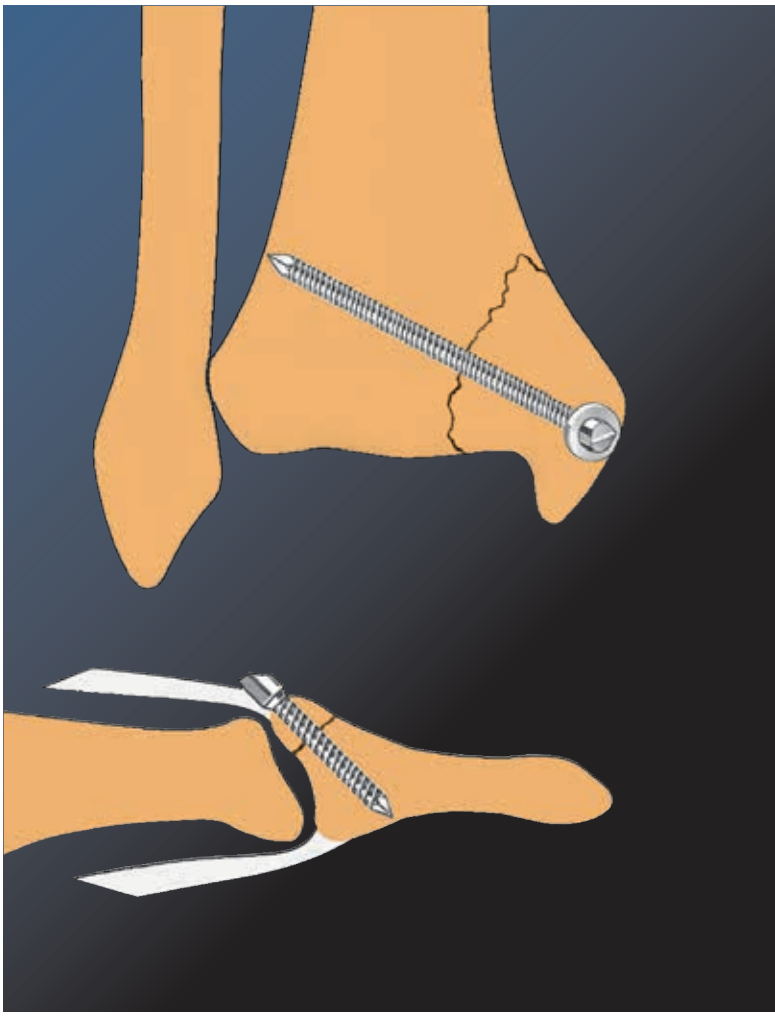
QUICK REFERENCE GUIDE



ONE-STEP FRACTURE FIXATION

THE FRAGMENT FIXATION SYSTEM

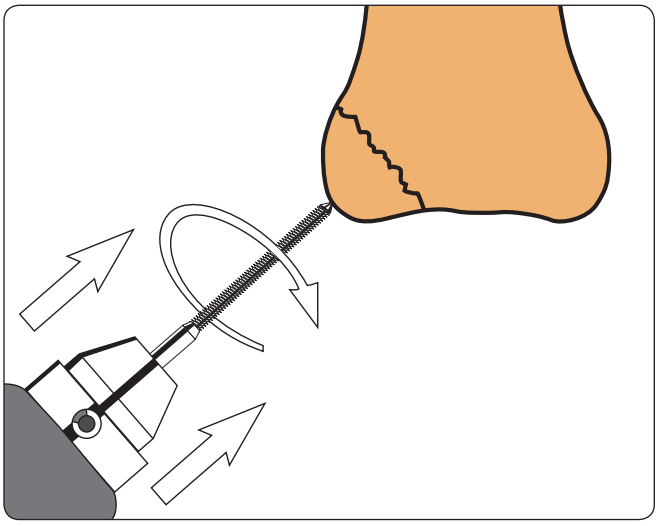
16

ORTHOFIX®

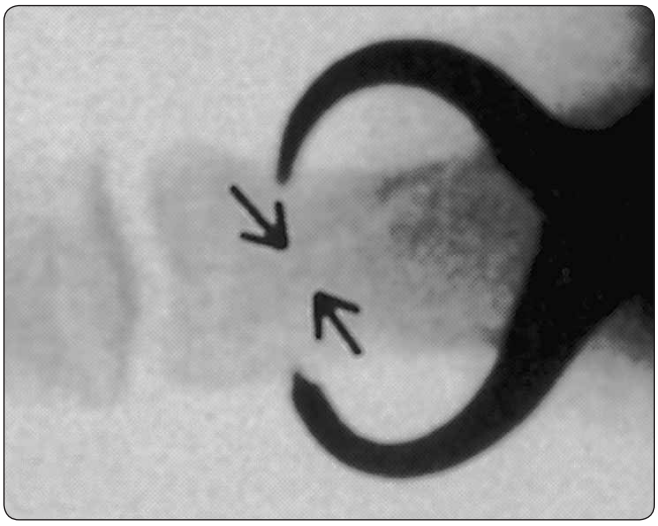
GENERAL PRINCIPLES

Three shaft diameter/thread diameter combinations are available (see opposite table). Each combination is available in a variety of thread lengths, but the total length of each implant is a uniform 120 mm. Choose the appropriate implant according to the fracture pattern and the anatomical site.

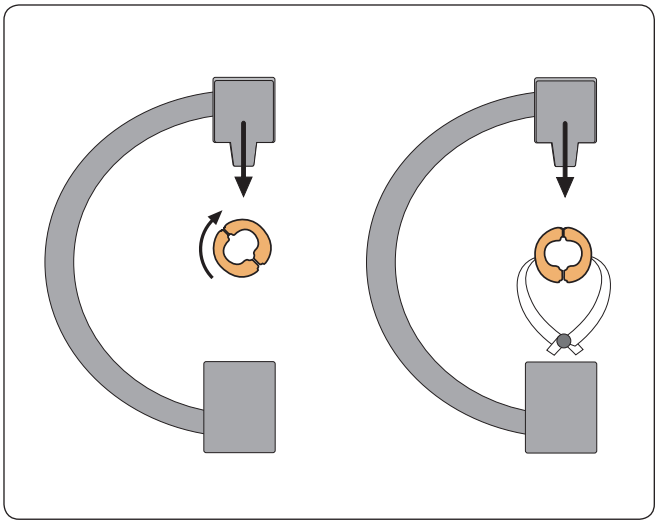
	Thread Diameter	Shaft Diameter
Small	1.2 mm	1.5 mm
Medium	1.6 mm	2.0 mm
Large	2.2 mm	3.0 mm



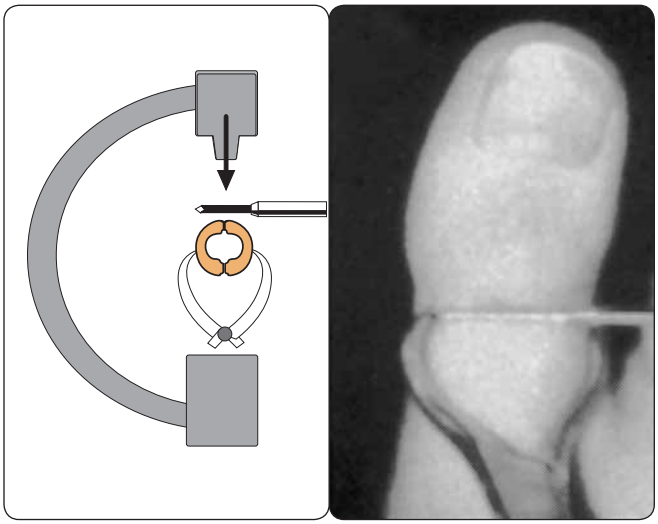
Determine the intended position of the implant before insertion. Insert the FFS implant without pre-drilling or tapping. Do not bend the implant during insertion into the bone, since this might lead to breakage.
When the chamfer is close to the cortex, the speed of insertion must be reduced. It is recommended to complete insertion by hand.



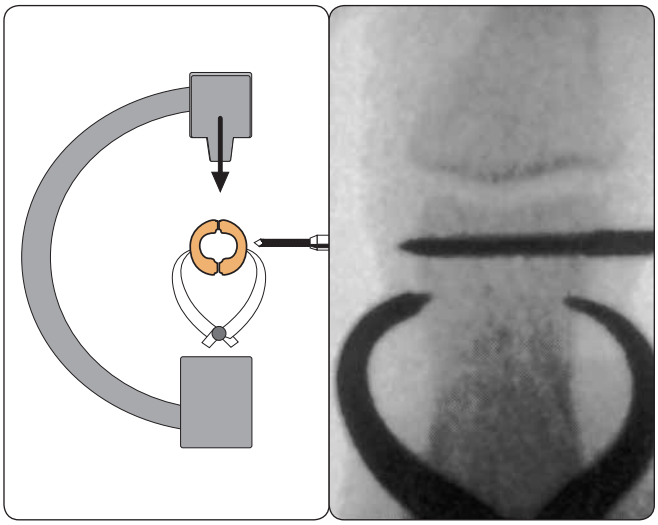
Reduce the fracture anatomically. Use forceps where possible for reduction and interfragmentary compression.



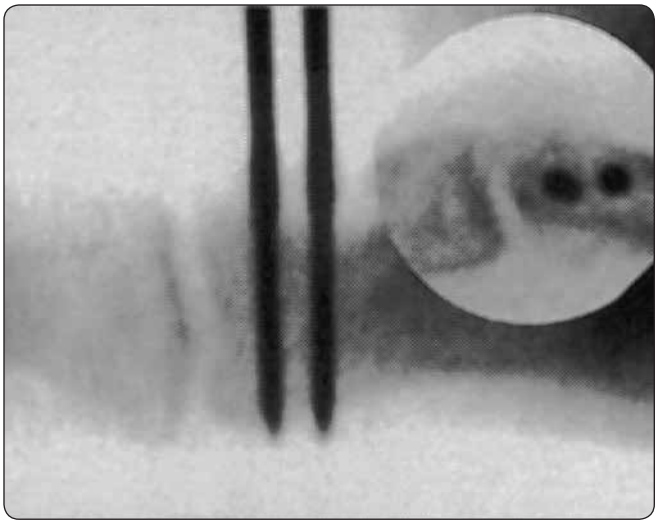
Turn the extremity until the X-ray beam is aligned with the fracture gap, and verify reduction.



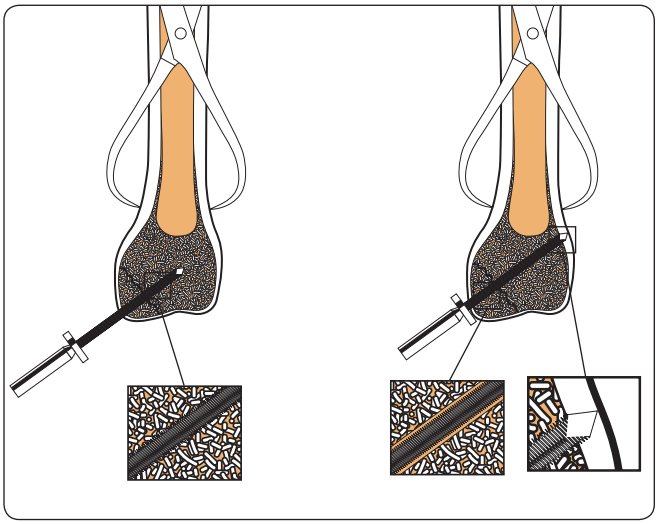
Measure the implant thread length required pre-operatively on the X-ray or determine it by overlaying an implant of adequate size.



Insert the implant percutaneously, at right angles to the X-ray beam, until the chamfer meets the near cortex.



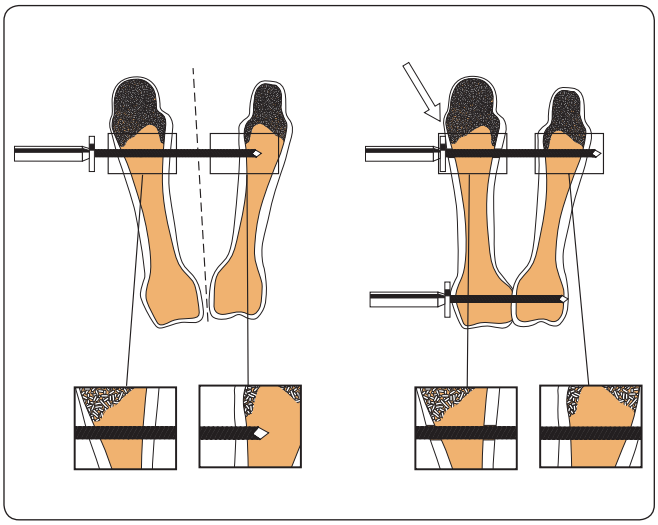
A second implant ensures rotational stability. Cut the implants just above the chamfer. Whenever possible, the cut end should be covered with skin. In the fingers and toes, where this is not possible, leave the end exposed and cover with a sterile dressing. Leave the FFS implants in place until fracture healing, normally for 6 weeks; remove them when necessary using the extractor.



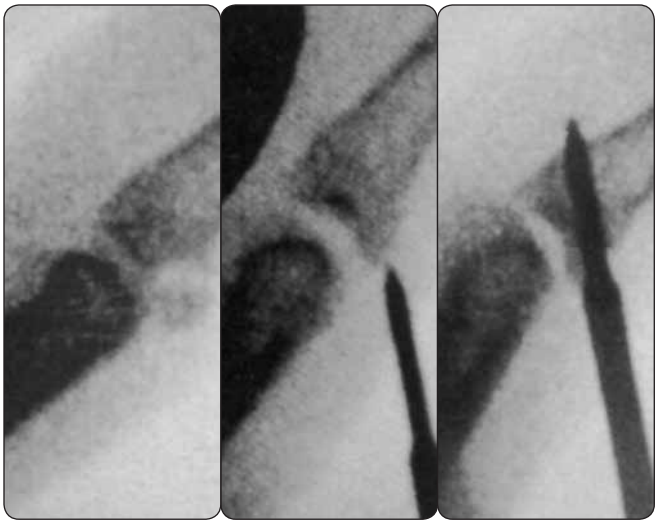
COMPRESSION EFFECT

The compression effect can be obtained in two ways.

If, for example, a bone fragment at the base of a phalanx requires reattachment, the implant is inserted in an oblique direction starting at the cancellous base of the bone with the tip directed towards the contralateral cortex.
When the tip reaches the contralateral cortex, the speed of insertion of the implant must be reduced. As the implant meets the resistance of the hard cortical bone, the thread makes several revolutions without advancing initially, leading to a gliding hole proximally and a threaded hole distally. When the chamfer and washer reach the bone, the two fragments will be compressed together. Insertion should be stopped at this point.



In the example shown, an inter-metacarpal dislocation resulted in widening of the space between adjacent metacarpal heads.
The FFS implant is first drilled into the near metacarpal producing a threaded hole. On reaching the far metacarpal it also produces a threaded hole. At the moment the washer reaches the near metacarpal cortex, the FFS revolves without advancing, thus producing a gliding hole in the near metacarpal. This allows the two metacarpal heads to approximate.

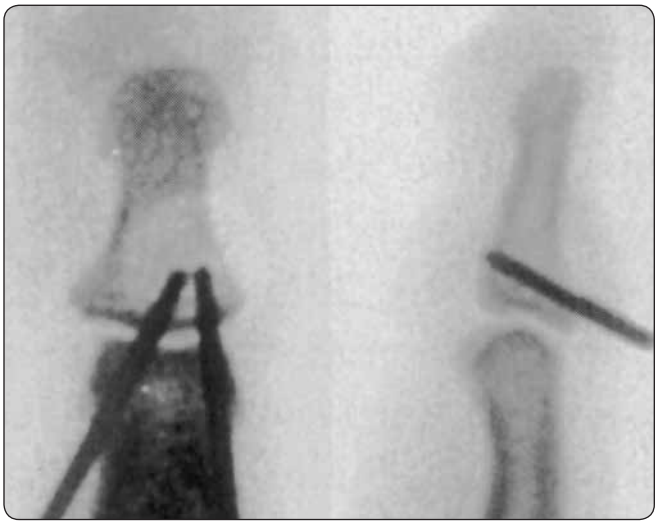


APPLICATION IN THE UPPER EXTREMITY

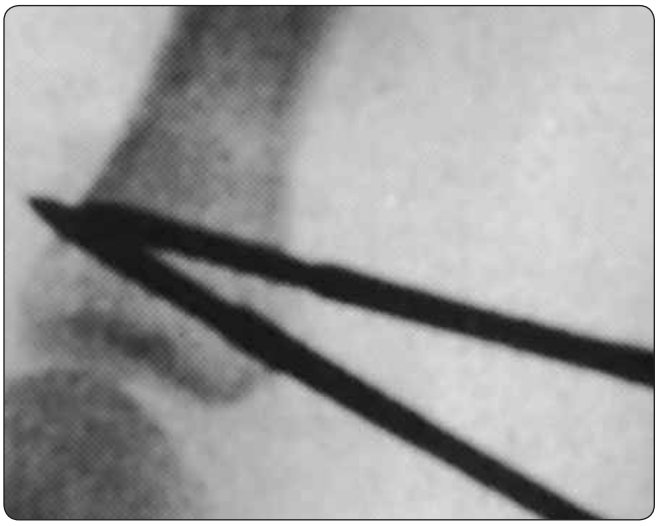
Hand

Bush Fractures
Use only the small (1.2 mm) implants. Place the tip of the implant on the fragment percutaneously, with gently increasing pressure until the fracture gap disappears. Advance it slowly until the chamfer reaches the near cortex.

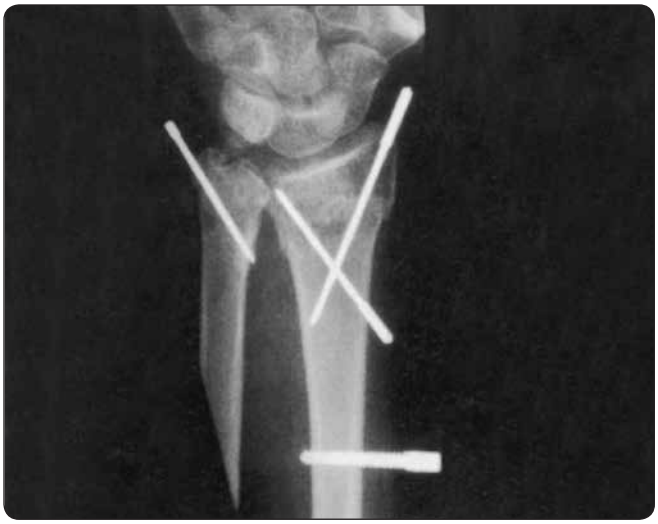
Note: Weber or other bone forceps may be used for reduction.



A second implant may be inserted in a slightly converging fashion.



Fractures at the Base of the First Phalanx
Insert two medium implants and cut close to the chamfer leaving 2-3 mm outside the bone.



DISTAL RADIUS

Use medium (1.6 mm) implants.
In comminuted fractures, following application of the external fixator, insert two FFS implants in a crossed fashion to prevent secondary loss of radial length and angulation.
In this case the concomitant ulnar fracture was treated with a single FFS implant.

ELBOW

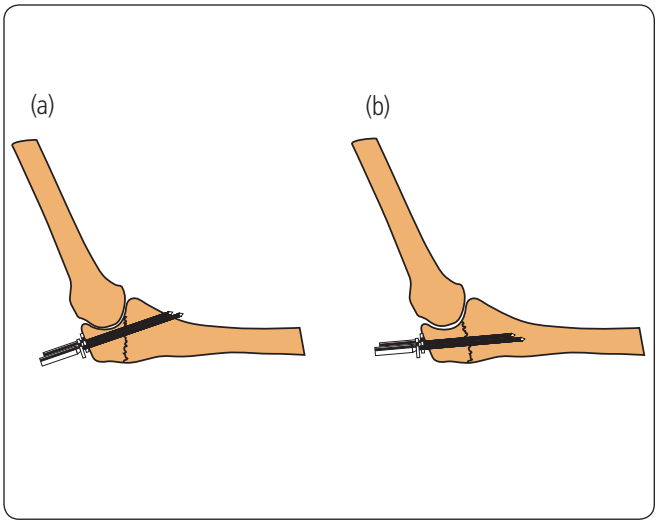
Humeral Epicondyle Fractures

Use either large (2.2 mm) or medium (1.6 mm) implants.
After open reduction, insert the implants, both with washers.

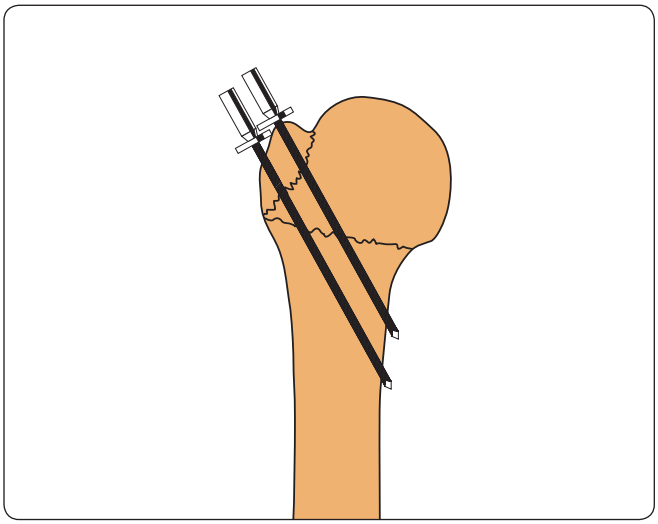
Note: If there is disruption of collateral ligaments, use the FFS implants in association with plastic washers. Hold the ligament in place with two pincers or forceps, and slowly drill the FFS implant into the bone until pressure from the plastic washer holds the ligament in place.

Radial Head Fractures

Reconstruct the radial head using medium implants without a washer. Drill the implant into a fragment and use it as a joystick to manipulate it into its anatomical position.
Then advance the implant slowly into the adjacent bone. Cut the implant shaft as close as possible to the cartilage-covered surface of the radial head. If forearm rotation is undisturbed, removal of the implants is not necessary.
If after fracture healing the patient reports a persistent pain during pro- and supination, and ultrasound discloses a chronic intra-articular effusion, remove the implants.

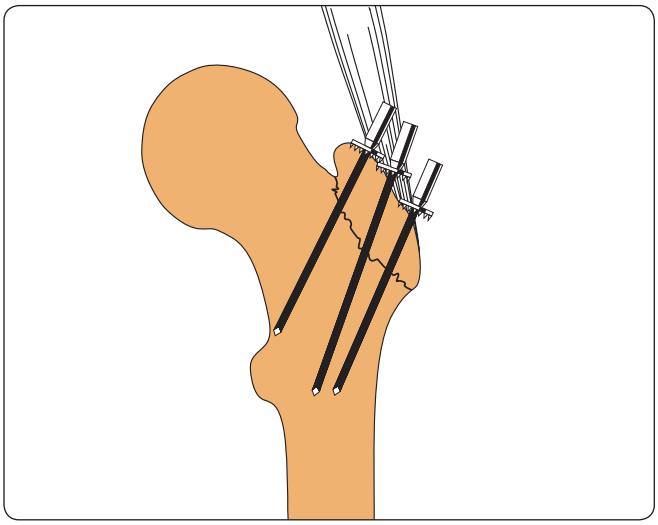


Olecranon Fractures
Use large implants with washers. Expose the fracture site through a dorsal approach, and reduce it anatomically. Starting at the tip of the olecranon, insert two FFS implants parallel to one another or in a slightly v-shaped configuration across the fracture line. In elderly patients with osteoporosis, anchor both implants in the ventral cortex of the ulna (a). In younger patients, the implants may be securely anchored in the cancellous bone and penetration of the contralateral cortex may not be necessary (b).



Proximal Humerus

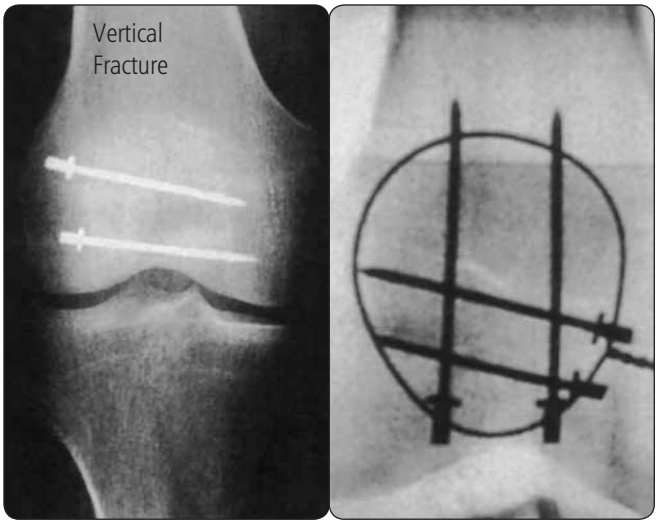
Stabilise a subcapital fracture combined with one of the greater tuberosity using two large FFS implants with washers.



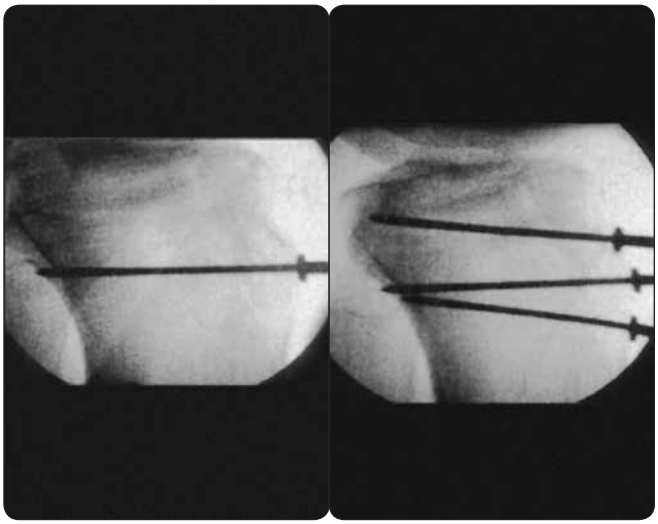
APPLICATION IN THE LOWER EXTREMITY

Hip and Knee Joints

Fractures of the Greater Trochanter
Except in the presence of severe osteoporosis, it is possible to reattach the greater trochanter securely using three large implants with plastic washers. Use additional tension band wiring only if the bone quality is poor.



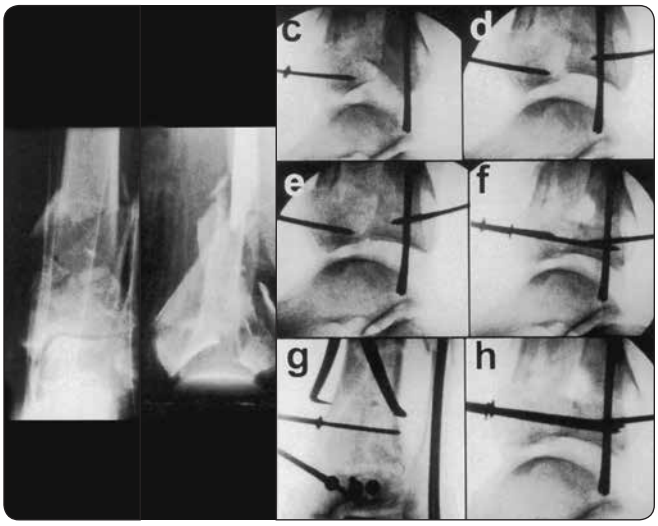
Fractures of the Patella
Use medium and/or large implants. Reduce the fragments with bone forceps and insert the FFS implants. Long term post-operative immobilization is not necessary. After wound healing, early passive physiotherapy is commenced to achieve minimum knee flexion of 90°. In case of poor bone quality or in the presence of more complex fractures, use an additional tension band wire.



Tibia

Proximal Tibia
In avulsion of the tibial tuberosity, insert the implants with compression (penetrate the second cortex and use washers).

In monocondylar fractures insert two large implants percutaneously under image intensification, parallel to the joint line in subchondral bone.
In more comminuted tibial plateau fractures, open reduction and internal or external fixation is advisable.
In these cases, the FFS implants are an additional measure to achieve joint congruency and support the reduction with the implants placed in subchondral bone.



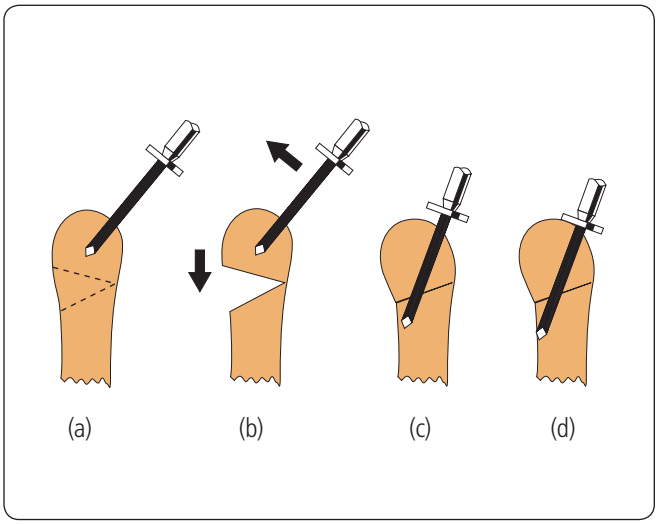
Distal Tibia
Insert large implants percutaneously or with an open approach and use them as joysticks to reduce the main joint-building fragments. After achieving anatomical reduction, insert the implants fully.

Foot

Metatarsal and Phalangeal Fractures

Use either large or medium FFS implants in metatarsals and proximal phalanges.

In displaced fractures, use open reduction.



Corrective Osteotomies

Insert the FFS implant into the distal fragment.
The direction of the implant represents the angle of correction.
Remove a bone wedge according to the pre-operative plan. Using the implant as a joystick, close the wedge and drill the implant slowly into the far cortex.
If necessary, insert a second implant to provide rotational stability.

Figures are reproduced from:

Orthofix External Fixation in Trauma and Orthopaedics. Giovanni De Bastiani, A. Graham Apley and Anthony Goldberg (Eds). Springer-Verlag London Heidelberg, 2000

with kind permission of the publishers

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

CE 0123

Distributed by:

Instructions for Use: See actual package insert for Instructions for Use.

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.

ORTHOFIX®

www.orthofix.com

PG 160 E0 D 04/19