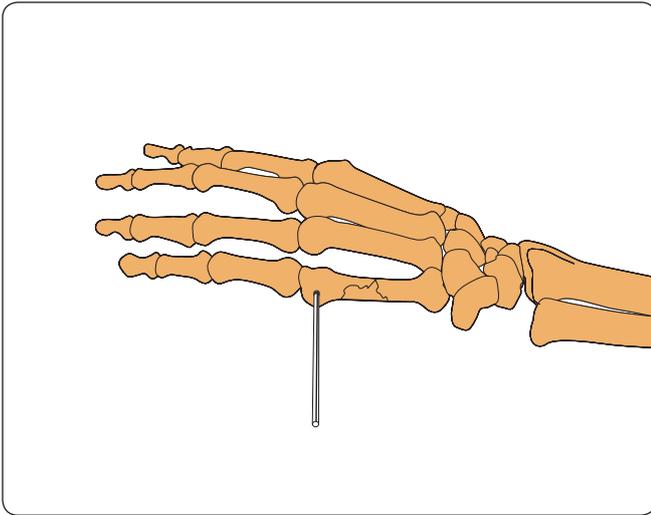


TREATMENT OF FRACTURES AND DEFORMITIES IN SMALL BONES

THE PENNIG MINIFIXATOR

BY PROF. DR. D. PENNIG



Please kindly refer to the product IFU PQMIN, to the Orthofix implantable devices and related instrument IFU PQSCR, and to the reusable medical devices IFU PQRMD that contain instructions for use of the product.

METACARPAL FRACTURES

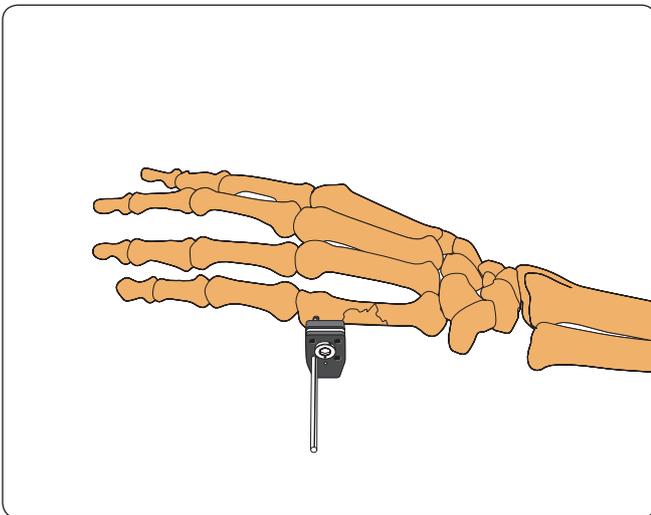
Fifth metacarpal diaphyseal fractures

Insert threaded wire (2mm; 100/15) closest to MCP joint first. Drill it into bone in the frontal plane, to penetrate far cortex by 1mm.

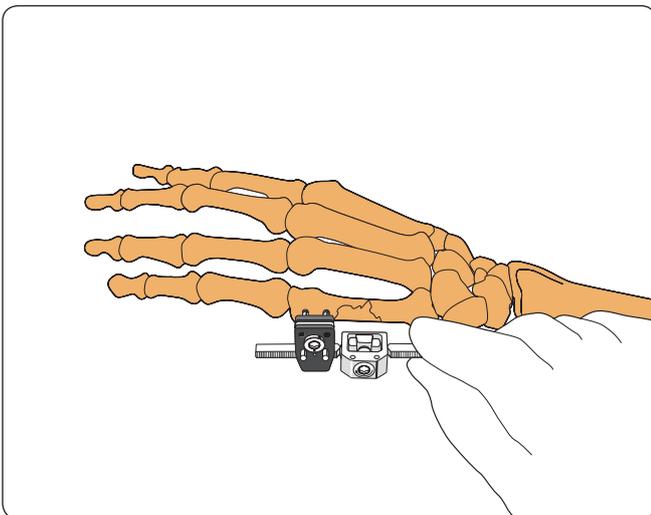


PRECAUTION: During and after insertion, ensure correct positioning of the implants under image intensification.

These wires can be backed out; they are not conical.



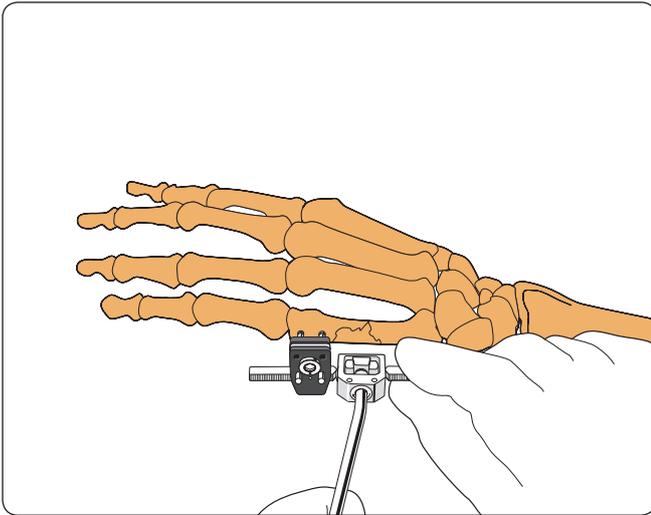
Place a standard clamp over the wire with dot on cam in line with dot on clamp. Head of cam must face away from bone. Position clamp 5-10mm from skin and trim this wire (and all subsequent wires) so that 5mm projects from clamp.



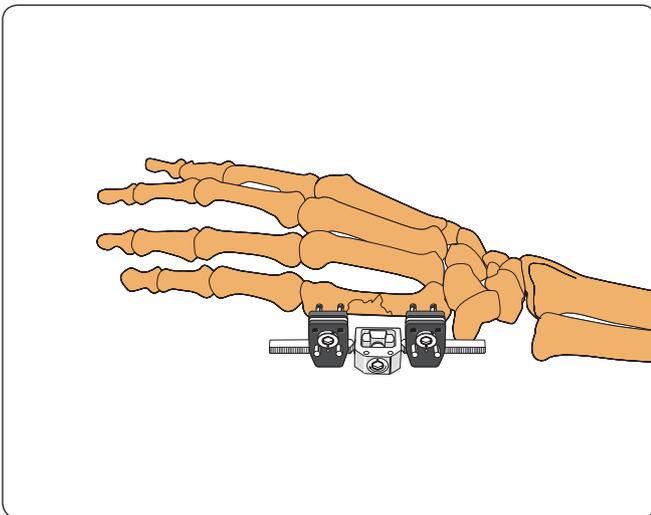
Insert second wire either axially (emerges from clamp parallel with first) or transversely (converges with first wire) depending on space available. Choose appropriate length Minifixator body and attach one threaded bar to the clamp.



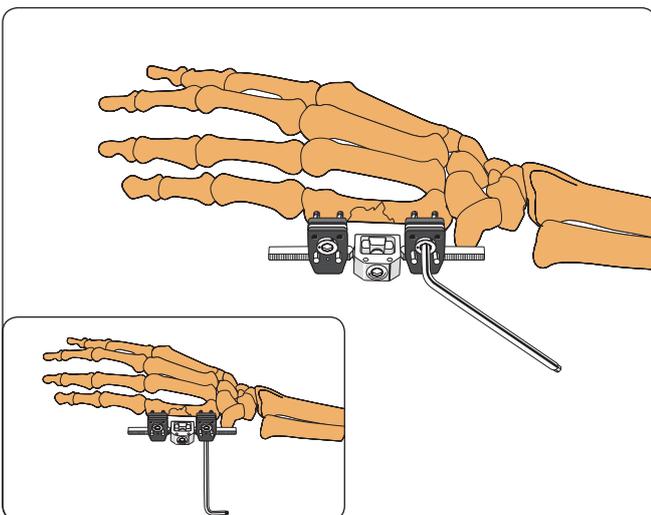
PRECAUTION: During and after insertion, ensure correct positioning of the implants under image intensification.



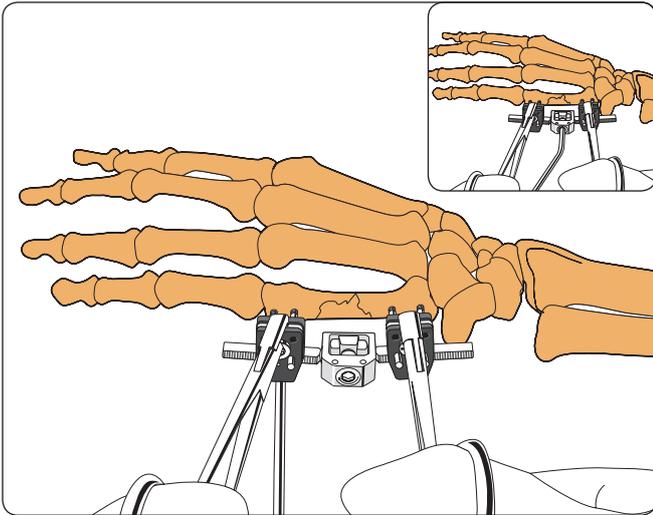
Tighten double ball-joint cam slightly and align fixator with long axis of bone.



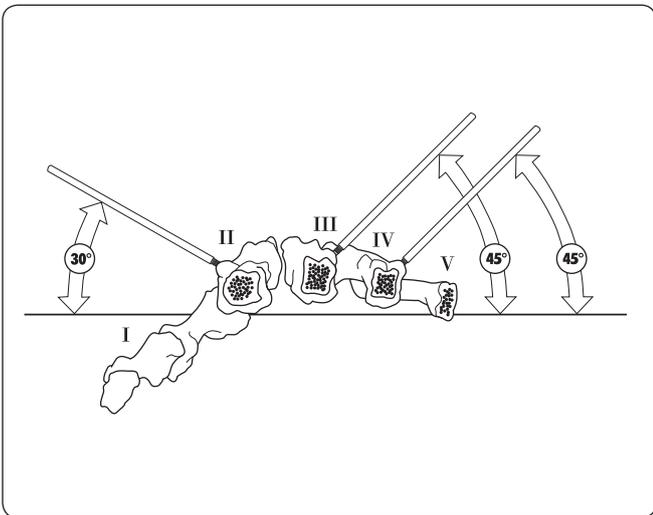
Attach second clamp and insert second set of wires, ensuring clamps have room to move on their bars to allow for final reduction.



Lock clamps to wires by turning cams. Lock one clamp to bar with its locking screw.



Reduce fracture using reduction forceps that distance surgeon's hands from radiation source. While maintaining reduction lock second clamp to bar and fully tighten double ball-joint. Trim wires to within 2mm of clamps. Dressing should fully cover Minifixator. Encourage movement of fingers and adjacent joints.



Special considerations in other metacarpal applications

1st Metacarpal

Apply wires in the frontal plane.

2nd Metacarpal

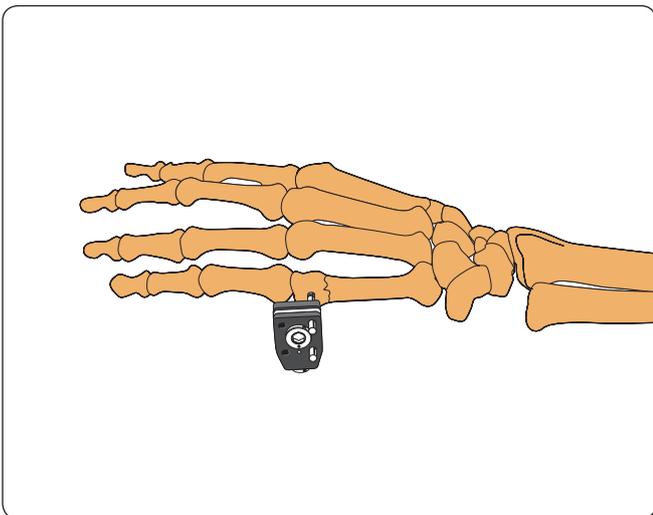
Incline wires dorsally at angle of 30° to the frontal plane.

3rd and 4th Metacarpal

Apply fixator from ulnar side.

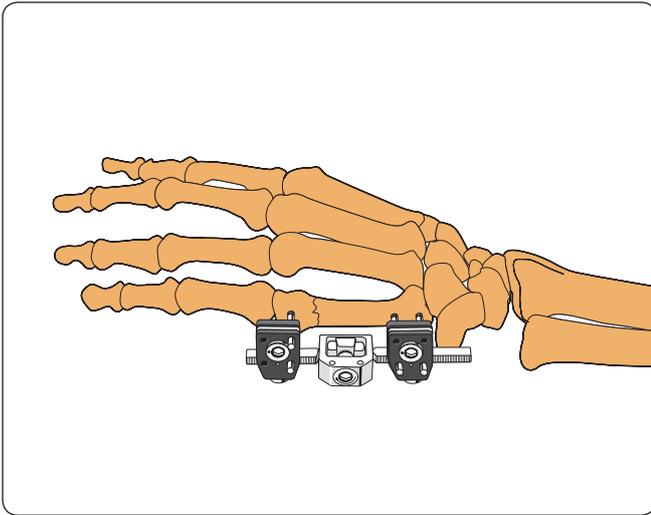
Incline wires dorsally at angle of 45° to the frontal plane.

For outline technique, refer to "Fifth metacarpal diaphyseal fractures" above.

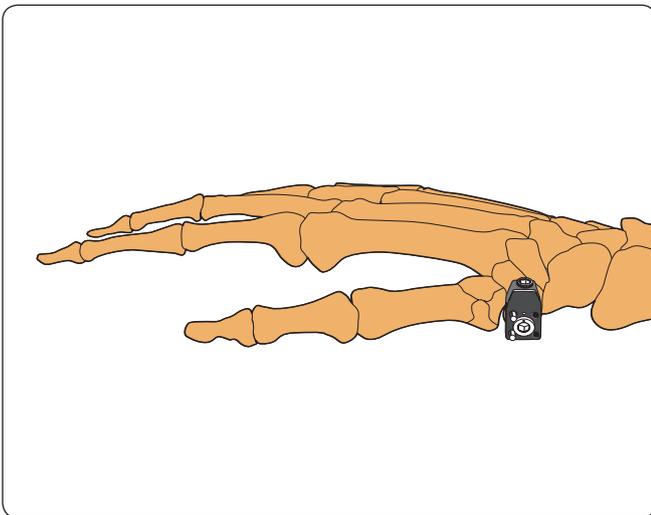


Fifth metacarpal distal metaphyseal fractures

2mm threaded wires are drilled into the bone, using the clamp as its own template. Insert most volar wire in distal fragment first, in frontal plane, parallel to joint surface. Place clamp over the wire 5-10mm from skin and insert second wire to converge with first.



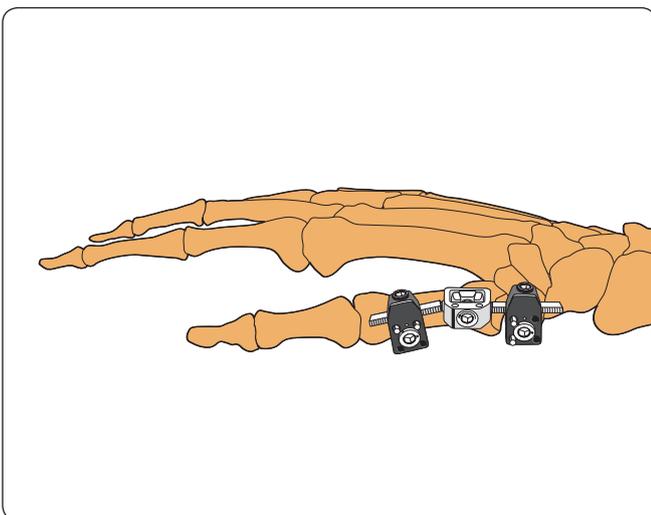
Attach Minifixator body (selected according to the dimensions of the bone) to clamp, align with long axis of bone and attach second clamp. Insert second set of wires in same manner, ensuring clamps have room to move on their bars to allow for final reduction, which is achieved using manipulation forceps.



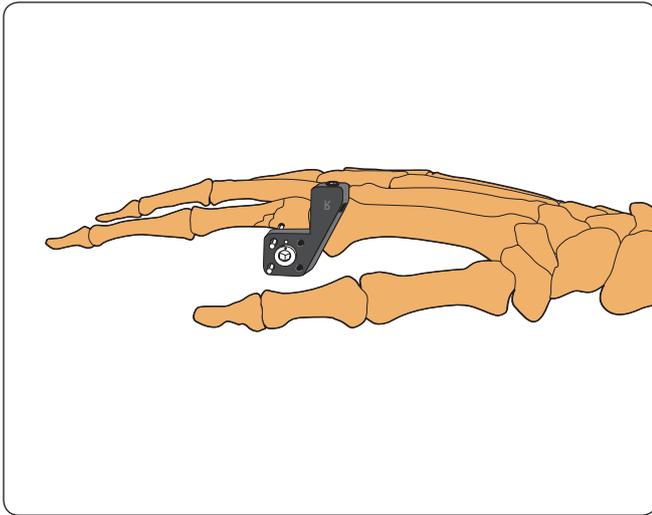
Fractures at the base of the first metacarpal

2mm threaded wires are drilled into the trapezium, and shaft of first metacarpal, using the clamp as its own template. Introduce first wire into trapezium, using semi-open approach to avoid injuring tendons. Slide clamp over first wire and insert second wire in a convergent mode.

Clamps are applied upside down and at least 5-10mm from skin.



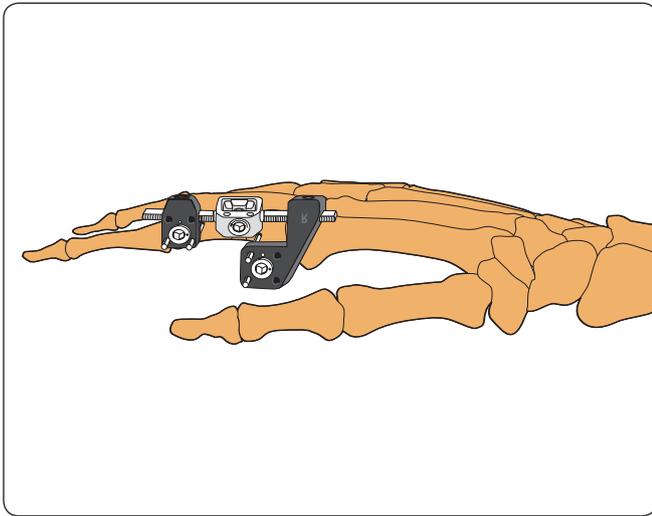
Attach Minifixator body (selected according to the dimensions of the bone) to first clamp and position second clamp. Insert second set of wires into metacarpal diaphysis in longitudinal plane, ensuring clamps have room to move on their bars to allow for final reduction, which is achieved by ligamentotaxis using manipulation forceps.



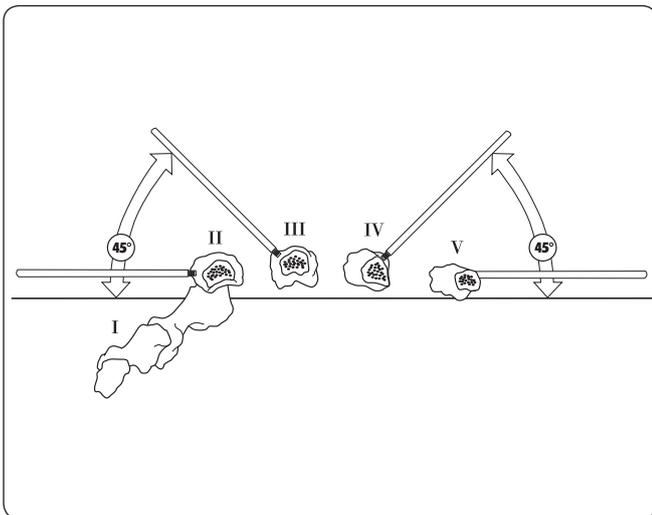
PHALANGEAL FRACTURES

Fractures of the proximal phalanx of the index finger

Use 2mm threaded wires at the base of the proximal phalanx and 1.6mm wires at more distal sites, using the clamp as its own template. Insert first wire in frontal plane, on radial aspect of base of phalanx. Place standard or L-clamp over wire, upside down, 5-10mm from skin. Insert second wire dorsal to first (converges).



Attach Minifixator body (selected according to the dimensions of the bone) to clamp, align with long axis of bone and attach second clamp. Insert second set of wires, ensuring clamps have room to move on their bars to allow for final reduction, which is achieved using manipulation forceps.



Special considerations in phalangeal applications in other digits

1st Digit

Apply fixator from radial side in frontal plane.

3rd Digit

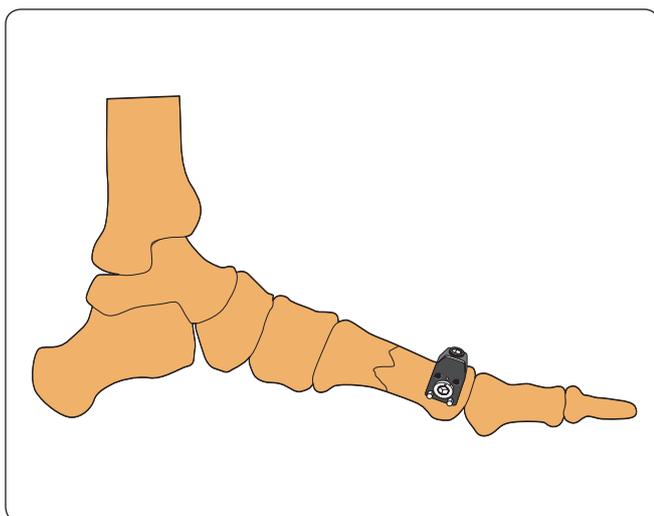
Incline wires dorsally at angle of 45° to the frontal plane.

4th Digit

Apply fixator from ulnar side. Incline wires dorsally at angle of 45° to the frontal plane.

5th Digit

Apply fixator from ulnar side in frontal plane.



METATARSAL FRACTURES

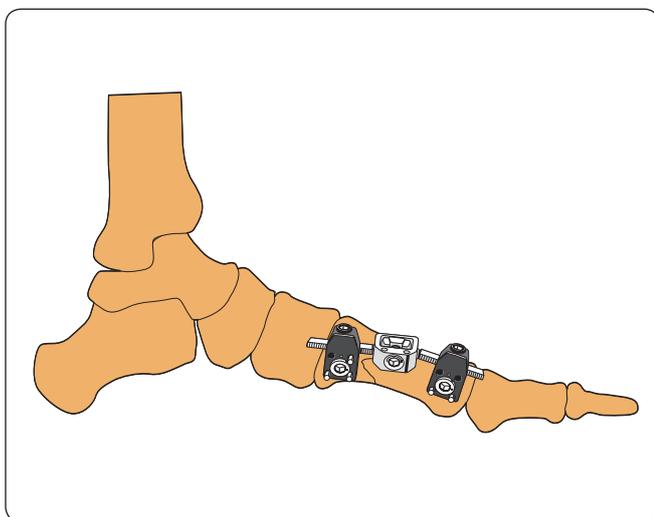
First metatarsal diaphyseal fractures

2mm threaded wires are drilled into the bone, using the clamp as its own template. Wire closest to the MTP joint is inserted first, in the frontal plane. Place clamp over wire, and insert second wire axially or transversely (depending on space available) under image intensification.

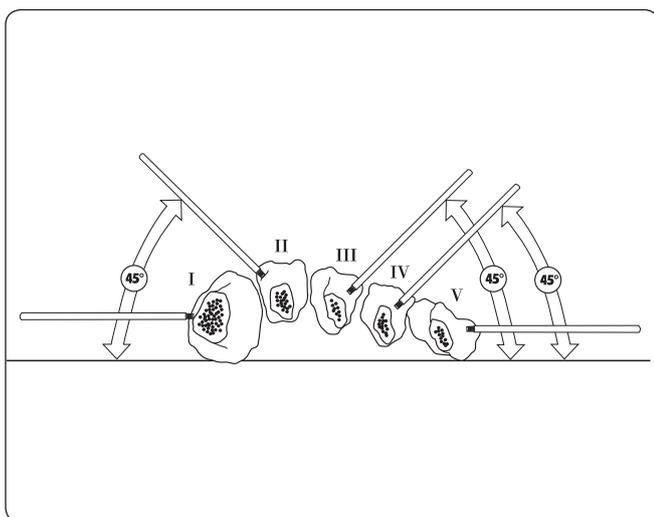


PRECAUTION: During and after insertion, ensure correct positioning of the implants under image intensification.

Clamps are applied upside down and at least 5-10mm from skin.



Attach Minifixator body (selected according to the dimensions of the bone) to clamp, align with long axis of bone and attach second clamp. Insert three wires in the second clamp, ensuring clamps have room to move on their bars to allow for final reduction, which is achieved using manipulation forceps.



Special considerations in other metatarsal applications

2nd Metatarsal

Incline wires dorsally at angle of 45° to the frontal plane.

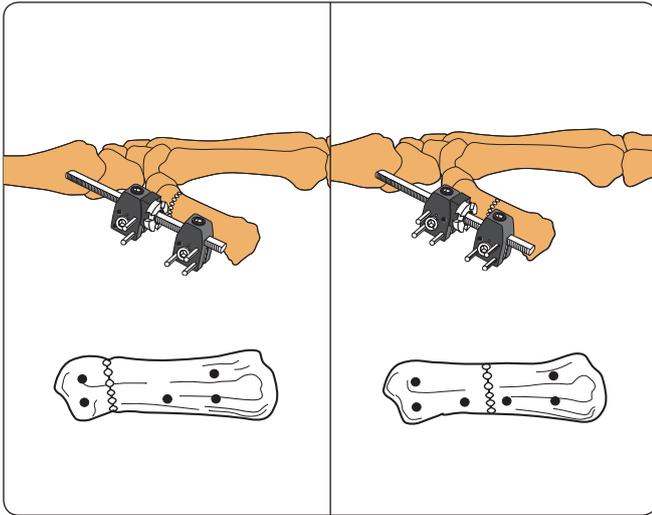
3rd and 4th Metatarsal

Incline wires dorsally at angle of 45° to the frontal plane.

5th Metatarsal

Apply fixator in the frontal plane.

For outline technique, refer to "Fifth metacarpal diaphyseal fractures" above.

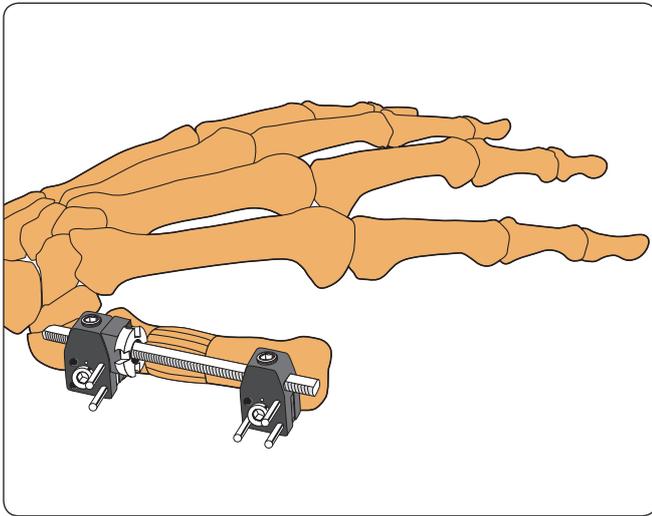


LENGTHENING

Lengthening

Apply lengthening bar with standard clamps or L-clamps in the frontal plane using 2mm wires. To increase stability in osteoporotic bone or in the metatarsals, add a 3rd wire in each clamp. Place the spacer and the compression-distraction nut on the bar before applying the second clamp. Perform the osteotomy.

Ensure spacer is between compression-distraction nut and standard clamp to avoid tilting the clamp.



Start distraction at a rate of 0.5mm per day (one quarter turn of the nut twice a day) after a waiting period of 7-10 days. Increase or reduce the distraction rate depending on the ossification.

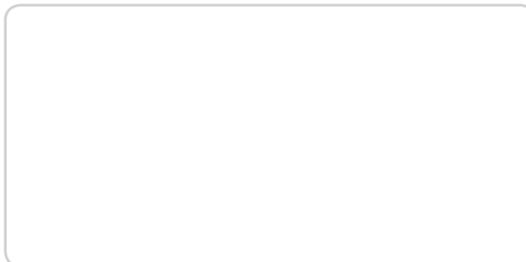
Electronic Instructions for use available at the website
<http://ifu.orthofix.it>

Electronic Instructions for use - Minimum requirements for consultation:

- Internet connection (56 Kbit/s)
- Device capable to visualize PDF (ISO/IEC 32000-1) files
- Disk space: 50 Mbytes

Free paper copy can be requested from customer service
(delivery within 7 days):
tel +39 045 6719301, fax +39 045 6719370,
e-mail: customerservice@orthofix.it

Distributed by:



Manufactured by:
ORTHOFIX Srl
Via Delle Nazioni 9, 37012 Bussolengo (Verona), Italy
Telephone +39 045 6719000, Fax +39 045 6719380



Caution: Federal law (USA) restricts this device to sale by or on the order of a physician. Proper surgical procedure is the responsibility of the medical professional. Operative techniques are furnished as an informative guideline. Each surgeon must evaluate the appropriateness of a technique based on his or her personal medical credentials and experience. Please refer to the "Instructions for Use" supplied with the product for specific information on indications for use, contraindications, warnings, precautions, adverse reactions and sterilization.