

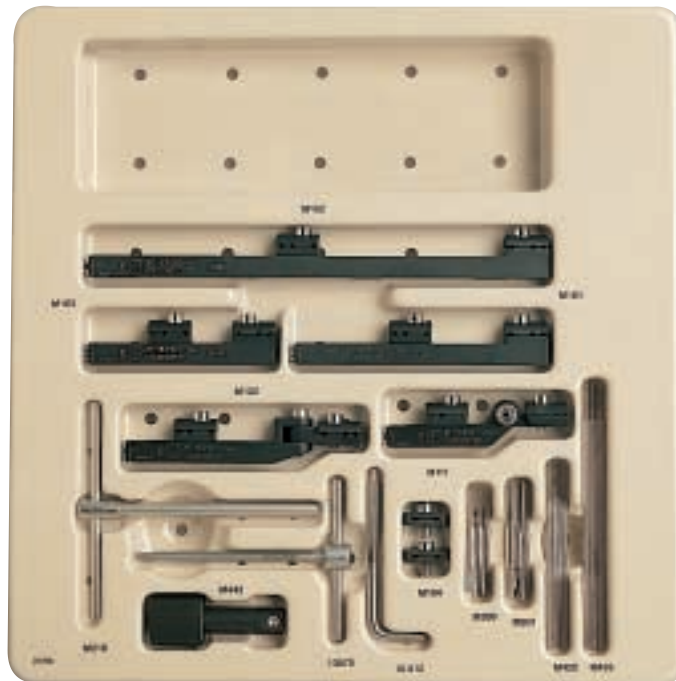
MiniRail System

Part B: Foot Applications

By Dr. B. Magnan, Dr. E. Rodriguez and Dr. G. Vito

14

ORDERING INFORMATION



MiniRail System Kit, M190C

Contents:

M 101	Standard MiniRail Lengthener
M 102	Long MiniRail Lengthener
M 103	Short MiniRail Lengthener
M 104	MiniRail Lengthener T-Clamp
M 111	Articulated MiniRail Fixator-Horizontal Axis
M 122	Articulated MiniRail Fixator-Vertical Axis
M 210	T-Wrench for Bone Screws
M 300	Self-drilling Cortical Screws shaft Ø 3 mm, thread Ø 2.5-2 mm, total length 40 mm, thread length 15 mm
M 301	Self-drilling Cortical Screws shaft Ø 3 mm, thread Ø 2.5-2 mm, total length 45 mm, thread length 20 mm
M 420	Threaded Wires Ø 1.6 mm (pack of 4), total length 70 mm, thread length 15 mm
M 426	Threaded Wires Ø 2.0 mm (pack of 4), total length 100 mm, thread length 15 mm
M 442	Threaded Wire Extractor
10012	Allen Wrench 3 mm
13570	T-Wrench for Clamp Screws

GENERAL POINTS:

Bone Fixation

The system is provided with 2 types of bone fixation:

1. Self-drilling screws, 3 mm shank, with a tapered thread 2.5 - 2.0 mm.
2. Threaded wires, 2 mm shank, with a cylindrical thread 15 mm long. Sizes supplied are 70/15, with a thread diameter of 1.6 mm, and 100/15, with a thread diameter of 2.0 mm.

In addition, larger self-drilling screws are available, with a 3 mm shank, but with a tapered thread diameter 3.0-2.5 mm.

- In the foot, the largest diameter implant should be selected compatible with the bone diameter, remembering that the diameter of the hole in the bone should never be larger than 30% of the bone diameter at that point. This is particularly important for stability when lengthening.
- All implants are self-drilling. The wires can be inserted directly percutaneously; the screws should be inserted through a small incision.
- All the screws have tapered threads. Care should be taken that they are not inserted too far, because they should not be backed out, as this will cause loosening.

Note: If this happens with the 2.5-2.0 mm threads, a screw with a larger thread can be inserted instead.

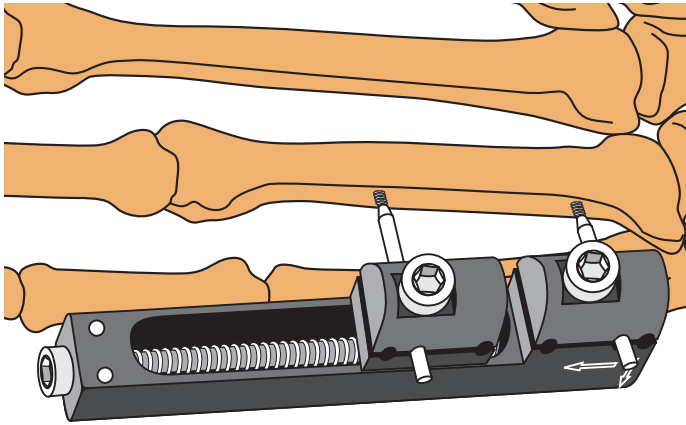
- The wires have cylindrical threads, and can therefore be backed out if necessary.
- In the diaphysis, screw or wire insertion should always be in the center of the bone axis, to avoid causing weakening.

Fixator Application

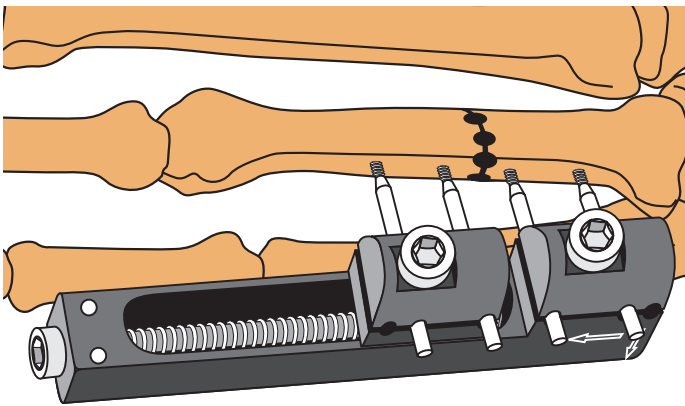
- The clamps should face down, beneath the fixator body, in cases where one is concerned with the body of the fixator striking the ground during weightbearing (metatarsal 1 and 5, calcaneus) or rubbing against adjacent soft tissues (metatarsals 2-4).

USE OF M 103 IN LENGTHENING OF A CONGENITALLY SHORT 4TH METATARSAL

- Insert a 2 mm diameter threaded wire (or 3 mm diameter bone screw) at 45° from the frontal plane and at right angles to the bone axis. Apply the MiniRail Lengthener over the wire (or screw). Insert a second wire (or screw) into a screw seat in the second clamp.

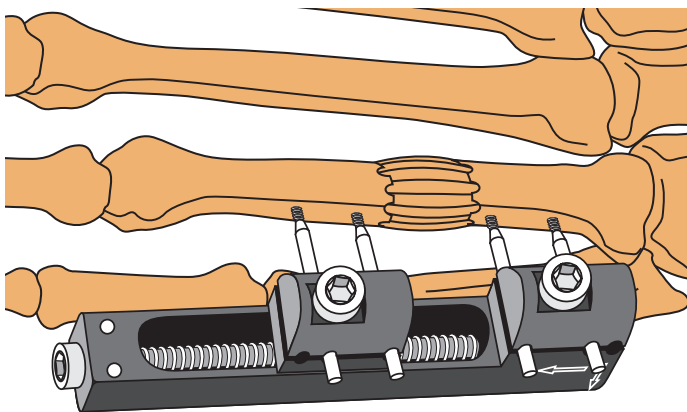


- Insert the remaining threaded wires (or screws). Perform an osteotomy mid-way between the two clamps.
- If a metaphyseal osteotomy is required, use the T-Clamp to place two screws or wires across the axis of the bone.



- Insert a K-wire longitudinally through the metatarso-phalangeal joint to prevent any subluxation during callus distraction.





Post-Operative Management

- Wait for 7-10 days before commencing distraction. Distract at a rate of 1 mm per day (one quarter turn clockwise of the threaded screw four times a day). Callus formation should be carefully monitored with standard radiographs weekly.

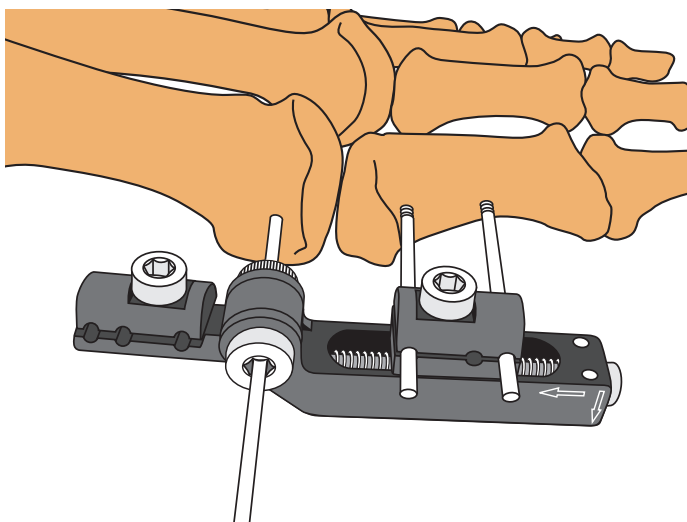
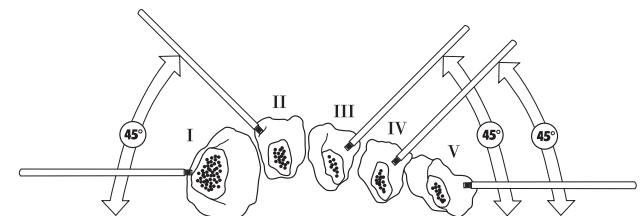
Special considerations in other metatarsal applications

1st or 5th Metatarsals

- Apply the fixator in the frontal plane.

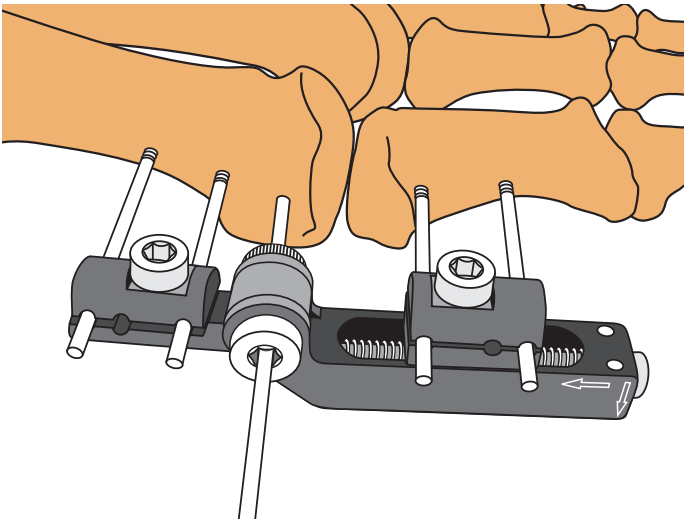
2nd or 3rd Metatarsal

- Incline wires (or screws) dorsally at an angle of 45° to the frontal plane.

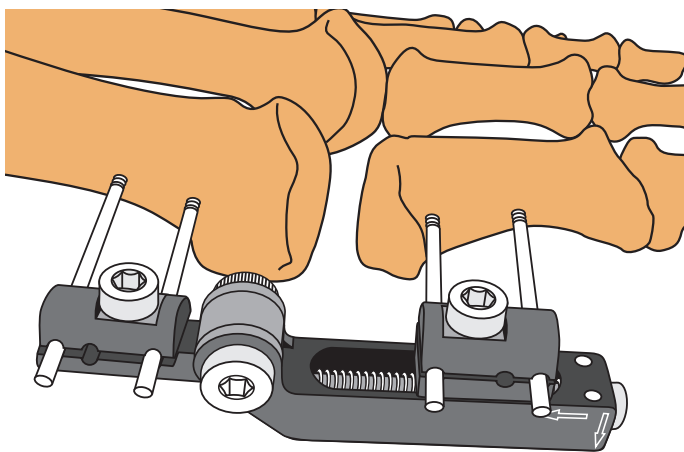


USE OF M 111 IN TREATMENT OF JOINT STIFFNESS (HALLUX RIGIDUS)

- Insert a 2 mm Kirschner wire into the head of the first metatarsal from the medial side, so that it is in the center of rotation of the joint. Orientate the fixator so that the body of the fixator with the distraction mechanism is facing the proximal phalanx. The hexagon at the hinge should face outwards (it may be necessary to transpose the two components of the hinge to achieve this). Slide the articulating hinge over the Kirschner Wire. Insert a 2 mm threaded wire (or 3 mm diameter bone screw) in the distal seat of the distal clamp and a second wire or screw into the proximal seat of the distal clamp. Check that the movement of the joint is about the axis of the Kirschner wire; if not, remove it and re-site it, adjusting the distraction mechanism as necessary.



- Insert wires or screws into the distal end of the first metatarsal.



- Distract 5 mm acutely (intraoperatively). Remove the K-wire and tighten the articulated body locking screw.

Post-Operative Management

- Wait 3 days following surgery and begin gradual distraction. Distract the joint 0.5 mm/day until a joint space two or three times the normal width is obtained (one full turn clockwise of the threaded screw = 1 mm distraction). When the soft tissues have relaxed, loosen the articulated body locking screw to commence physical therapy. At the end of an exercise period, place the hallux in the neutral position and retighten the articulated body locking screw. Two weeks following completion of distraction, remove the fixator.



USE OF M122 IN PAEDIATRIC METATARSUS ADDUCTUS

- 5 year old girl with right metatarsus adductus. AP X-ray shows medial deviation of metatarsals 2-5 at the Lisfranc's joint.



Soft tissue

- Perform the following:
 - Percutaneous tendo achilles lengthening
 - Abductor hallucis release
 - Partial anterior tibial tendon resection
 - Capsulotomies 2-5



- Orientate the MiniRail Fixator on the medial side of the first metatarsal with the shorter hinged side distal on the foot.
- Two distal screws or wires are inserted from the medial side into the first metatarsal, distal to the growth plate, in the coronal plane at 90 degrees to the axis of the bone.
- The fixator hinge is orientated to accommodate the angle between the forefoot and hindfoot, so that screws inserted into the calcaneus are at 90 degrees to the bone axis. Orientate hinge on fixator to accommodate the appropriate alignment of the forefoot with the rearfoot.
- Two proximal pins are inserted into the calcaneus.
- Translation of the pins in the distal clamp will provide lateral deviation of all metatarsals as required.



Final Result

Post-Operative Management

- Non-Weightbearing for the first three days. Ambulation after third day as tolerated with a surgical shoe. External Fixation for six weeks with casting for ten days after fixator removal. Pin site care twice a day.

The Orthofix Quality System has been certified to be in compliance with the requirements of:

- Medical Devices Directive 93/42/EEC, Annex II - (Full Quality System)
- International Standards EN 46001/ISO 9001

for orthopaedic external fixator systems including bone screws, nails and wires, sterile external and internal fixation systems.



See “Orthofix External Fixation System” instructions leaflet (PQ EXF) and appropriate Operative Manual prior to use.