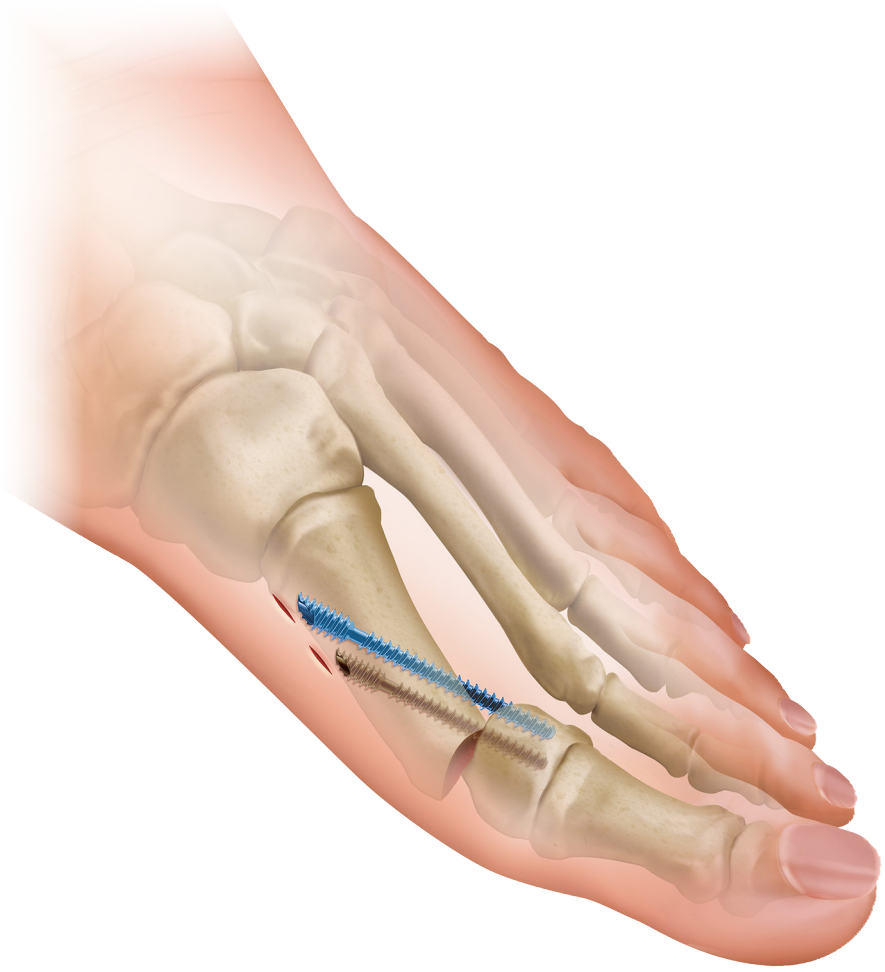
stryker

PROstep™
Chevron Osteotomy

Operative technique



PROstep™
Chevron Osteotomy

This publication sets forth detailed recommended procedures for using Stryker 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.

Important

- The patient should be advised that the device cannot and does not replicate a normal healthy bone, that the device can break or become damaged as a result of strenuous activity or trauma and that the device has a finite expected service life.
- Removal or revision of the device may be required sometime in the future.
- Cleaning and sterilization information is provided in the applicable instructions for use.
- Non-sterile devices, including implants and instruments, must be cleaned and sterilized prior to use, in accordance with validated methods.
- Devices that are able to be disassembled should be disassembled prior to point-of-use processing. Additionally, devices with movable components that do not facilitate disassembly should be manually articulated during the point-of-use processing step in order to evacuate additional soils.
- Please remember that the compatibility of different product systems has not been tested unless specified otherwise in the product labeling.
- Consult Instructions for Use (https://ifu.wright.com) for a complete list of potential adverse effects and adverse events, contraindications, warnings and precautions.
- The surgeon must advise patients of surgical risks, and make them aware of adverse effects and alternative treatments.
- An implant whose packaging is open or damaged or whose expiration date has passed must not be used. Every precaution must be taken to ensure sterility when opening the packaging of the implant and during implantation

Table of contents

Introduction

The PROstep MICA Screw System is a cannulated fully threaded titanium alloy screw system that is indicated for use in bone reconstruction, osteotomy, arthrodesis, joint fusion, fracture repair, and fracture fixation of bones appropriate for the size of the device. With self-tapping headless compression screws (Figure 1) in diameters of 3mm and 4mm (Table 1), the PROstep MICA Screw System provides extensive versatility for surgical procedures of the foot within one comprehensive system.

Table 1: Available diameters and lengths
Headless screws

Diameter	Screw lengths
3mm	20mm, 22mm, 24mm, 26mm, 28mm, 30mm, 32mm, 34mm, 36mm, 38mm, 40mm, 42mm, 44mm, 46mm, 48mm
4mm	20mm, 22mm, 24mm, 26mm, 28mm, 30mm, 32mm, 34mm, 36mm, 38mm, 40mm, 42mm, 44mm, 46mm, 48mm, 50mm, 52mm, 54mm, 56mm, 58mm, 60mm

System basics

- The PROstep MICA Screw System offers the simplicity of self-tapping cannulated compression screws in 3mm and 4mm diameters.
- All PROstep MICA Screws are manufactured from titanium alloy (Ti 6Al-4V) to provide consistent strength.
- Screws are color-coded by diameter to easily identify associated instrumentation (Table 2).
- Pilot drills, countersinks, and drivers have corresponding color-coded banding to match screw diameter, simplifying the pairing of instrumentation with screw selection. (Figure 2)
- Cannulated drill bits are included for use in hard cortical bone, when an oblique approach is desired, or when bicortical fixation is required.
- Cannulated countersinks are provided to recess screw heads into the cortex of the bone.

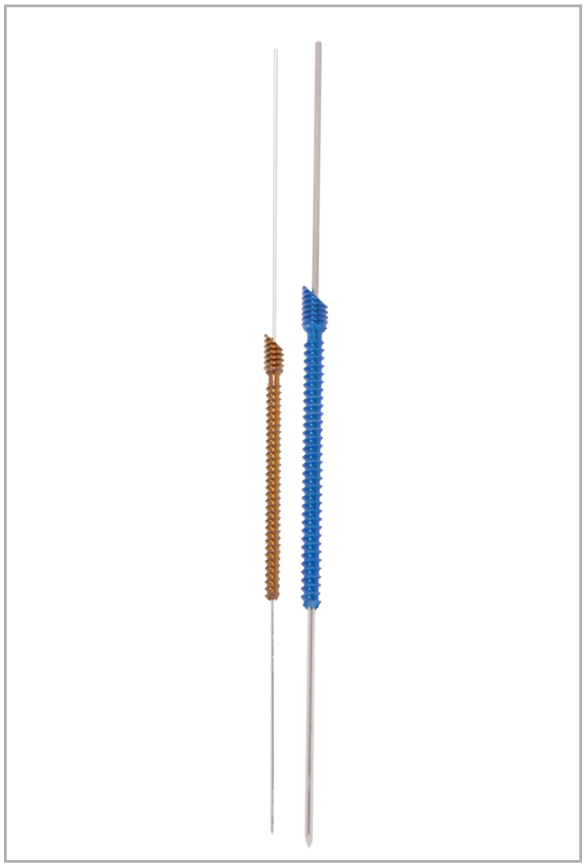


Figure 1
PROstep MICA Fully Threaded Screw

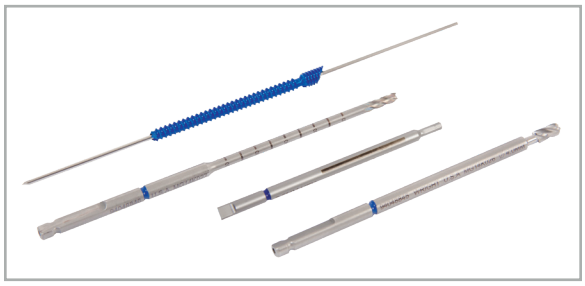


Figure 2
Colored banding on the pilot drill, driver, and countersink simplifies identification with screw size.

Table 2: Headless screws

Screw diameter	Color	Pilot drill	Countersink	Driver	K-wire
3mm	Brown	2.2mm	2.8mm	2mm hex	0.9mm
4mm	Blue	3mm	4mm	2.5mm hex	1.4mm

Indications and warnings

Indications

The PROstep MICA Screw is indicated for fixation of bone fractures or for bone reconstruction. Examples include:

- Mono or bi-cortical osteotomies in the foot
- Distal or proximal metatarsal osteotomies
- Weil osteotomy
- Fusion of the first metatarsophalangeal joint and interphalangeal joint
- Fixation of osteotomies for hallux valgus treatment (such as scarf, chevron, etc.)
- Akin type osteotomy
- Arthrodesis base first metatarsal cuneiform joint to reposition and stabilize metatarsus varus primus
- Calcaneus/cuboid arthrodesis
- Talar/navicular arthrodesis

Contraindications

General surgical contraindications:

- Infection
- Physiologically or psychologically inadequate patient
- Irreparable tendon system
- Possibility for conservative treatment
- Growing patients with open epiphyses
- Patients with high levels of activity

Patient positioning and setup

Note:
Patient positioning based on right handed health care professional.

Patient positioning and equipment setup is extremely important when performing any PROstep MICA procedure.

The patient's feet should be positioned off the end of the table, enabling ease of access for x-ray, thereby allowing biplanar x-ray views throughout the procedure. (Figure 3)

The x-ray itself should come in from the patient's right allowing rotation of the c-arm to achieve anterior-posterior and lateral views of each foot. (Figure 4)

The PROstep Power Box is positioned to the patient's left. (Figure 5)

This setup enables free movement of the surgeon around the patient's feet, to either stand at the side or end of the table as the operation demands. The position of the equipment is independent of whether the operative side is left or right. (Figure 6) The positioning of equipment can be mirrored for a left-handed surgeon.

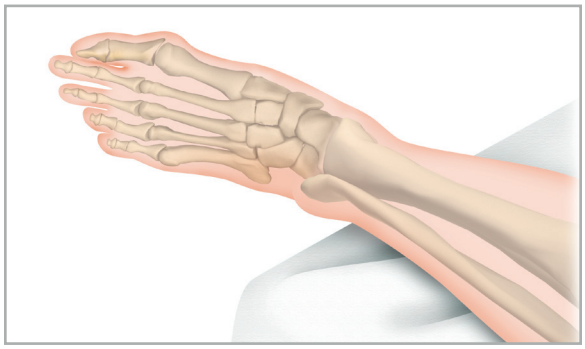


Figure 3

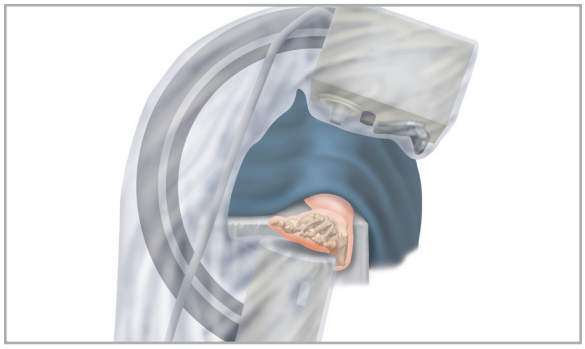


Figure 4

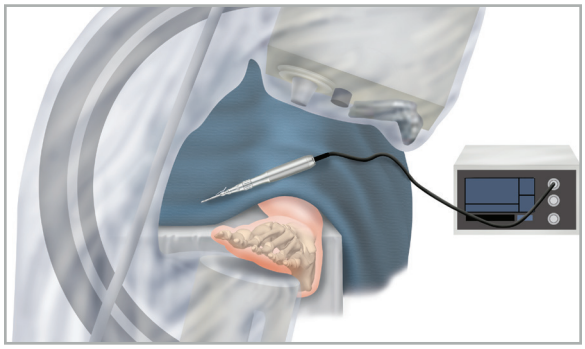


Figure 5

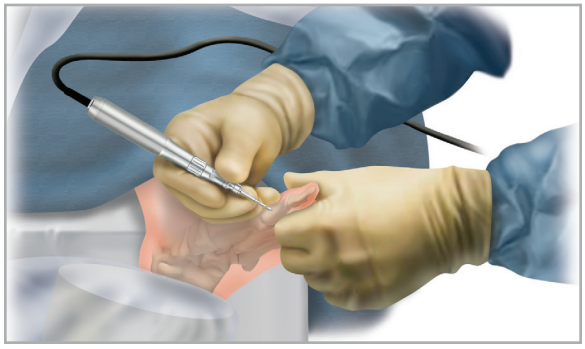


Figure 6

Chevron osteotomy

2mm x 20mm PROstep MICA Burr (57SR0220)

Patient presentations:
Hallux valgus deformity

Surgical approach

A stab incision is placed over the dorso-medial aspect of the proximal edge of the 'flare' of the medial eminence. The placement of this incision is vital.

The incision must avoid the dorso-medial cutaneous nerve to the hallux; if palpable, this nerve should be marked before placing the incision.

Once the incision is made, the straight periosteal elevator (57S1MI07) is used to carefully create a working area for the burr. This is created over the dorsal surface of M1 but not on the plantar surface, as this may risk damage to the blood supply of the M1 head.

Osteotomy with burr

2mm x 20mm PROstep MICA Burr (57SR0220)

The plane of the osteotomy is defined by the entry cut of the burr into the metatarsal. It is from this entry cut that the dorsal and plantar limbs of the chevron are then made. In other words, this first entry of the burr creates the apex of the chevron.

It must be noted that the osteotomy will remove 2mm of bone. This needs to be accounted for when deciding on the plane of the osteotomy. The burr (57SR0220) should generally be perpendicular to the first metatarsal and angled approximately 20° plantarly, allowing for any lost length and height to be regained when lateralizing the metatarsal head. It is wise to view initial osteotomy planes under x-ray. (Figures 7 and 8)

Note:
Burrs were designed to be used at 6000 RPM. Higher rotation could cause increased risk of bone necrosis or soft tissue damage.

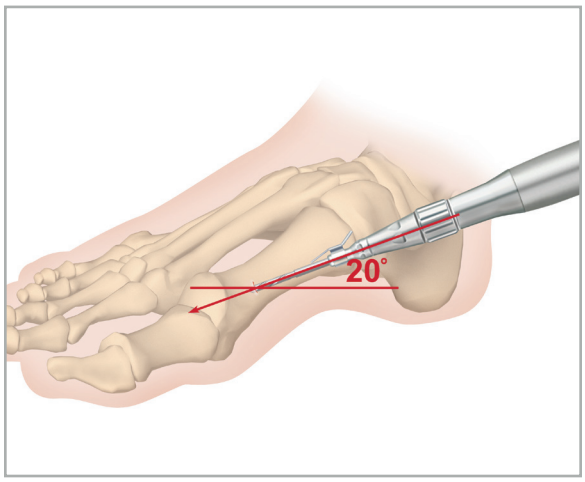


Figure 7

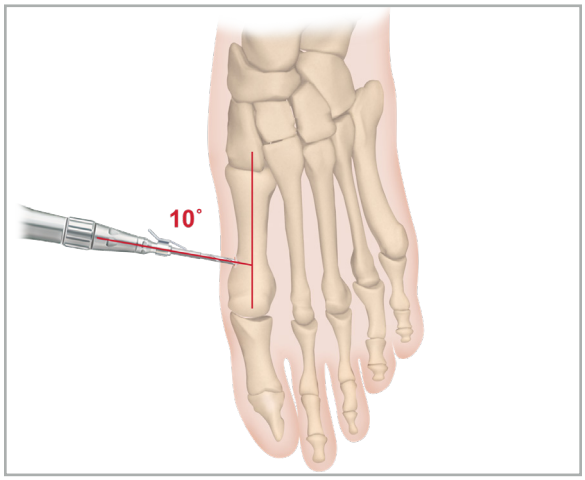
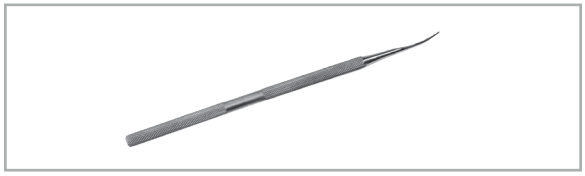


Figure 8



57S1MI07
Straight periosteal elevator (part of a set)

57SR0220
2mm x 20mm PROstep MICA Burr

Osteotomy with burr (continued)

The dorsal osteotomy is the first limb to be created. Insert the 2mm x 20mm PROstep MICA Burr (57SR0220) into the stab incision portal and bi-cortical osteotomy hole. (Figure 9)

Once the burr exits the lateral cortex of the metatarsal, rotate and lift the handpiece so that the burr cuts dorsally until you have completed the dorsal limb of the osteotomy. (Figure 10)

Note:
Is it important to rotate and lift while cutting to both prevent any thermal injury to the skin/soft tissues, and prevent plantar extension of the osteotomy on the near cortex. Imagine the skin portal as the fulcrum point for rotation.

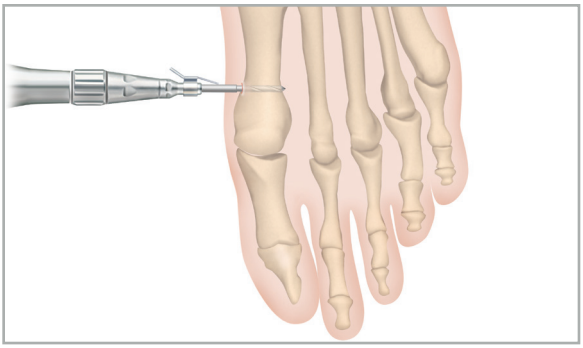
The plantar limb is created by placing the burr back to the original bi-cortical position. Then, under controlled power, slowly translate the burr plantarly and at the same time rotate the handpiece dorsally and laterally (so the burr moves in a plantar medial direction) until the burr exits the medial cortex. (Figure 11)

Note:
After completing the plantar osteotomy, the handpiece should be dorsal to the hallux to ensure the burr has fully exited the medial cortex of the metatarsal.

Once the cut is complete (confirmed by the motion at the osteotomy site), the metatarsal head can be displaced along its defined plane. Displacement is achieved by placing the straight periosteal elevator (57S1MI07), or first met translator (57S100MT) through the existing portal, into the diaphysis of the proximal fragment and levering the distal fragment laterally. (Figure 12)

Note:
Care must be taken not to fracture the medial cortex of the proximal fragment. To avoid this, make sure the elevator is inserted sufficiently deeply into the diaphysis.

Note:
Elevation of the metatarsal head is avoided by ensuring that the straight periosteal elevator remains directly over the medial eminence during displacement. (Figure 12)



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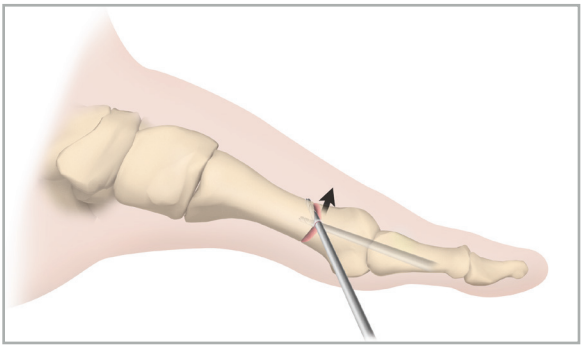

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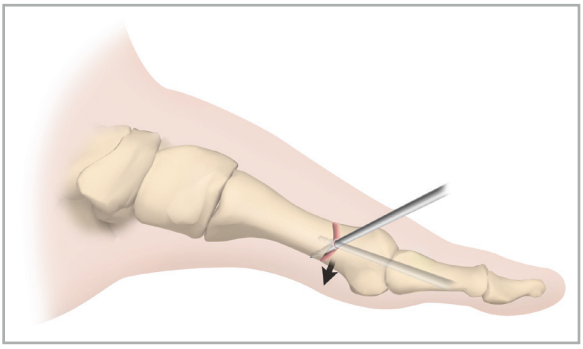


Figure 11

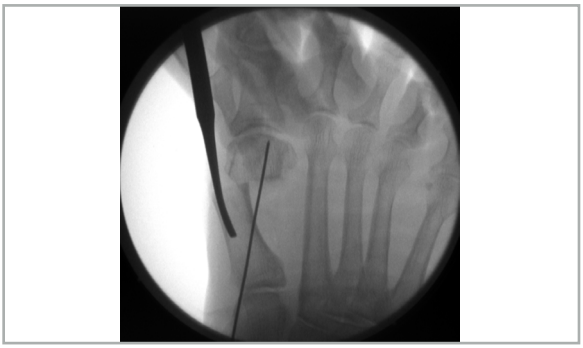
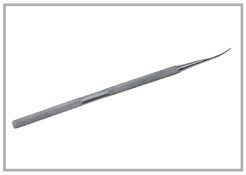


Figure 12

57SR0220
2mm x 20mm PROstep MICA Burr



57S1MI07
Straight periosteal elevator (part of a set)

57S100MT
First met translator

Chevron Osteotomy | Free hand technique

Step 1: K-wire

Once the lateralization and plantarization have been achieved, drive the 1.4mm and 0.9mm k-wires into the metatarsal head.

Note::
The proximal/lateral 1.4mm k-wire should sit in the lateral half of the metatarsal head and the distal/medial 0.9mm wire should sit in the medial half of the metatarsal head. Both 1.4mm and 0.9mm k-wires should not breach the MTP joint. (Figure 13)

DSDS1009S
0.9mm k-wire

DSDS1014S
1.4mm k-wire

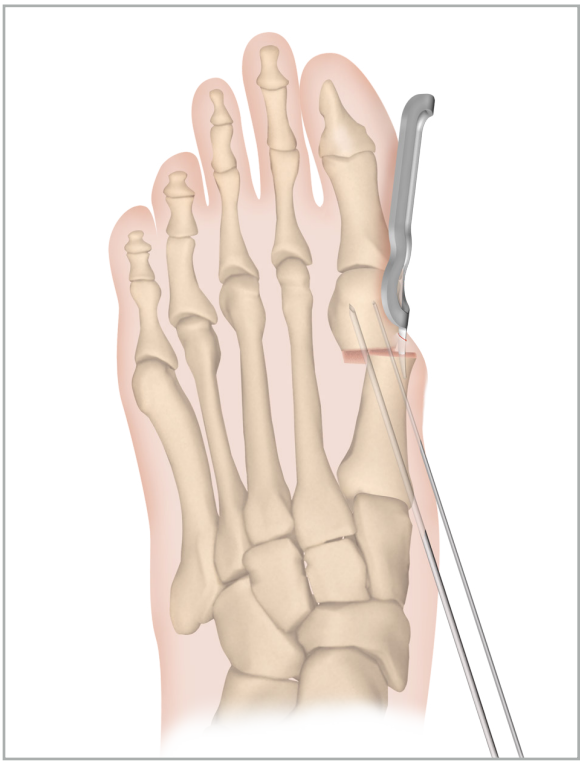


Figure 13

Step 2: Measure

Use the PROstep MICA Depth Gauge (57S000DG) to determine which size 4mm PROstep MICA Screw is needed for the proximal/lateral 1.4mm k-wire. Repeat for the distal/medial 3mm MICA Screw to be placed over the 0.9mm k-wire. (Figure 14)

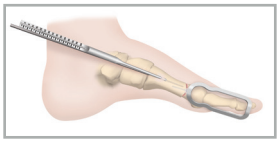


Figure 14

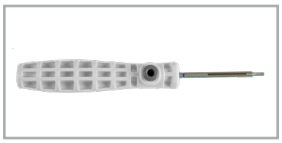


Figure 15

Step 3: Drill

For the 4mm PROstep MICA Screw, use the 3mm cannulated drill (57S00030).

For the 3mm PROstep MICA Screw, use the 2.2mm cannulated drill (57S00022).

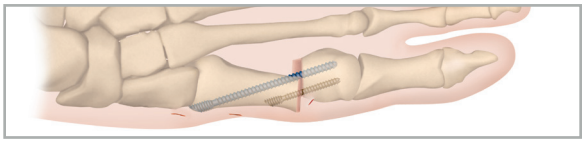


Figure 16

Note:
Alternatively, solid drills are available: 2.2mm (57S0L122) for the 3mm PROstep MICA Screw and 3.0mm (57S00130) for the 4mm PROstep MICA Screw. When using the 2.2mm solid drill through the target guide, insert the 2.2mm drill sleeve (57S00222) into the target guide prior to drill use.

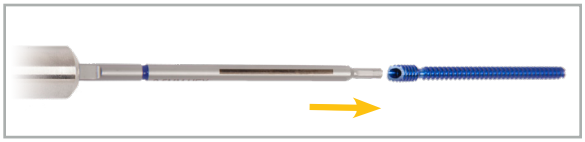


Figure 17

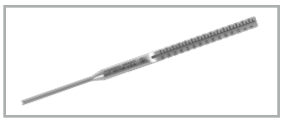
Step 4: Screw

The 4mm PROstep MICA Screw will be inserted over the 1.4mm k-wire using the 2.5mm hex driver (57S02025) attached to the handle (57S1HNDL).

The 3mm PROstep MICA Screw will be inserted over the 0.9mm k-wire using the 2.0mm hex driver (57S02020), attached to the handle (57S1HNDL). (Figure 15)

Insert each screw until the angled head is flush with the medial aspect of the first metatarsal. (Figure 16)

Note:
It is important to remember to align the line on the hex driver with the beveled head of the PROstep MICA Screw to allow for greater control when inserting the screw. (Figure 17) This alignment allows the user to determine when the PROstep MICA Screw is seated flush. X-ray will also confirm this.



57S000DG
MICA Depth Gauge

57S00030
3mm cannulated drill

57S00022
2.2mm cannulated drill

57S00222
drill sleeve 2.2mm

57S0L122
2.2mm solid drill

57S00130
3mm solid drill

57S02025
2.5mm hex driver

57S02020
2mm hex driver

57S1HNDL
handle

Chevron Osteotomy | Guided technique

Step 1: Introduction of the Pusher Assembly

Insert the Pusher Assembly (57790000) hook into the proximal fragment intramedullary canal.

Note:
If the osteotomy site is very tight, loosen it by creating an initial shift with an elevator in the canal.

The PROstep Straight Elevator may also be used as a "shoe horn" to help insert the hook.

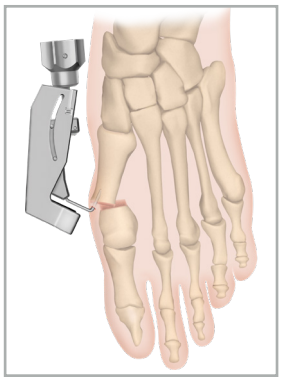


Figure 18

Step 2: Attachment of the Proximal Guide

Pull the Pusher Assembly (57790000) away from the foot and slide the Proximal Guide Block (57790009) into place.

Note:
Ensure the Guide is aligned with the long axis of the metatarsal. The proximal end must be sufficiently dorsal on the foot.

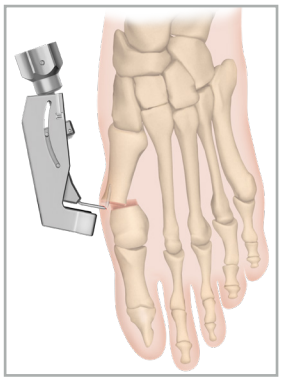


Figure 19

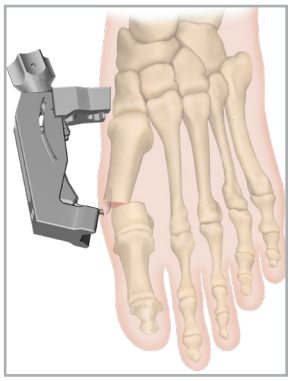


Figure 20

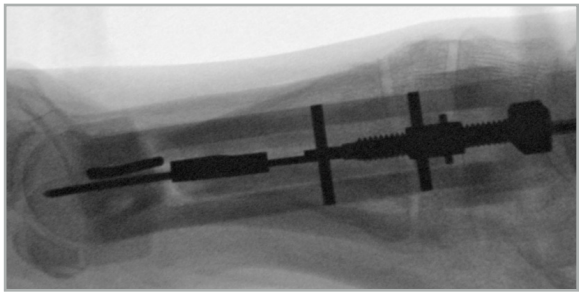


Figure 21

Step 3: Anchoring the Met Head

Tighten the thumb screw until the met head begins to lateralize.

Manually supinate the hallux if rotational correction is desired.

Anchor the rotation using a 2mm K-Wire (57790010) in the dorsal or the plantar hole.

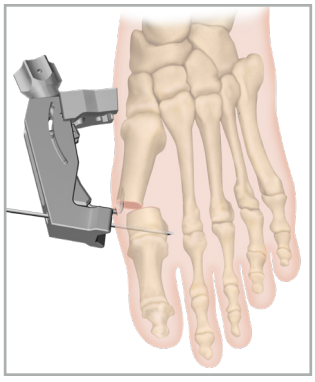


Figure 22

Step 4: Lateralization

Tighten the thumb screw until the met head is sufficiently lateralized.

Fine adjustment is possible by small turns of the thumb screw. Each turn of the Adjustment Knob causes between 1mm and 1.5mm of shift.

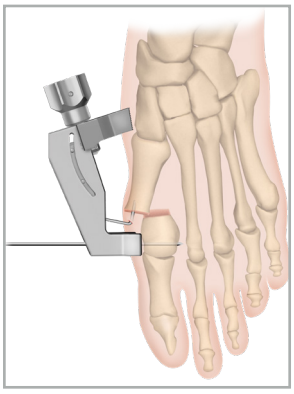


Figure 23

Step 5: Trajectory Indication

Make a proximal incision.

Assemble the Central Trajectory Cartridge (57790007), 1.4mm Wire Sleeve (57790001), and 1.4mm K-Wire (DSDS1014S).

The K-Wire shows the lateral screw trajectory on AP X-Ray when aligned with the Wire Sleeve.

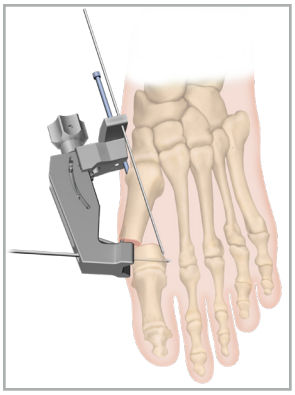


Figure 24

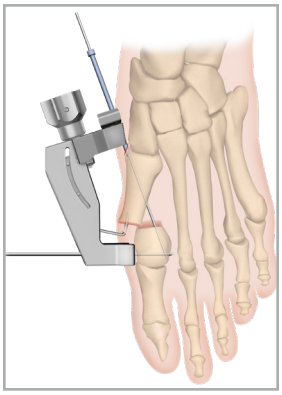


Figure 25

Step 6: Trajectory Selection

If the indicated trajectory is appropriate, continue to the next step.

For medial or lateral adjustment of the trajectory, replace the Central Cartridge (57790007) with the Medial (57790006) or Lateral Cartridge (57790008).

Note:
For very small feet, the standard trajectory may begin too proximally:

- **Manually pull the proximal end away from the foot.**
- **Insert the 1.4mm Wire Sleeve (57790001) to contact the metatarsal corner.**
- **The Sleeve will now support the proximal end of the device.**

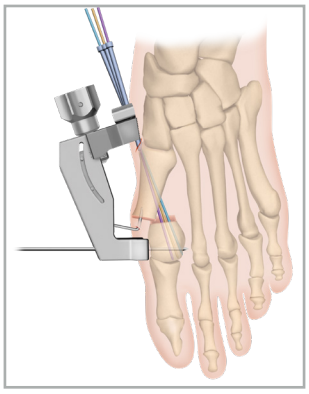


Figure 26

Step 7: Driving the Fixation Wires

Make additional incision to place the 0.9mm Wire Sleeve (57790002).

Ensure both sleeves are fully down to bone.

Drive the 1.4mm (DSDS1014S) and 0.9mm K-Wires (DSDS1009S) for the MICA Construct.

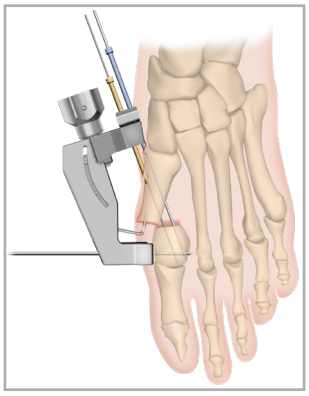


Figure 27

Step 8: Depth Gauge and Pre-Drilling for Screws

Remove the Sleeves and Cartridge.

Measure the needed screw lengths with the Depth Gauge (57S000DG) and then drill for each screw.

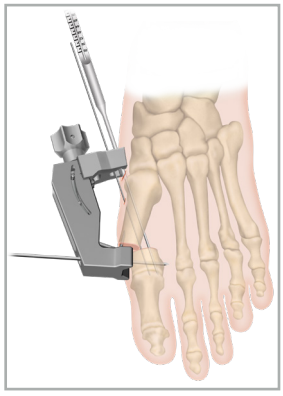


Figure 28

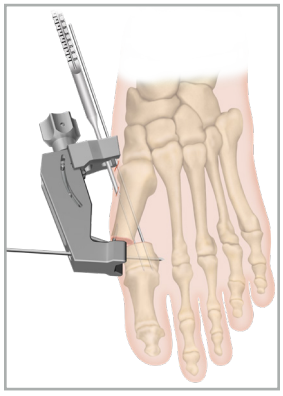


Figure 29

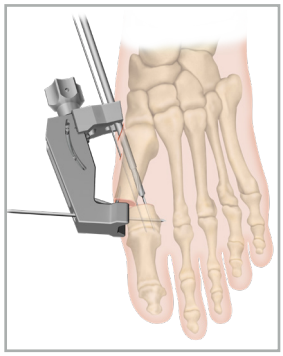


Figure 30

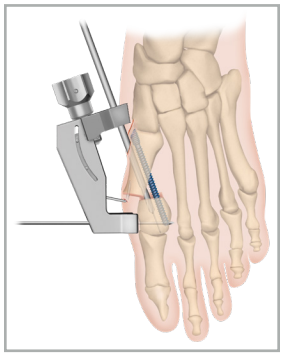


Figure 31

Step 9: Screw Placement

Insert the screws through the Screw Sleeve (57790003).

If two 4mm MICA screws are preferred, use the 1.4mm Wire Sleeve (57790001) sequentially in place of the 0.9mm Wire Sleeve (57790002). Loosen and remove the Guide.

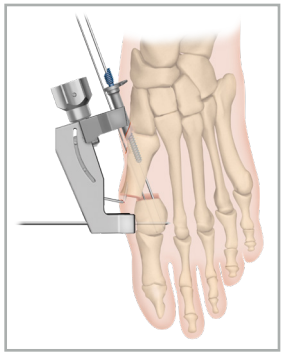


Figure 32

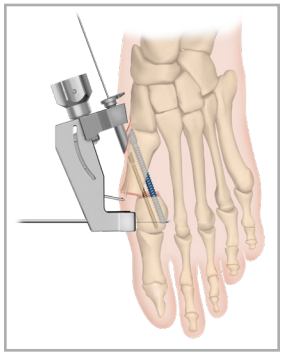


Figure 33

Step 10: Removal of Sharp Corner

If a palpable prominence remains after fixation, remove it with a PROstep burr.

(Optional) If guidance is needed:
Place the Recontouring Guide (57790011) over the 2.5mm Hex Driver (57S02025) and 0.9mm K-Wire (DSDS1009S).

Drive another 1.4mm K-Wire (DSDS1014S) into the prominence and drill over it using the 3mm Cannulated Drill (57S00030). This creates a pilot hole for burring.

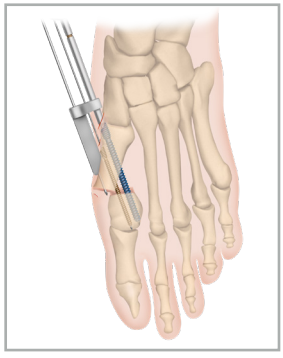


Figure 34

MICA Guide: Final Construct

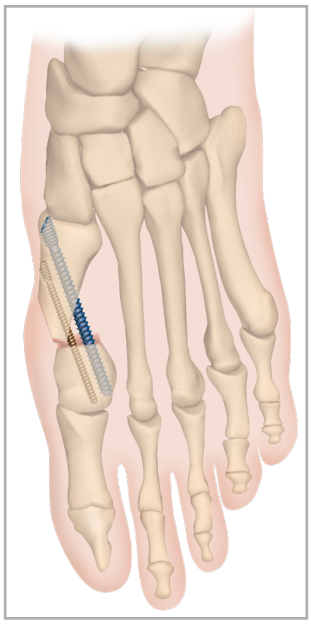
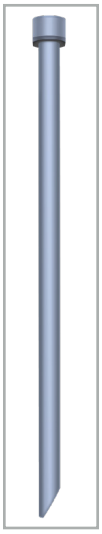


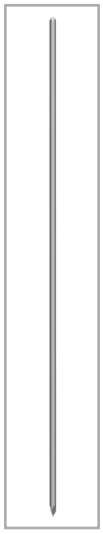
Figure 35

MICA Guide: Images and Part Numbers

0.9mm Wire Sleeve
(57790002)

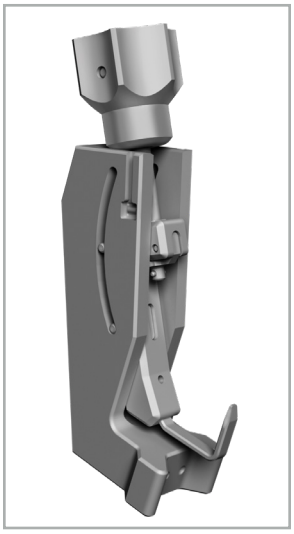


1.4mm Wire Sleeve
(57790001)



2mm K-wire
(57790010)

Drill and Screw Sleeve
(57790003)



Pusher Assembly
(57790000)

Recontouring
Guide
(57790011)

Medial
Trajectory Insert
(57790006)

Central
Trajectory Insert
(57790007)

Lateral
Trajectory Insert
(57790008)

Proximal
Guide Block
(57790009)

Lateral release

If required, this is performed through a stab incision over the lateral extreme of the dorsal aspect of the first MTP joint line.

A beaver blade is angled parallel to the joint, with the blade facing laterally, so as not to damage the articular surfaces. The blade is then deepened towards the plantar lateral aspect of the first MTPJ. (Figure 36)

The lateral head of the flexor hallucis brevis (lateral sesamophalangeal ligament) is divided on the plantar aspect of the joint. (Figure 37) This is a thickening of the plantar lateral capsule of the joint (plantar plate) and has a gritty quality when cut. Do not continue the cut laterally, otherwise, the lateral collateral ligament will be cut.

The x-ray may help to guide the beaver blade positioning and a varus movement of the hallux against the correctly positioned blade completes the cut.

X-ray views are helpful to confirm the release by observing a static lateral sesamoid on varus movement of the hallux.

In mild to moderate hallux valgus deformities, this is usually sufficient release of the lateral soft tissues.

Depending on surgeon preference, with greater deformities, the adductor hallucis and the sesamoid-metatarsal ligament can also be divided.

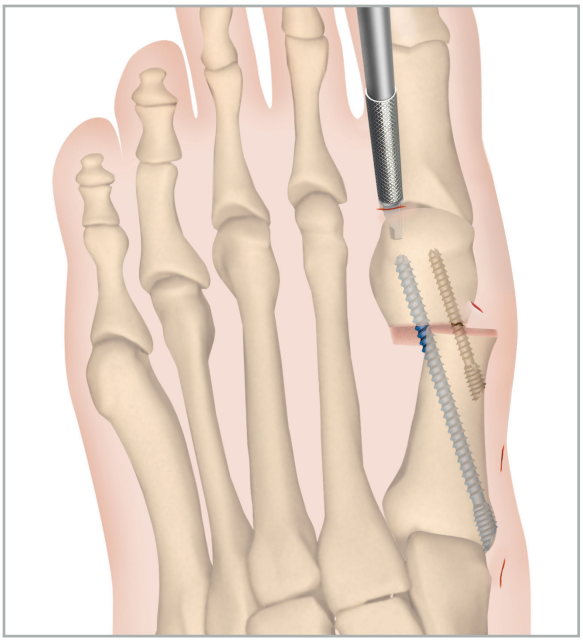


Figure 36
Blade position

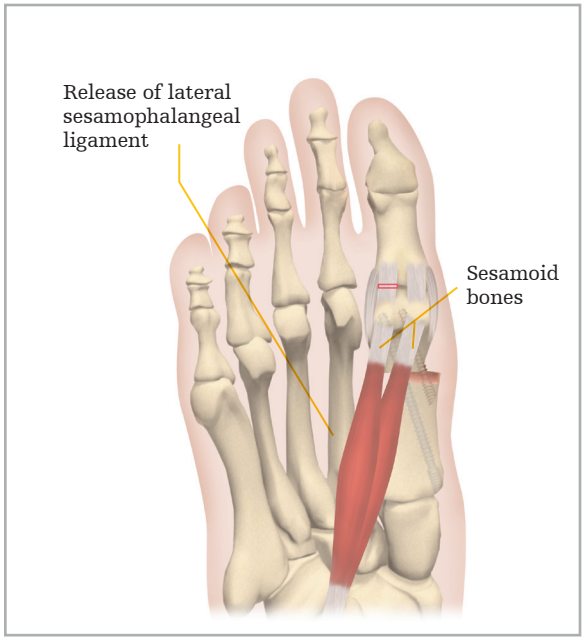


Figure 37

Explant information

Removal of the 3mm screw may be performed by using the 2mm hex driver (57S02020).

Removal of the 4mm screw may be performed by using the 2.5mm hex driver (57S02025).

If removal of the implant is required due to revision or failure of the device, the surgeon should contact the manufacturer using the contact information located on the back cover of this surgical technique to receive instructions for returning the explanted device to the manufacturer for investigation.

Postoperative management

Postoperative care is the responsibility of the medical professional.

Ordering information

PROstep MICA Screws

Part numbers		Description
3mm PROstep MICA Screws		
Packaging slimline	**Packaging standard**	
57S03020	57S13020	PROstep MICA Screw 3mm x 20mm
57S03022	57S13022	PROstep MICA Screw 3mm x 22mm
57S03024	57S13024	PROstep MICA Screw 3mm x 24mm
57S03026	57S13026	PROstep MICA Screw 3mm x 26mm
57S03028	57S13028	PROstep MICA Screw 3mm x 28mm
57S03030	57S13030	PROstep MICA Screw 3mm x 30mm
57S03032	57S13032	PROstep MICA Screw 3mm x 32mm
57S03034	57S13034	PROstep MICA Screw 3mm x 34mm
57S03036	57S13036	PROstep MICA Screw 3mm x 36mm
57S03038	57S13038	PROstep MICA Screw 3mm x 38mm
57S03040	57S13040	PROstep MICA Screw 3mm x 40mm
57S03042	57S13042	PROstep MICA Screw 3mm x 42mm
57S03044	57S13044	PROstep MICA Screw 3mm x 44mm
57S03046	57S13046	PROstep MICA Screw 3mm x 46mm
57S03048	57S13048	PROstep MICA Screw 3mm x 48mm

4mm PROstep MICA Screws

Packaging slimline	Packaging standard	
N/A	57S34020	PROstep MICA Screw 4mm x 20mm
N/A	57S34022	PROstep MICA Screw 4mm x 22mm
N/A	57S34024	PROstep MICA Screw 4mm x 24mm
N/A	57S34026	PROstep MICA Screw 4mm x 26mm
N/A	57S34028	PROstep MICA Screw 4mm x 28mm
N/A	57S34030	PROstep MICA Screw 4mm x 30mm
N/A	57S34032	PROstep MICA Screw 4mm x 32mm
N/A	57S34034	PROstep MICA Screw 4mm x 34mm
N/A	57S34036	PROstep MICA Screw 4mm x 36mm
57S04038	57S34038	PROstep MICA Screw 4mm x 38mm
57S04040	57S34040	PROstep MICA Screw 4mm x 40mm
57S04042	57S34042	PROstep MICA Screw 4mm x 42mm
57S04044	57S34044	PROstep MICA Screw 4mm x 44mm
57S04046	57S34046	PROstep MICA Screw 4mm x 46mm
57S04048	57S34048	PROstep MICA Screw 4mm x 48mm
57S04050	57S34050	PROstep MICA Screw 4mm x 50mm
57S04052	57S34052	PROstep MICA Screw 4mm x 52mm
57S04054	57S34054	PROstep MICA Screw 4mm x 54mm
57S04056	57S34056	PROstep MICA Screw 4mm x 56mm
57S04058	57S34058	PROstep MICA Screw 4mm x 58mm
57S04060	57S34060	PROstep MICA Screw 4mm x 60mm

PROstep MICA instruments

Part number	Description
Sterile consumable instruments	
DSDS1009S	K-wire 0.9mm x 150mm sterile
DSDS1014S	K-wire 1.4mm x 150mm sterile
57S00022	2.2mm x 60mm drill bit sterile
57S00030	3mm x 60mm drill bit sterile
57S0L122	2.2mm x 60mm solid drill sterile
57S00130	3mm x 60mm solid drill sterile
57S00122	2.2mm x 60mm Solid Drill sterile
DSDS1028S	2.8mm Cannulated Countersink sterile
57S01040	4.0mm Cannulated Countersink sterile
57S02020	2mm hex driver sterile
57S02025	2.5mm hex driver sterile
57S1MI07	MIS sterile instrument pack
57S000DG	PROstep MICA Depth Gauge sterile
57S1HNDL	Cannulated AO handle sterile
57S00222	PROstep MICA Drill Sleeve 2.2mm sterile
57S100MT	First met translator sterile
57790000	Pusher Assembly
57790009	Proximal Guide Block
57790006	Medial Traj Insert
57790007	Central Traj Insert
57790008	Lateral Traj Insert
57790003	Drill & Screw Sleeve
57790011	Recontouring Guide
57790002	0.9mm Wire Sleeve
57790001	1.4mm Wire Sleeve
DSDS1009	K-Wire 0.9mm
DSDS1014	K-Wire 1.4mm
57790010	K-Wire 2.0mm
Sterile burrs	
57SC0208	PROstep MICA Burr 2mm x 8mm sterile
57SR0212	PROstep MICA Burr 2mm x 12mm sterile
57SR0220	PROstep MICA Burr 2mm x 20mm sterile

Notes

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