Stainless Steel Connecting Rod 5mm x 250mm
	5049-5-300	Stainless Steel Connecting Rod 5mm x 300mm
	5049-7-018	Curved Rod Semi Circular 111mm Small
	5049-7-020	Curved Rod Semi Circular 146mm Medium

Components

Catalogue Number	Description	
4940-0-015	Compression/Distraction Rod for Hoffmann®II Compact™	
4940-1-100	Compression/Distraction Rod-to-Tube Coupling	

Instruments

4920-9-020	Removable Thumbwheel	
4940-9-010	Stabilization/Reduction Wrench	
4940-9-030	5mm Wrench/3–4mm Pin Driver	
5150-9-005	5mm Spanner Wrench	
4940-9-920	Sterilization Case	

Hoffmann®II Compact™ External Fixation System Technique Guide*

Hoffmann®II Compact™ system for treatment of distal radius fractures joint bridging technique

W. Andrew Egelseder, Jr, MD
From the Section of Orthopedics, Program in Trauma,
The R. Adams Cowley Shock Trauma Center,
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Hoffmann II Compact System for the treatment of distal radius fractures non-joint bridging technique

Margaret McQueen, MD,FRCS,Ed (Orth)
Consultant Orthopedic Surgeon
Edinburgh Orthopedic Trauma Unit
Royal Infirmary of Edinburgh
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Notes:

Notes:

Notes:

Hoffmann®II Swiss Patent Application: 01-709/94-3. Other Patents Pending. * Patents: EU 385,929; 374,093;
Canada 1,193,506; U.S. 5,160,335 and 5,207,676. ** Swiss Patent Application: 02-709/94-3. Other Patents Pending.
*** Patents: EU 230,856; Swiss CH 671,150; U.S. 4,978,350.
†Data on file at Stryker® Howmedica Osteonics USA.

Hoffmann II Compact™

Monotube® TRIAX™ *

EXTERNAL FIXATION SYSTEM

Unilateral frame system designed to handle a wide variety of fractures and limb-lengthening applications. This simple, colour-coded system offers both dynamic and carbon tubes for individualised performance and economy. True simplicity, versatility, and economy.

Hoffmann® II **

EXTERNAL FIXATION SYSTEM

Modular frames which allow for true independent pin placement. Completely compatible with Original Hoffmann® components, this new system improves flexibility and ease-of-use, while enhancing frame economics through minimal componentry. It's external fixation with a "snap."

Hoffmann® II Compact™

EXTERNAL FIXATION SYSTEM

Designed to complement the anatomy of the distal radius by allowing independent movement of its clamps in multiple planes. Standard unilateral or bi-lateral bridging frames for intra-articular fractures and peri-articular non-bridging frames for extra-articular fractures. Fully compatible with the Hoffmann® II System, based on a spring-loaded snap-fit mechanism that improves flexibility and ease-of-use.

Dynamic Joint Distractor II

The DJD II is a Dynamic Elbow Joint Distractor. Fully compatible with the Hoffmann® II Compact™ System, it is designed to treat post-traumatic elbow stiffness as well as acute elbow trauma cases.

TenXor™

External Fixation System

The Tenxor™ System is a hybrid system providing advanced technology and ease of application. Fully compatible with Hoffmann® II and Monotube® Triax™, based on a spring-loaded, snap-fit mechanism that improves flexibility and ease of use.

Apex® *** PIN FIXATION

Every Fixator incorporates the high quality pin-to-bone interface provided by Apex® Pins. The Apex® Pin cuts more sharply with less torque, friction and heat upon insertion improving purchase while minimising the risk of pin tract problems.† Available in self-drilling and blunt tip designs, only from Stryker® Howmedica Osteonics!

stryker® Trauma

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