Variable Angle LCP Mesh Plate 2.4/2.7. Part of the Variable Angle LCP Forefoot/Midfoot System 2.4/2.7.

Surgical Technique

Instruments and implants approved by the AO Foundation.

DePuy Synthes
COMPANIES OF Johnson&Johnson

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Image intensifier control

Warning
This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

Processing, Reprocessing, Care and Maintenance
For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance
For general information about reprocessing, care and maintenance of Synthes reusable devices, instrument trays and cases, as well as processing of Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

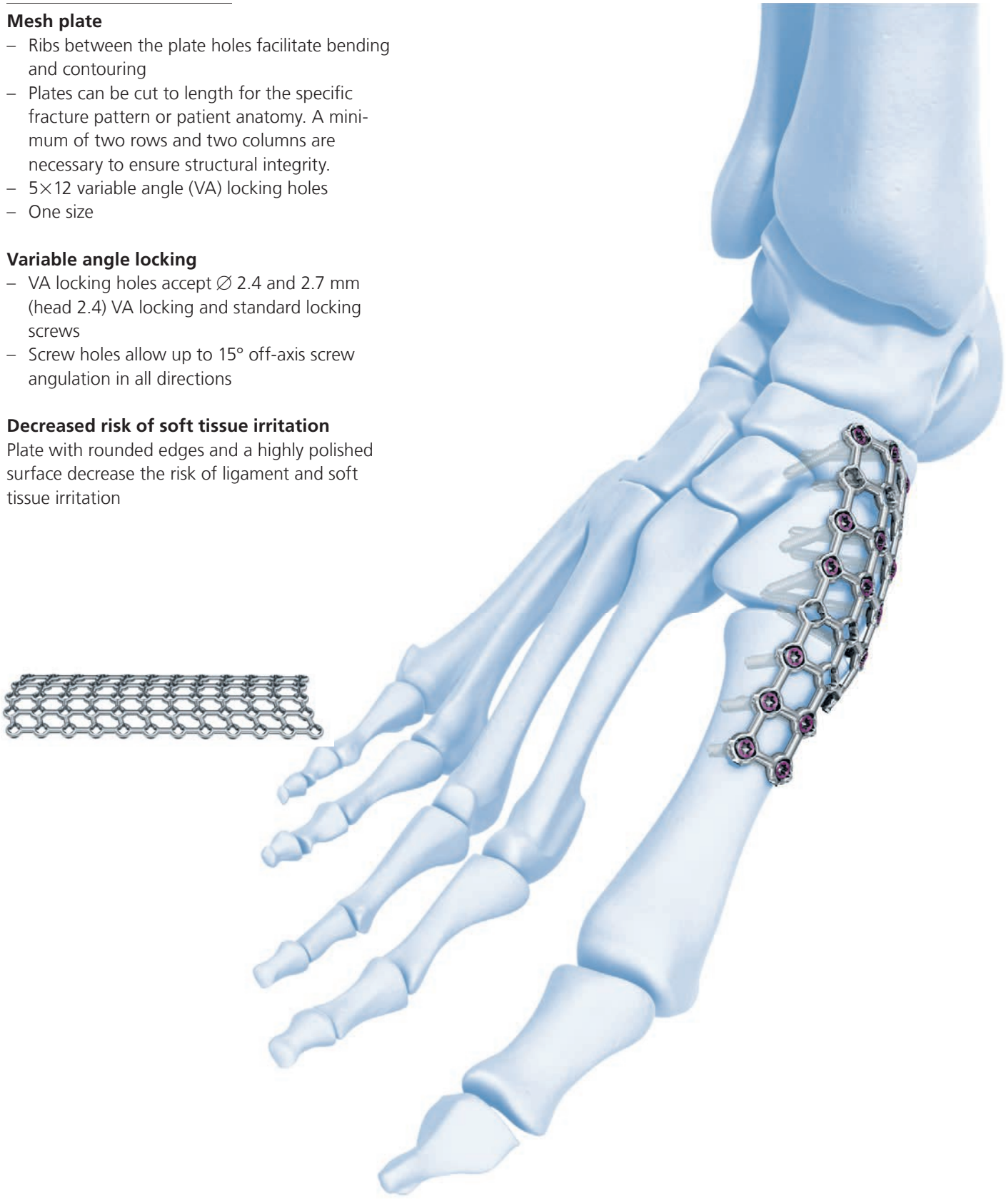
Variable Angle LCP Mesh Plate
2.4/2.7. Part of the Variable Angle LCP Forefoot/Midfoot System 2.4/2.7.

Features and Benefits

Mesh plate
- Ribs between the plate holes facilitate bending and contouring
- Plates can be cut to length for the specific fracture pattern or patient anatomy. A minimum of two rows and two columns are necessary to ensure structural integrity.
- 5×12 variable angle (VA) locking holes
- One size

Variable angle locking
- VA locking holes accept ∅ 2.4 and 2.7 mm (head 2.4) VA locking and standard locking screws
- Screw holes allow up to 15° off-axis screw angulation in all directions

Decreased risk of soft tissue irritation
Plate with rounded edges and a highly polished surface decrease the risk of ligament and soft tissue irritation

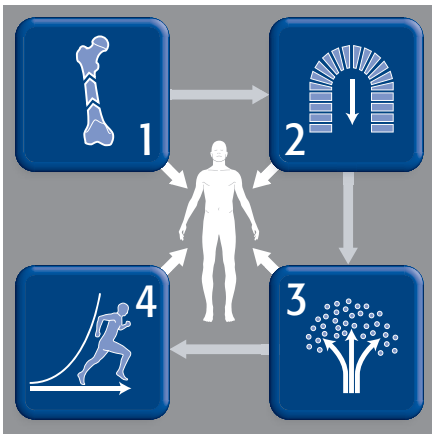


AO Principles

In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation.[1,2]

Anatomic reduction
Fracture reduction and fixation to restore anatomical relationships.

Early, active mobilization
Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.



Stable fixation
Fracture fixation providing absolute or relative stability, as required by the patient, the injury, and the personality of the fracture.

Preservation of blood supply
Preservation of the blood supply to soft tissues and bone by gentle reduction techniques and careful handling.

[1] Müller ME, Allgöwer M, Schneider R, Willenegger H . Manual of Internal Fixation. 3rd ed. Berlin, Heidelberg, New York: Springer. 1991.
[2] Rüedi TP, Buckley RE, Moran CG. AO Principles of Fracture Management. 2nd ed. Stuttgart, New York: Thieme. 2007.

Indications

The Mesh Plate, part of the Variable Angle LCP Forefoot/ Midfoot System 2.4/2.7, is indicated for fractures, deformations, severe osteoarthritis and non- and mal-unions in the forefoot and midfoot, particularly in osteopenic bone.

Screw Insertion Techniques

Variable angle (VA) locking holes 2.4/2.7 accept ∅ 2.4 mm and 2.7 mm variable angle (VA) locking screws.

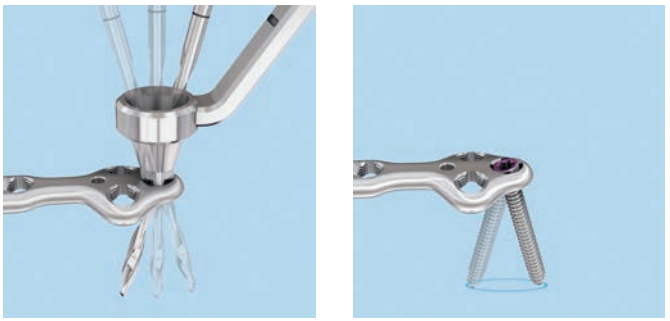
Screws can be inserted using two different techniques:
– Variable angle technique
– Predefined nominal angle technique

Variable angle technique
To drill variable angle holes at +/- 15° deviation from the nominal trajectory of the locking hole, insert the tip of the VA-LCP drill sleeve (03.211.003/03.110.023) and key into the cloverleaf-designed VA locking hole.

Precaution: It is important not to angulate more than 15° from the central axis of the screw hole. Overangulation may complicate screw locking and ultimately lead to inadequate screw locking.

Predefined nominal angle technique
The fixed-angle VA-LCP drill sleeve (03.211.004/03.110.024) only allows the drill bit to follow the nominal trajectory of the locking hole.

VA-LCP Drill Sleeve, conical, for Drill Bits (03.211.003/03.110.023)



Use of funnel-shaped VA-LCP Drill Sleeve

VA-LCP Drill Sleeve, coaxial, for Drill Bits (03.211.004/03.110.024)

1a
Prepare joint surface

Remove the cartilage and prepare the joint surface for arthrodesis. The surface of the joint can be manipulated to achieve the desired correction.

1b
Osteotomy

Create an osteotomy starting from one side. Do not cut through the bone, being sure to leave the other cortex intact.

1c
Reduce fracture

Reduce the fracture under image intensifier control and, if necessary, fix with Kirschner wires or reduction forceps. The reduction method will be fracture specific.

2
Cut plate

Instruments	
03.211.007	Cutting Pliers for Mesh Plate
391.940	Wire Cutter, long, length 230 mm

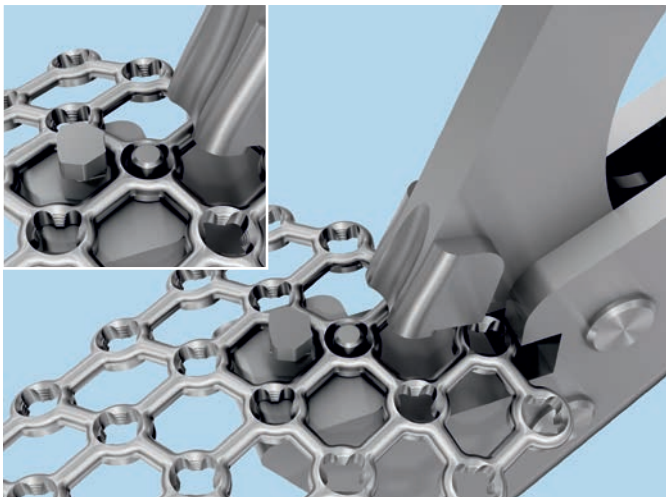
The plate can be cut to fit the patient anatomy. To cut multiple rows, use the wire cutter.

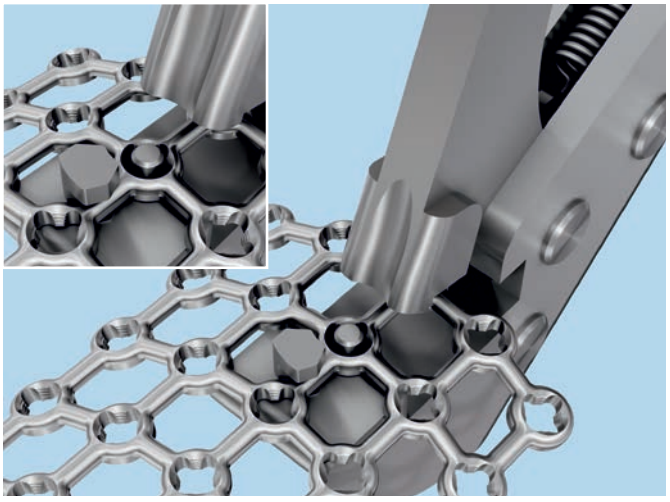
Precaution: A minimum of two rows and two columns are necessary to ensure structural integrity.

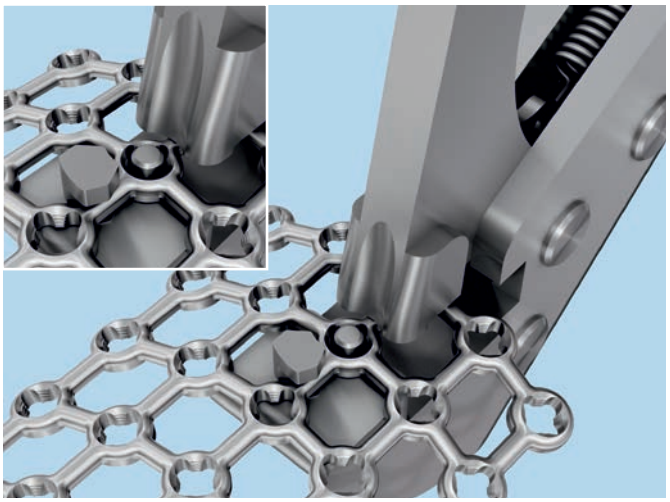
The cutting pliers for mesh plate can be used for finer cuts around the screw holes. To prevent sharp edges from causing soft tissue irritation, place the plate into the jaws of the cutter as shown.

1) Position the plate on the seating pin.
2) Position the plate under the notched pin.
3) Cut.

Warning: To prevent sharp edges from causing soft tissue irritation, place the plate into the jaws of the cutter as described. The hole or edge to be removed should be inside the jaws as depicted. To aid in alignment, the adjacent plate hole should be positioned on the seating pin and under the notched pin.





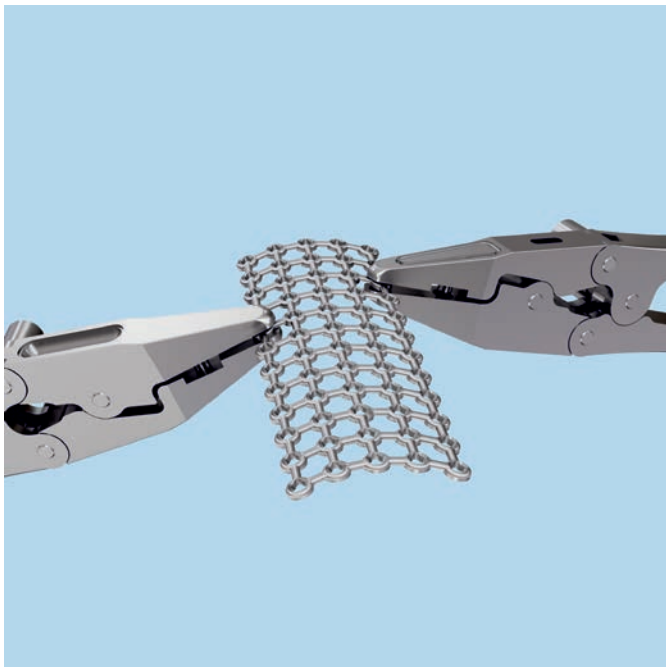


3
Contour plate

Instrument	
03.211.005	Bending Pliers for VA Locking Plates

The plate can be contoured to fit the specific anatomy and fixation options.

The bending pliers are designed to protect the VA locking holes during contouring. The feature on the pliers lines up with the cloverleaf design of the plate hole. Use two pliers to contour the plate.



Precaution:
- If possible, bend the plate between the VA locking holes. Do not deform the threaded part of the holes or over-bend the plates during bending as this may adversely affect insertion of VA locking screws.
- Do not repeatedly bend the plates back and forth as this may weaken the plate.

4

Drill and insert cortex screws

Instruments for use with cortex screws ∅ 2.7 mm	
310.534	Drill Bit ∅ 2.0 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling
310.260	Drill Bit ∅ 2.7 mm, length 100/75 mm, 2-flute, for Quick Coupling
323.260	Universal Drill Guide 2.7
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm
03.111.038	Handle with Quick Coupling
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
Instruments for use with cortex screws ∅ 2.4 mm	
310.509	Drill Bit ∅ 1.8 mm, with marking, length110/85 mm, 2-flute, for Quick Coupling
310.530	Drill Bit ∅ 2.4 mm, length 100/75 mm, 2-flute, for Quick Coupling
323.202	Universal Drill Guide 2.4
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm
03.111.038	Handle with Quick Coupling
314.467	Screwdriver Shaft, Stardrive, T8, self-holding

Insert independent cortex screws according to the corresponding indication and situation. Use the lag screw technique to achieve additional compression.

For ∅ 2.4 mm cortex screws, use the 2.4 universal drill guide and predrill the screw hole with the ∅ 1.8 mm drill bit. For ∅ 2.7 mm cortex screws, use the 2.7 universal drill guide and predrill the screw hole with the ∅ 2.0 mm drill bit.

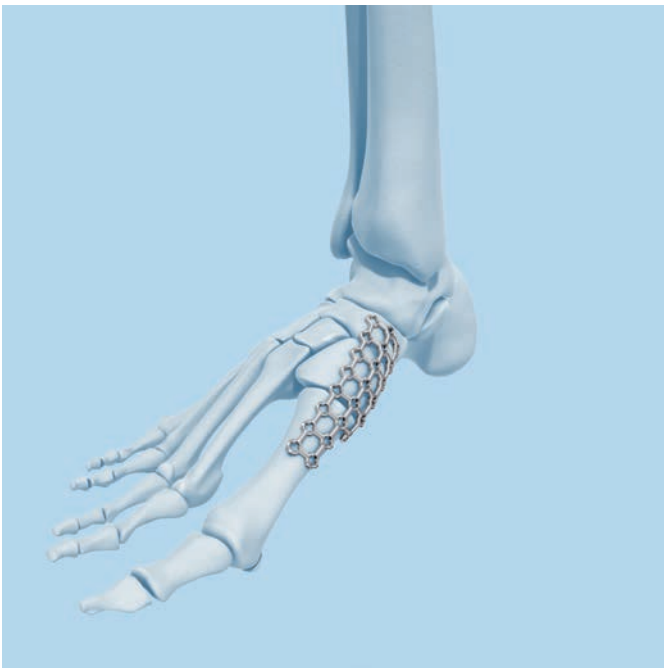
To drill a gliding hole for compression, use the ∅ 2.7 mm drill bit (for ∅ 2.7 mm cortex screws) or the ∅ 2.4 mm drill bit (for ∅ 2.4 mm cortex screws) with the double drill guide.

Determine the screw length with the depth gauge and insert the cortex screws manually.

5
Position plate

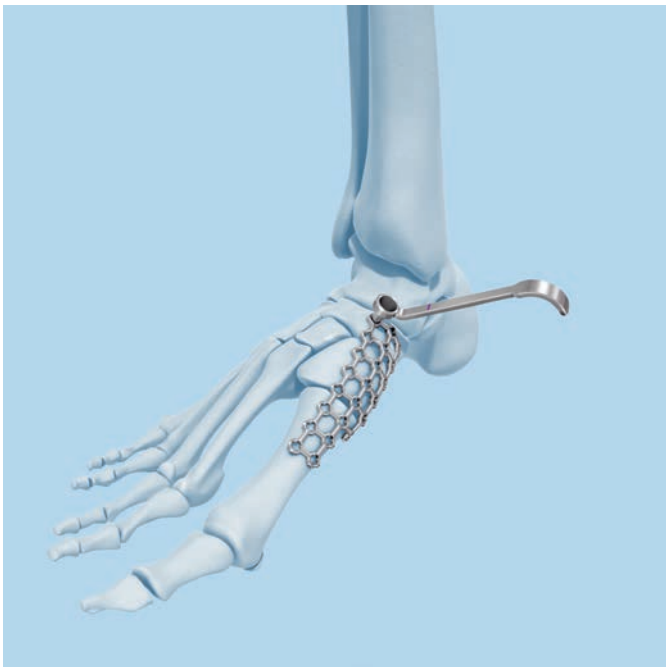
Position the plate over the osteotomy, the joint or the fracture gap. If necessary, fix provisionally with Kirschner wires or reduction forceps.

Place the plate on the bone, ensuring appropriate placement according to the specific procedure.

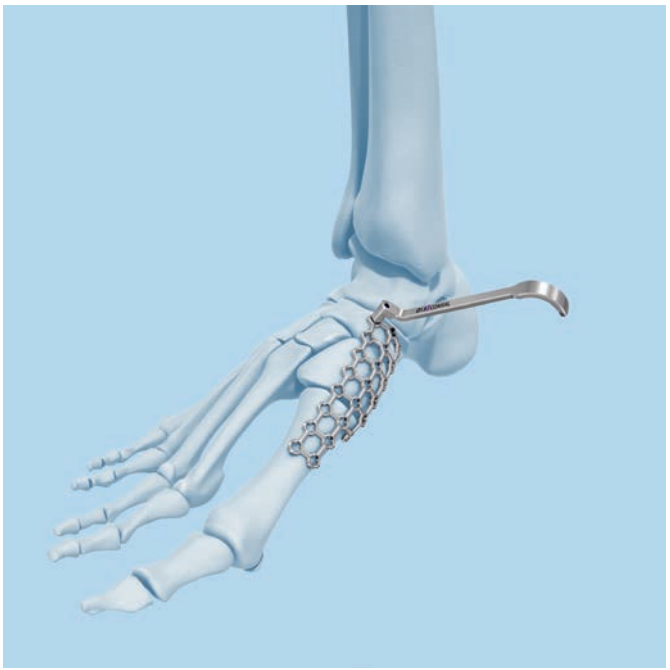


6
Predrill for VA locking screws

Instruments for use with VA locking screws ∅ 2.7 mm	
310.534	Drill Bit ∅ 2.0 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling
03.211.003	VA-LCP Drill Sleeve 2.7, conical, for Drill Bits ∅ 2.0 mm
03.211.004	VA-LCP Drill Sleeve 2.7, coaxial, for Drill Bits ∅ 2.0 mm
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm



Instruments for use with VA locking screws ∅ 2.4 mm	
310.509	Drill Bit ∅ 1.8 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling
03.110.023	VA-LCP Drill Sleeve 2.4, conical, for Drill Bits ∅ 1.8 mm
03. 110.024	VA-LCP Drill Sleeve 2.4, coaxial, for Drill Bits ∅ 1.8 mm
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm

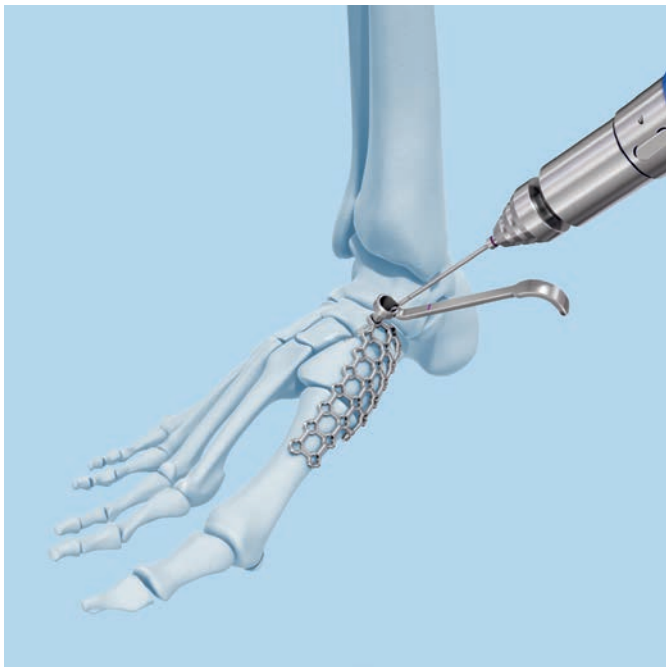


Determine the size of the VA locking screws (∅ 2.4 or 2.7 mm) and the insertion technique: variable angle (6a) or predefined nominal angle (6b).

6a

Predrill using variable angle technique

Instruments for use with VA locking screws ∅ 2.7 mm	
310.534	Drill Bit ∅ 2.0 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling
03.211.003	VA-LCP Drill Sleeve 2.7, conical, for Drill Bits ∅ 2.0 mm
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm
Instruments for use with VA locking screws ∅ 2.4 mm	
310.509	Drill Bit ∅ 1.8 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling
03.110.023	VA-LCP Drill Sleeve 2.4, conical, for Drill Bits ∅ 1.8 mm
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm



VA locking screws allow manipulation around the independent lag screw or existing implants.

Insert and lock the tip of the VA-LCP drill sleeve into the cloverleaf-designed VA locking hole. The cone will self-retain in the hole.

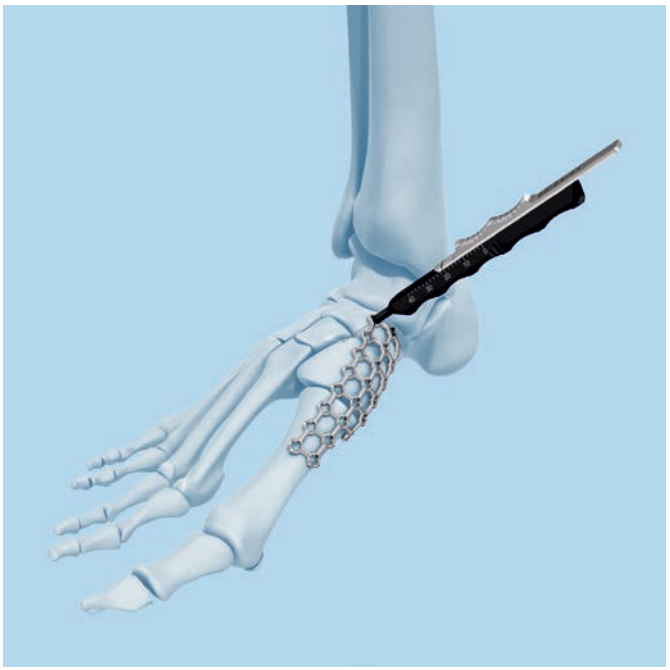
Use the ∅ 2.0 drill bit (for ∅ 2.7 mm VA locking screws) or the ∅ 1.8 mm drill bit (for ∅ 2.4 mm VA locking screws) to drill at the desired angle and to the desired depth.

The funnel of the drill sleeve allows the drill bit up to 15° angulation around the central axis of the locking hole.

Precaution: To ensure that the drill sleeve is locked correctly, do not angle the drill bit in excess of +/- 15° from the nominal trajectory of the hole.

- Verify the drill bit angle and depth under image intensifier control. If incorrect, drill at a different angle and verify again.

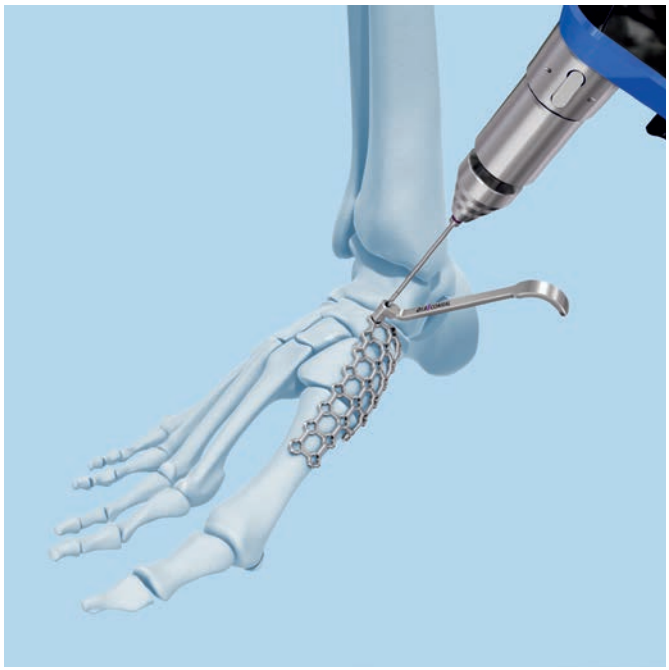
  Use the corresponding depth gauge to measure the correct screw length.



6b

Predrill using predefined nominal angle technique

Instruments for use with VA locking screws ∅ 2.7 mm	
310.534	Drill Bit ∅ 2.0 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling
03.211.004	VA-LCP Drill Sleeve 2.7, coaxial, for Drill Bits ∅ 2.0 mm
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm
Instruments for use with VA locking screws ∅ 2.4 mm	
310.509	Drill Bit ∅ 1.8 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling
03.110.024	VA-LCP Drill Sleeve 2.4, coaxial, for Drill Bits ∅ 1.8 mm
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm



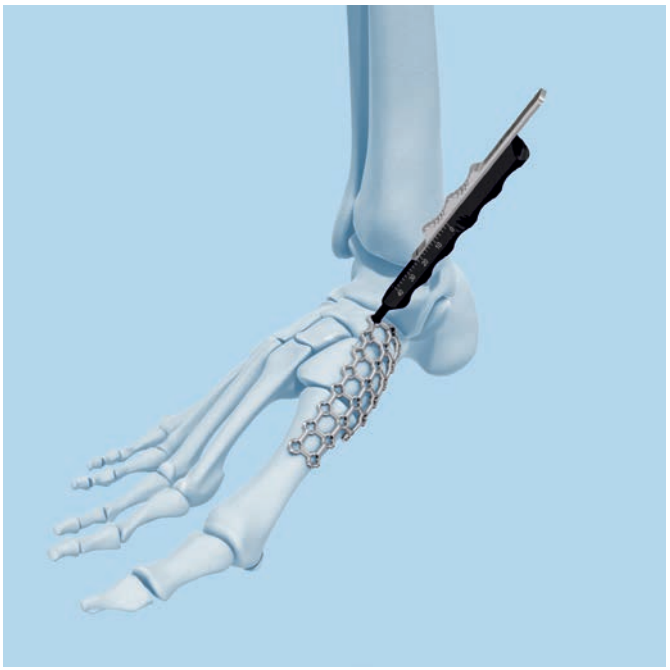
VA locking screws and standard locking screws can be inserted into the plate at the predefined hole angle.

Insert and lock the tip of the VA-LCP drill sleeve into the cloverleaf-designed VA locking hole. The coaxial drill sleeve will self-retain in the hole.

Use the ∅ 2.0 drill bit (for ∅ 2.7 mm VA locking screws and standard locking screws) or the ∅ 1.8 mm drill bit (for ∅ 2.4 mm VA locking screws and standard locking screws) to drill to the desired depth.

Verify the drill bit depth under image intensifier control.

Use the corresponding depth gauge to measure the correct screw length.



7
Insert VA locking screws

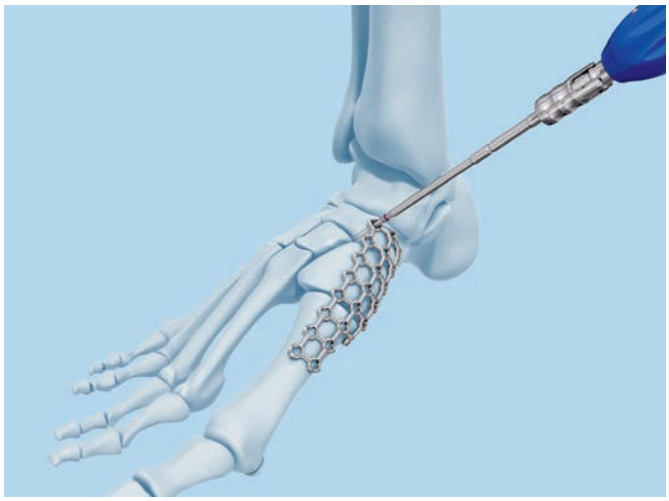
Instruments	
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
03.111.038	Handle with Quick Coupling

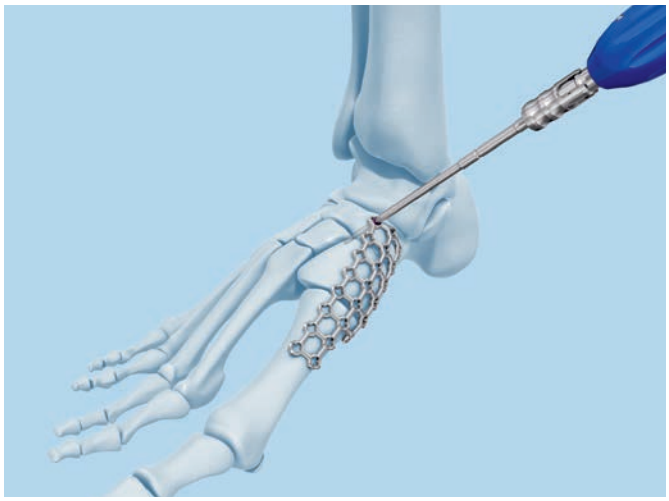
Insert the correct length VA locking screw manually using the screwdriver shaft and handle with quick coupling. Insert the screw until the screw head is seated (with limited force) in the VA locking hole.

Precaution: Do not over-tighten screws. This allows for the screws to be easily removed should they not be in the desired position.

Insert additional screws as needed.

Confirm proper reconstruction, screw placement and screw length under image intensifier control.





8

Final tighten VA locking screws

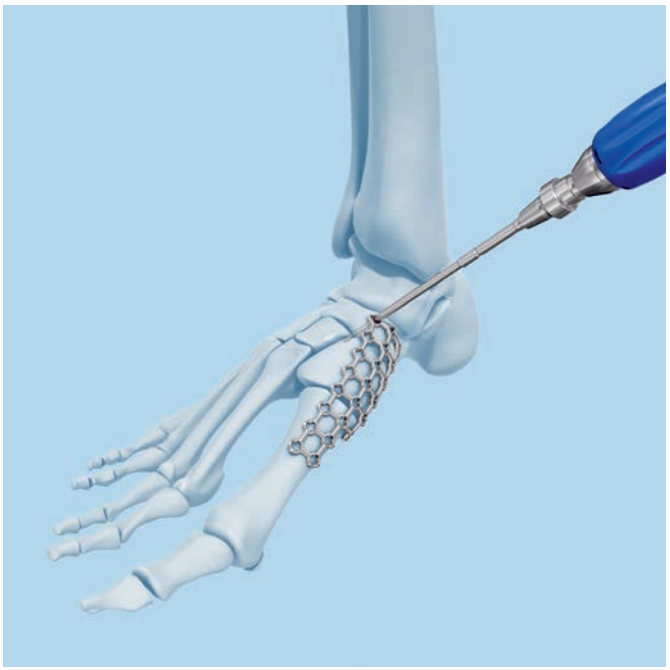
Instruments	
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
03.110.002	Torque Limiter, 1.2 Nm, with AO/ASIF Quick Coupling
03.110.005	Handle for Torque Limiters 0.4/0.8/1.2 Nm

Use the 1.2 Nm torque limiter to final tighten the VA locking screws. The torque limiter attaches to the T8 Stardrive screwdriver shaft and the blue handle of the torque limiter.

Use of the torque limiter is mandatory for VA locking holes to ensure the correct amount of torque is applied when final tightening the screws.

After final tightening, the screws are securely locked in the plate to achieve maximum strength of the plate-screw interface.

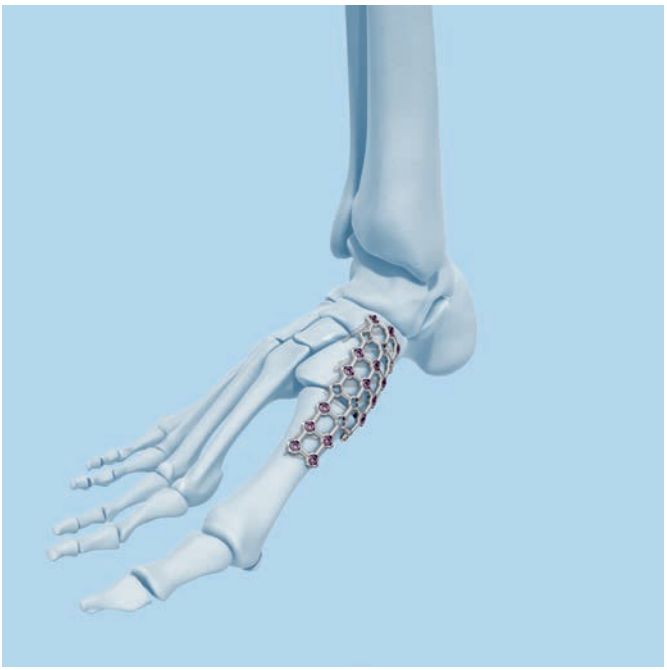
Note: For final locking, the 1.2 Nm TLA torque limiting attachment is required.



9

Ensure proper reconstruction

Ensure proper joint reconstruction, screw placement and screw length under image intensifier control. Verify that the screws are not in the joint or the soft tissue.



Implant Removal

Instruments

314.467	Screwdriver Shaft, Stardrive, T8, self-holding
03.111.038	Handle with Quick Coupling

To remove locking screws, first unlock all locking screws before removing them completely, otherwise the plate may rotate and damage the soft tissue.

Screws

Variable Angle Locking Screws ∅ 2.7 mm

0X.211.010– 0X.211.040*	VA Locking Screw Stardrive ∅ 2.7 mm (head 2.4), self-tapping, length 10–40 mm
0X.211.042S– 0X.211.060S	VA Locking Screw Stardrive ∅ 2.7 mm (head 2.4), self-tapping, length 42–60 mm, sterile

Threaded, rounded head locks securely into the threaded VA locking holes to provide angular stability at angles determined by the surgeon.

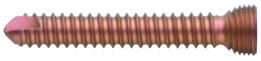
Also securely locks into standard locking holes of the plate at the predefined angle.

Note: For final locking, the 1.2 Nm TLA torque limiting attachment is required.

Optional

Variable Angle Locking Screws ∅ 2.4 mm

0X.210.106– 0X.210.140*	VA Locking Screw Stardrive ∅ 2.4 mm, self-tapping, length 6–40 mm
0X.210.142S– 0X.210.160S	VA Locking Screw Stardrive ∅ 2.4 mm, self-tapping, length 42–60 mm, sterile



X = 2: Stainless steel
X = 4: TAN

*Are available nonsterile and sterile packed. To order sterile packed screws, add suffix "S" to article number.

Optional

Cortex Screws ∅ 2.7 mm

X02.870 – X02.900*	Cortex Screw Stardrive ∅ 2.7 mm, self-tapping, length 10 – 40 mm
X02.962S – X02.960S	Cortex Screw Stardrive ∅ 2.7 mm, self-tapping, length 42 – 60 mm, sterile






Optional

Cortex Screws ∅ 2.4 mm

X01.756 – X01.790*	Cortex Screw Stardrive ∅ 2.4 mm, self-tapping, length 6 – 40 mm
0X.210.942S – 0X.210.960S	Cortex Screw Stardrive ∅ 2.4 mm, self-tapping, length 42 – 60 mm, sterile






Optional

Locking Screws ∅ 2.4/2.7 mm

X12.806 – X12.830*	Locking Screw Stardrive ∅ 2.4 mm, self-tapping, length 6 – 30 mm
X02.206 – X02.260*	Locking Screw Stardrive ∅ 2.7 mm (head LCP 2.4), self-tapping, length 6 – 60 mm





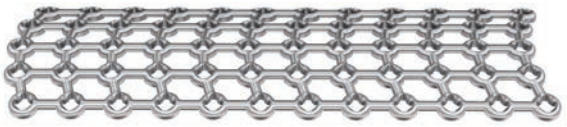

X = 2: Stainless steel
X = 4: TAN

*Are available nonsterile and sterile packed. To order sterile packed screws, add suffix "S" to article number.

Plate

Mesh Plate 2.4/2.7, VA locking

Art. No.	Holes	Length (mm)	Width (mm)
0X.211.224S	5×12	113	39



X = 2: Stainless steel
X = 4: TAN

Plates are only available sterile packed.

Instruments

314.467	Screwdriver Shaft, Stardrive, T8, self-holding	
03.110.002	Torque Limiter, 1.2 Nm, with AO/ASIF Quick Coupling	
03.110.005	Handle for Torque Limiters 0.4/0.8/1.2 Nm	
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm	
03.111.038	Handle with Quick Coupling	
03.211.001	Holding Pin for VA Locking Plates 2.4/2.7	

Instruments for mesh plate

391.940	Wire Cutter, long, length 230 mm	
03.211.005	Bending Pliers for VA Locking Plates	
03.211.007	Cutting Pliers for Mesh Plate	

Instruments for insertion of ∅ 2.7 mm screws

310.260	Drill Bit ∅ 2.7 mm, length 100/75 mm, 2-flute, for Quick Coupling	
310.534	Drill Bit ∅ 2.0 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling	
323.260	Universal Drill Guide 2.7	
03.211.003	VA-LCP Drill Sleeve 2.7, conical, for Drill Bits ∅ 2.0 mm	
03.211.004	VA-LCP Drill Sleeve 2.7, coaxial, for Drill Bits ∅ 2.0 mm	

Instruments for insertion of ∅ 2.4 mm screws

310.509	Drill Bit ∅ 1.8 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling	
310.530	Drill Bit ∅ 2.4 mm, length 100/75 mm, 2-flute, for Quick Coupling	
323.202	Universal Drill Guide 2.4	
03.110.023	VA-LCP Drill Sleeve 2.4, conical, for Drill Bits ∅ 1.8 mm	
03.110.024	VA-LCP Drill Sleeve 2.4, coaxial, for Drill Bits ∅ 1.8 mm	

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-06e1 and ASTM F2119-07

Non-clinical testing of worst case scenario in a 3 T MRI system did not reveal any relevant torque or displacement of the construct for an experimentally measured local spatial gradient of the magnetic field of 3.69 T/m. The largest image artifact extended approximately 169 mm from the construct when scanned using the Gradient Echo (GE). Testing was conducted on a 3 T MRI system.

Radio-Frequency-(RF-)induced heating according to ASTM F2182-11a

Non-clinical electromagnetic and thermal testing of worst case scenario lead to peak temperature rise of 9.5 °C with an average temperature rise of 6.6 °C (1.5 T) and a peak temperature rise of 5.9 °C (3 T) under MRI Conditions using RF Coils [whole body averaged specific absorption rate (SAR) of 2 W/kg for 6 minutes (1.5 T) and for 15 minutes (3 T)].

Precautions: The above mentioned test relies on non-clinical testing. The actual temperature rise in the patient will depend on a variety of factors beyond the SAR and time of RF application. Thus, it is recommended to pay particular attention to the following points:

- It is recommended to thoroughly monitor patients undergoing MR scanning for perceived temperature and/or pain sensations.
- Patients with impaired thermo regulation or temperature sensation should be excluded from MR scanning procedures.
- Generally it is recommended to use a MR system with low field strength in the presence of conductive implants. The employed specific absorption rate (SAR) should be reduced as far as possible.
- Using the ventilation system may further contribute to reduce temperature increase in the body.

DePuy Synthes
COMPANIES OF Johnson&Johnson
People inspired™

Synthes GmbH
Eimattstrasse 3
4436 Oberdorf
Switzerland
Tel: +41 61 965 61 11
Fax: +41 61 965 66 00
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