

# **PEDUS L** Locking Plantar Lapidus Plate





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## PEDUS L - Locking Plantar Lapidus Plate –

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Note:

The surgery instructions outlined below reflect the surgery procedure recommended by the author. However, each surgeon must decide which surgical method and which approach is the most successful for his patient.



## - PEDUS L - Locking Plantar Lapidus Plate -

#### Implants





#### Dimensions PEDUS-L Locking Plantar Lapidus Plate, sterile

- Thickness:
- Material:

1.6 mm Ti6Al4V Type II anodization

## Dimensions Locking Cortical Screw $\varnothing$ 3.0 mm, self-tapping

<ul> <li>Thread diameter:</li> </ul>	3.0 mm
<ul> <li>Core diameter:</li> </ul>	1.95 mm
• Pitch:	1.25 mm
<ul> <li>Hexagon socket:</li> </ul>	2.5 mm
<ul> <li>Screw length:</li> </ul>	16-30 mm
• Material:	Ti6Al4V Type II anodization

## Dimensions Cortical Screw $\varnothing$ 2.7 mm, self-tapping

<ul> <li>Screw diameter:</li> </ul>	2.7 mm
<ul> <li>Core diameter:</li> </ul>	1.9 mm
• Pitch:	1.0 mm
<ul> <li>Hexagon socket:</li> </ul>	2.5 mm
<ul> <li>Screw length:</li> </ul>	12-30 mm
• Material:	Ti6Al4V anodization



## Cannulated Screw $\ensuremath{\oslash}$ 3.5 mm, short thread self-drilling

<ul> <li>Screw diameter:</li> </ul>	3.5 mm
Core diameter:	2.5 mm
• Pitch:	1.25 mm
<ul> <li>Hexagon socket:</li> </ul>	2.5 mm
<ul> <li>Screw length:</li> </ul>	34-42 mm
Perforation:	1.35 mm
• Material:	Ti6Al4V anodization



Article Number
10.03530.016
10.03530.018
10.03530.020
10.03530.022
10.03530.024
10.03530.026
10.03530.028
10.03530.030
Article Number
03.03527.012
03.03527.014
03.03527.016
03.03527.018
03.03527.020
03.03527.022
03.03527.024
03.03527.026
03.03527.028
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Article Number
08.03535.030
08.03535.032

08.03535.034 08.03535.036 08.03535.038 08.03535.040 08.03535.042



### System

#### Principle and goal of surgery

The plantar plate has several advantages in the fusion of the first TMT joint. For one, it optimizes the biomechanics. A tension band mechanism is created in the plantar region that causes compression of the arthrodesis under weight bearing. Furthermore, the plate is completely covered by the abductor hallucis muscle, which reduces wound healing disturbances after surgery and makes removal of the metal unnecessary in most cases.

#### **Advantages**

- Biomechanically optimal configuration of the arthrodesis through a tension band mechanism
- This results in a faster build-up of permissible weight bearing
- Shorter thrombosis prophylaxis through faster achievement of sufficient partial weight bearing of the foot
- Good covering of the plate through abductor hallucis muscle
- Precise correction also of medial and large intermetatarsal angles
- Good combinability with distal procedures such as Reverdin-Laird-Green procedure or Akin osteotomy procedure for the correction of the joint angle
- When using modern angle-stable implants a high primary stability without corrective loss is achieved
- Compared to the dorsal and medial plate or to screw osteosynthesis, there is a higher primary stability and also a reduced rate of pseudarthrosis
- Reduced risk of iatrogenic lifting of the first metatarsal

#### Disadvantages

- The discreet shortening of the first metatarsal bone can lead to reduced strength of the flexor hallucis longus muscle
- Risk of developing transfer metatarsalgia

#### Indications

- Hallux valgus with unstable and degenerative changes of the first TMT joint
- Isolated arthritis in the first TMT joint
- Hypermobility or radiological instability of the first TMT joint

#### Contraindications

- Short first metatarsal (the interposition of a bone transplant must be considered on a case-by-case basis)
- Severe degenerative changes in the metatarsophalangeal joint of the great toe
- Extensive disturbances of the peripheral blood supply
- Poor skin conditions
- Local infection



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#### Operation manual



#### Approach

Marking of skin incision on the medial side over the first metatarsophalangeal joint along the upper edge of the abductor hallucis muscle up to 2 cm on the proximal side of the first tarsometatarsal joint.



Removal of the tendinous parts of the anterior tibial muscle running to the base of the first metatarsal. The main part of the tendon has its insertion point on the medial cuneiform bone and should be left there. The preparation and opening of the medial joint capsule on the great toe metatarsophalangeal joint is typically performed in an L or V shape while exposing the pseudo-exostosis. Through arthrodesis of the first TMT joint a correction of the intermetatarsal angle by about 10 degrees and more can be achieved. For this reason, it is advisable to resect the pseudo-exostosis after the correction of the IMA to avoid a too much resection of the exostosis.



#### Identification of the TMT 1 joint with a cannula

There is a layer of connective tissue between the bones and the abductor hallucis muscle, which allows for blunt removal of the plantar structures from the joint capsule of the first TMT joint. Exposure of the plantar joint parts enables later application of the plantar plate.

Opening of the medial joint capsule of the first TMT joint. With unclear anatomical situation identification of first TMT joint with a cannula under image intensifier control.



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#### Resection of the TMT 1 articular surface

A careful resection of the joint surfaces while removing a laterobasal wedge with oscillating saw corresponding to the desired correction. Surgery methods are also published involving only removal of cartilage from the first TMT joint followed by drilling of the subchondral bone lamella or an arthroscopic procedure. The soft tissue can be reliably protected with two small retractors. It is advisable to apply the first saw cut at a 90 degree angle to the axis of the first metatarsal. Then, the first metatarsal is brought into the desired position by manual repositioning and if necessary fixated to the second metatarsal with Kirschner wires. The result of the repositioning can be checked with the help of the image intensifier. The second saw cut is now applied parallel to the resection area on the cuneiform bone, thus defining the lateral wedge.

If the elongation of the first ray is desired the correction can be performed through interposition of a tricortical iliac crest bone graft in TMT 1. With degenerative changes in the metatarsophalangeal joint an elongation of the first metatarsal can lead to limited mobility, however, so that shortening osteotomy, e.g. in Weil technique, can be considered in the event of a disproportion between the length of the first metatarsal and the second to fourth metatarsals. The resected bone pieces are removed with the luer. In part, these must be sharply removed from the joint capsule on the plantar side. Spreading of the arthrodesis with a small osteotomy retractor to ensure that all pieces of bone have been completely removed and do not obstruct repositioning. After resection of the TMT 1 joint the transarticular mobilization of the sesamoid bone complex is performed through a longitudinal incision of the joint capsule on the upper edge of the fibular sesamoid bone if the sesamoid bone complex is decentered. The adductor hallucis muscle located below then becomes visible and is removed so that the great toe can be brought into a varus position of 20 degrees without applying significant force. A complete separation of all lateral ligamentous structures should be avoided, since this poses a risk of over correction.

#### Insertion of the cannulated 3.5 mm lag screw

Then repositioning of arthrodesis. The cortical bone is aligned on the plantar side, which causes a ridge on the dorsal side, which is removed with the luer. The arthrodesis is temporarily stabilized using Kirschner wire that is drilled from the dorsal side through the first metatarsal in plantar direction into the cuneiform bone. The entry point of the Kirschner wire is approx. 3 cm to the distal side of the arthrodesis. Afterwards the repositioned first metatarsal and position of Kirschner wire are checked under the image intensifier control through dorsoplantar projection and in 45-degree supination. The tip of the Kirschner wire should perforate the cortical bone of the medial cuneiform bone on the plantar side of the joint surface to the navicular bone, the cortical bones of the medial cuneiform and first metatarsal bone should be aligned on the plantar side. When the check using the image intensifier shows satisfying results, drilling of the Kirschner wire with the cannulated 2.7 mm drill bit (Ref.: 12.20010.027) through the douple drill sleeve (Ref.: 08.20060.027), countersinking to prepare the seating for the head of the screw using the cannulated countersing (Ref.: 08.20030.035), measurement of the length with the measuring device (Ref.: 08.20100.035) and insertion of the appropriate self drilling cannulated 3.5 mm lag screw under manual repositioning of the TMT 1 joint.







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Again check the position and localization of the lag screw under the image intensifier.



#### Positioning of the plate

Then modeling and attachment of an angle-stable neutralization plate with two Kirschner wires onto the bone. On the plantar side of the first TMT joint is a plane area, which can be used well to position the plate.



#### Insertion of the locking or non-locking screws

The screw holes are used step by step. The appropriate drill guide (Ref.: 10.20060.046) is screwed into one of the holes and the bone is now drilled bicortically through the drill guide using the 2.0 mm drill bit (Ref.: 10.20010.020). The screw length is determined using the depth gauge (Ref.: 02.20100.038). The depth gauge is therefore placed direct onto the bone. Now the appropriate screw (lccking or non-locking) is screwed into place using the 2.5 mm hexagon screw driver shaft plus handle (Ref.: 12.20040.025 and 02.20050.010). The other screws are then screwed into place following the above instruction.



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After the plate fixation with all screws a final control of the plate position and the screw length is recommended with the image intensifier.



#### Resection of the pseudo-exostosis

Finally, carefully resection the pseudo-exostosis, since the extent of the necessary resection can now be easily evaluated.



#### Concluding the operation

Under repositioning of the sesamoid bone complex, closure of the medial joint capsule on the metatarsophalangeal joint of the great toe. The great toe is held here in a neutral position. An over-contracted closure of the joint capsule must be avoided. Check the joint mobility, which should allow a range of motion with dorsal extension/plantar flexion of 60-0-40 degrees. Then, closure of medial soft tissue. The removed fibers of the anterior tibial muscle can be sown up with the periosteum.

If necessary, the TMT 1 arthrodesis can be combined with an Akin osteotomy or with distal metatarsal osteotomy to correct the distal metatarsal articular angle (DMAA).





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#### Post operative treatment

- 6 weeks lower leg walker with 20 kg partial weight bearing until ossification has taken place.
- Increasing weight bearing following radiological follow-up.
- Mobilisation of the first metatarsophalangeal joint, corrective bandaging and hallux splinting should be selected in accordance with the requirements of the distal intervention.





### Instruments



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