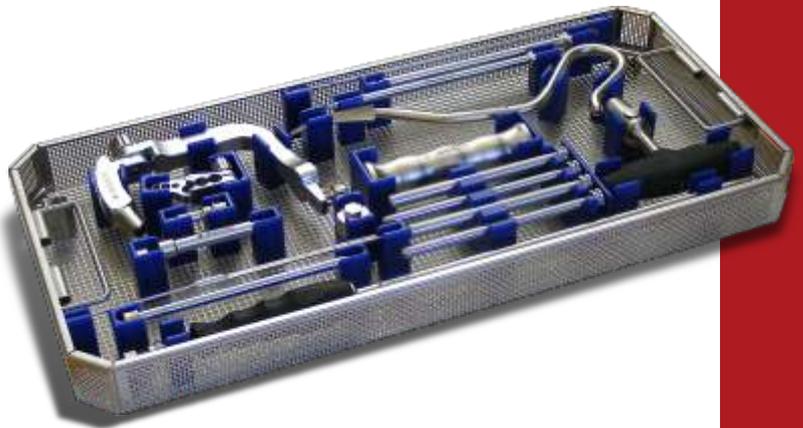




**MTT**  
**MULTILOCKING TIBIAL TREATMENT NAILING**  
**IMPLANTS AND OPERATING MANUAL**





**Before starting use the product**

Before each use, carefully check the operability of implants and surgical instruments, and ensure they are free of any damage. If you notice any cracks, fractures, deformations, discoloration or any damages that indicate improper storage, imperfect sterilization or prior incorrect treatment, do not use the device. Always carry out the assembly, fitting and operation test of the implants and instruments to be used for the implantation. The product may only be used if the fittings are perfect, the dimensions are accurate, the clamping components work properly and the angles are correctly set.

**Requirements regarding the user**

The instruments and implants may only be used by qualified surgeons who are familiar with the surgical practice, with the relevant medical literature and are sufficiently experienced in the use of implants and instruments. The operating surgeon is responsible for identifying the correct indication, selecting the implants and conducting the surgical procedure in conformity with the relevant medical practice.

**Contraindications**

Use of the implant is not recommended if the medical condition of the patient does not allow successful acceptance of the device, or if the recovery of the patient is hindered by causes such as reduced blood circulation, bone system of poor quality or quantity, existing infection, rehabilitation excluded due to the mental condition of the patient etc.

**General warnings**

Before the surgical procedure, the patient should be informed about the possible disadvantages of implant use. When selecting the implant, the type of the bone fracture as well as the weight and activity level of the patient should always be taken into consideration. Since the solidity of the implant is limited, overloading due to overweight should be avoided. The biomechanical loading of the implant should be as minimal as possible.

The process of recovery should be monitored during the use of the implant. In the event of repeated loading or prolonged bone recovery, the implants may be deformed or dislocated, which should be prevented by timely interventions. Strong and/or repeated deformation of the implant should be avoided. The implants are only for single use, re-implantation is prohibited.

The appropriate type and correct size of the implants must be identified according to the characteristics of the particular case. Before the surgical procedure, the user manuals supplied with the other required devices, e.g. implants, should be carefully studied.

**Applied materials**

The applied materials are high-quality and high-tensile, nonmagnetic, stainless steel and titanium alloy materials specially developed for implants. Combined use with other materials or products supplied by other manufacturers may lead to harmful processes for which Medimetal Ltd. will not accept any responsibility.

**Protection, packaging and preparation for use**

The implants are packaged in clean condition, free of any production-related contaminations. Before use, such storage conditions must be ensured that will preserve the integrity of the packaging. The implants should be stored in a clean, dry place, protected from exposure to extreme temperatures and chemicals.

**Sterilization**

Before use, unpack and sterilize the implant in accordance with the relevant instructions. Do not touch the implant with bare hands. The surgical instruments should be sterilized together with the instrument tray. The instructions provided by the manufacturer of the sterilization equipment must always be followed.

**Interactions with medicinal products**

It is not known whether the implants interact with medicinal products.



**System of implants:**

Material: steel or titanium alloy

- Multilocking tibial treatment nail (MTT), solid,  
diameter 8 - 9 - 10 - 11 - 12 mm, (proximal diameter 12 mm)  
cat. nr.: from 14030-08270 to 14030-08420  
from 34030-08270 to 34030-08420 (titanium alloy)  
from 14030-09270 to 14030-09420  
from 34030-09270 to 34030-09420 (titanium alloy)  
from 14030-10270 to 14030-10420  
from 34030-10270 to 34030-10420 (titanium alloy)  
from 14030-11270 to 14030-11420  
from 34030-11270 to 34030-11420 (titanium alloy)  
from 14030-12270 to 14030-12420  
from 34030-12270 to 34030-12420 (titanium alloy)
- Multilocking tibial treatment nail (MTT), solid, diameter 13 mm, (proximal diameter 13 mm)  
cat. nr.: from 14030-13270 to 14030-13420  
from 34030-13270 to 34030-13420 (titanium alloy)
- Locking screw, diameter 4,9 mm, cat. nr.: from 12200-49020 to 12200-49100  
from 32200-49020 to 32200-49100 (titanium alloy)
- End cup, cat. nr.: 12400-08011 and 32400-08011 (titanium alloy)
- Surgical set for locking humeral nailing, cat. nr.: 94030-00000

**Indications of the multilocking tibial treatment (MTT) nail:**

Besides the diaphyseal fractures of the tibia, the nail has numerous indications. In case of comminuted fractures of the proximal end, the available locking holes provide sufficient locking directions for the most common dispositions of the fragments. Despite the various proximal locking possibilities, an easy-to-use multifunctional aiming device helps the aiming. During the surgery, there is no need to change aiming attachments depending on the locking direction. The aiming arm can easily be turned to the adequate position for the required direction. The same universal elements are needed for the right- and also for the left tibia; only the correct side of the attachment has to be used. The distal targeting can be performed with the support of X-ray image intensifier.



The four fixing direction of the proximal end extend the applicability of the MTT nail. On request rigid or dynamical osteosyntheses can be created by the energizing slot.



On the distal end we can use four locking planes: AP direction, locking from the two lateral directions, and one antero-lateral fixing. The fixation of distal fractures can be done by the locking holes, which following directly to the end of the nail.

## Multilocking tibial treatment nail (MTT), solid

L (mm)	Catalogue number					
	∅ 8		∅ 9		∅ 10	
	steel	titanium alloy	steel	titanium alloy	steel	titanium alloy
270	14030-08270	34030-08270	14030-09270	34030-09270	14030-10270	34030-10270
285	14030-08285	34030-08285	14030-09285	34030-09285	14030-10285	34030-10285
300	14030-08300	34030-08300	14030-09300	34030-09300	14030-10300	34030-10300
315	14030-08315	34030-08315	14030-09315	34030-09315	14030-10315	34030-10315
330	14030-08330	34030-08330	14030-09330	34030-09330	14030-10330	34030-10330
345	14030-08345	34030-08345	14030-09345	34030-09345	14030-10345	34030-10345
360	14030-08360	34030-08360	14030-09360	34030-09360	14030-10360	34030-10360
375	14030-08375	34030-08375	14030-09375	34030-09375	14030-10375	34030-10375
390	14030-08390	34030-08390	14030-09390	34030-09390	14030-10390	34030-10390
405	14030-08405	34030-08405	14030-09405	34030-09405	14030-10405	34030-10405
420	14030-08420	34030-08420	14030-09420	34030-09420	14030-10420	34030-10420

L (mm)	Catalogue number					
	∅ 11		∅ 12		∅ 13	
	steel	titanium alloy	steel	titanium alloy	steel	titanium alloy
270	14030-11270	34030-11270	14030-12270	34030-12270	14030-13270	34030-13270
285	14030-11285	34030-11285	14030-12285	34030-12285	14030-13285	34030-13285
300	14030-11300	34030-11300	14030-12300	34030-12300	14030-13300	34030-13300
315	14030-11315	34030-11315	14030-12315	34030-12315	14030-13315	34030-13315
330	14030-11330	34030-11330	14030-12330	34030-12330	14030-13330	34030-13330
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375	14030-11375	34030-11375	14030-12375	34030-12375	14030-13375	34030-13375
390	14030-11390	34030-11390	14030-12390	34030-12390	14030-13390	34030-13390
405	14030-11405	34030-11405	14030-12405	34030-12405	14030-13405	34030-13405
420	14030-11420	34030-11420	14030-12420	34030-12420	14030-13420	34030-13420

## End cup for multilocking tibial treatment nail (MTT)

Cat. no	
steel	titanium alloy
12400-08011	32400-08011



**Locking screw**

Thread diameter: 4,9 mm  
 Core diameter: 4,2 mm  
 Pitch: 2,75 mm  
 Head diameter: 8,0 mm  
 Hex width: 3,5 mm

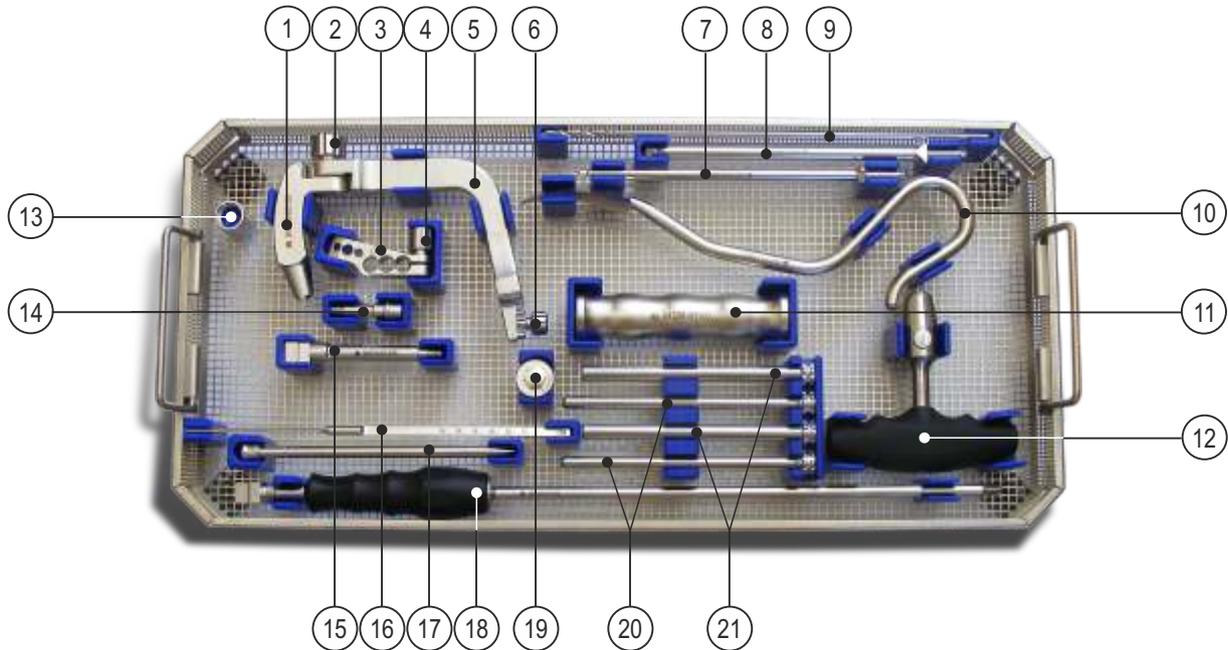
L (mm)	Cat. nr.		L (mm)	Cat. nr.		L (mm)	Cat. nr.	
	steel	titanium alloy		steel	titanium alloy		steel	titanium alloy
20	12200-49020	32200-49020	42	12200-49042	32200-49042	64	12200-49064	32200-49064
22	12200-49022	32200-49022	44	12200-49044	32200-49044	65	12200-49065	32200-49065
24	12200-49024	32200-49024	45	12200-49045	32200-49045	66	12200-49066	32200-49066
25	12200-49025	32200-49025	46	12200-49046	32200-49046	68	12200-49068	32200-49068
26	12200-49026	32200-49026	48	12200-49048	32200-49048	70	12200-49070	32200-49070
28	12200-49028	32200-49028	50	12200-49050	32200-49050	72	12200-49072	32200-49072
30	12200-49030	32200-49030	52	12200-49052	32200-49052	75	12200-49075	32200-49075
32	12200-49032	32200-49032	54	12200-49054	32200-49054	76	12200-49076	32200-49076
34	12200-49034	32200-49034	55	12200-49055	32200-49055	78	12200-49078	32200-49078
35	12200-49035	32200-49035	56	12200-49056	32200-49056	80	12200-49080	32200-49080
36	12200-49036	32200-49036	58	12200-49058	32200-49058	85	12200-49085	32200-49085
38	12200-49038	32200-49038	60	12200-49060	32200-49060	90	12200-49090	32200-49090
40	12200-49040	32200-49040	62	12200-49062	32200-49062	100	12200-49100	32200-49100

## Surgical instruments for MTT nailing

**Surgical set****Tray for MTT (Multilocking Tibial Treatment) nailing instrument set with instruments:**

Cat. nr.: 94030-00000

(Empty tray with instrument holder, cat. nr.: 94030-10000)



Pos.	Cat. no.	Description	pcs
1.	94030-00100	Nail holder aiming device	1
2.	94030-00400	Aiming arm clamp screw	1
3.	94030-00300	Aiming arm attachment	1
4.	94030-00500	Screw for clamping of the sleeve	1
5.	94030-00200	Aiming arm	1
6.	94030-00600	Aiming arm attachment clamp screw	1
7.	94030-01300	Screw driver, quick coupling, 3,5 × 200 mm	1
8.	94030-00800	Wrench with round end, quick coupling, 8 mm	1
9.	99010-40280	Spiral drill with three faceted chuck, 4 × 280 mm	1
10.	94010-00500	Awl	1
11.	94500-01100	Slide hammer	1
12.	99000-00006	T-wrench with quick coupling, cannulated	1
13.	94500-01004	Fixation sleeve for removal device	1
14.	94030-00700	Nail clamping device	1
15.	94030-01400	Attachment for hammer guide	1
16.	94030-01200	Length gauge	1
17.	94030-01100	Pointer	1
18.	94500-01000	Hammer guide shaft	1
19.	94500-02500	Bumper for hammer guide	1
20.	94030-01000	Drill guide sleeve, 8/4,2 mm	2
21.	94030-00900	Soft tissue protector, 10/8,2 mm	2

## Surgical instruments for MTT nailing

## TIBIAL NAILING



Pos.	Cat. no.	Description	pcs
1.	94030-00100	Nail holder aiming device	1



Pos.	Cat. no.	Description	pcs
2.	94030-00400	Aiming arm clamp screw	1



Pos.	Cat. no.	Description	pcs
3.	94030-00300	Aiming arm attachment	1



Pos.	Cat. no.	Description	pcs
4.	94030-00500	Screw for clamping of the sleeve	1



Pos.	Cat. no.	Description	pcs
5.	94030-00200	Aiming arm	1



Pos.	Cat. no.	Description	pcs
6.	94030-00600	Aiming arm attachment clamp screw	1



Pos.	Cat. no.	Description	pcs
7.	94030-01300	Screw driver, quick coupling 3,5 × 200 mm	1

## Surgical instruments for MTT nailing

Pos.	Cat. no.	Description	pcs
8.	94030-00800	Wrench with round end, quick coupling 8 mm	1



Pos.	Cat. no.	Description	pcs
9.	99010-40280	Spiral drill with three faceted chuck 4 x 280 mm	1



Pos.	Cat. no.	Description	pcs
10.	94010-00500	Awl	1



Pos.	Cat. no.	Description	pcs
11.	94500-01100	Slide hammer	1



Pos.	Cat. no.	Description	pcs
12.	99000-00006	T-wrench with quick coupling, cannulated	1



Pos.	Cat. no.	Description	pcs
13.	94500-01004	Fixation sleeve for removal device	1



Pos.	Cat. no.	Description	pcs
14.	94030-00700	Nail clamping device	1



## Surgical instruments for MTT nailing



Pos.	Cat. no.	Description	pcs
15.	94030-01400	Attachment for hammer guide	1



Pos.	Cat. no.	Description	pcs
16.	94030-01200	Length gauge	1



Pos.	Cat. no.	Description	pcs
17.	94030-01100	Pointer	1



Pos.	Cat. no.	Description	pcs
18.	94500-01000	Hammer guide shaft	1



Pos.	Cat. no.	Description	pcs
19.	94500-02500	Bumper for hammer guide	1



Pos.	Cat. no.	Description	pcs
20.	94030-01000	Drill guide sleeve 8/4,2 mm	2



Pos.	Cat. no.	Description	pcs
21.	94030-00900	Soft tissue protector 10/8,2 mm	2

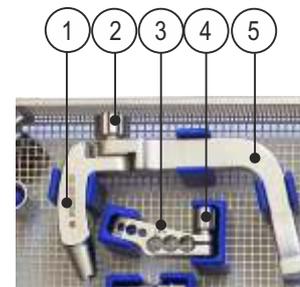
## 1 Preoperative planning

On preoperative X-rays measure the length of the uninjured limb to determine the proper nail length, diameter can be estimated by measuring the width of the intramedullary canal.

During measurement consider that X-rays are usually 10% magnified.



Numbers in brackets after instrument names refer to the list number in the instrument tray.



## 2 Assembling of the aiming arm with the nail

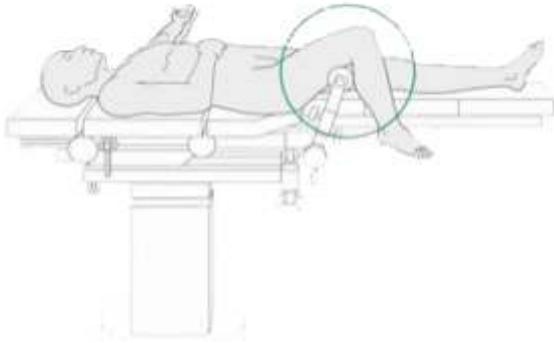
After determining the appropriate size we can choose the implant and with the help of the connection bit we can fix it with the nail holder aiming device. (1) The formation of the connection surfaces precludes the false assembly. We ensure the nail and the holder by nail clamping device. (14)

Before the operation please make sure that the aiming arm focuses on the location of the proximal locking holes.

Install the aiming arm (5) to the pin of the nail holder aiming device (1) and turn it to the sagittal direction at the beginning. For finding the directions quickly, the markings on the nail holder aiming device (1) and on the aiming arm could be helpful. We can get the sagittal aiming position if the hole with „I” marking whole suits to the finger marked pin of the nail holder aiming device (1). We can ensure the set position with clamp screw (2). We can check the precision of the aiming device by leading the soft tissue protector (5), drill sleeve and drill into the appropriate hole through the aiming arm. The half loosening of the clamp screw (2) allows checking the precision of the remaining whole position (II and III marking) by turning over the aiming arm (5).

The aiming of the fixing position of the lateral locking hole and the energizing slot is ensured by the attachment with the appropriate attachment (3). After tightening of the clamp screw (6) check this function of aiming arm too.



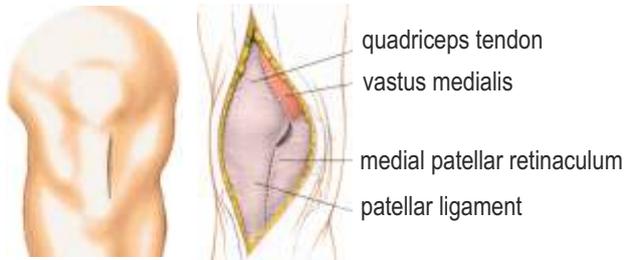


### 3 Patient positioning and reposition

The patient is placed in a supine position on a radiolucent table. The knee of the injured leg has to be able to flex at least 90°.

The image intensifier must be placed so that the tibia could be visualized in both a-p and lateral views. A leg holder is may be used to help for reduction and insertion of the nail. It must be placed under the lower thigh to avoid compression of neurovascular structures of the poplitear fossa.

The closed reduction is performed manually under image intensifier control using axial traction. The reduction can be temporarily fixed with reduction clamps.



### 4 Incision

Make a 5-cm long longitudinal transligamentous incision overlying the medial edge of the patella tendon.

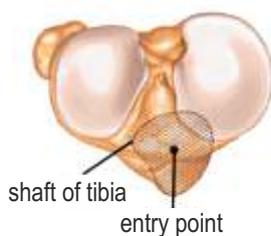


### 5 Determine of entry point

In a-p view the entry point is in line with the axis of the medullary canal and with the lateral tubercle of the intercondylar eminence.

In the lateral view the entry point is at the ventral edge of the tibial plateau and in line with the medullary canal.

Insert the guide wire 8-10 cm in the intramedullary canal of the tibia from the determined entry point. Its position must be checked with the image intensifier in a-p and lateral views.ay use the extraction device to support insertion.

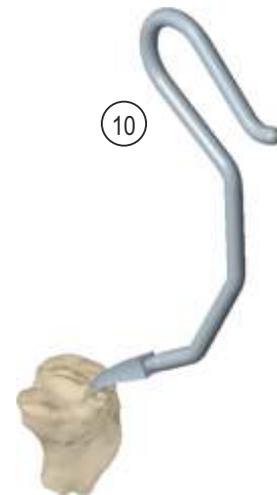


## 6 Opening of the intramedullary canal

The awl (10) can be used for opening the medullary canal.

If necessary the medullary canal is enlarged to the desired diameter with a flexible reamer. Ream with 0.5 mm increments and ream 1 mm larger than the nail diameter. The reamer head is advanced with gentle back and forth movements, force must not be used.

Passage through the fracture zone and the correct position of the reaming rod are verified with the image intensifier.



## 7 Leading the nail in

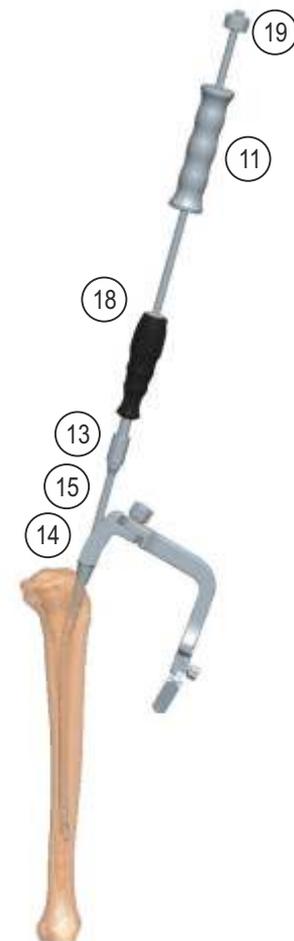
It can be done by the aiming arm. If necessary, we can gently use the slide hammer.

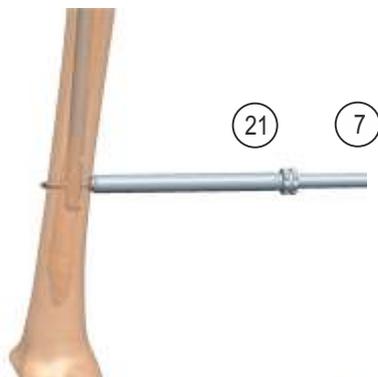
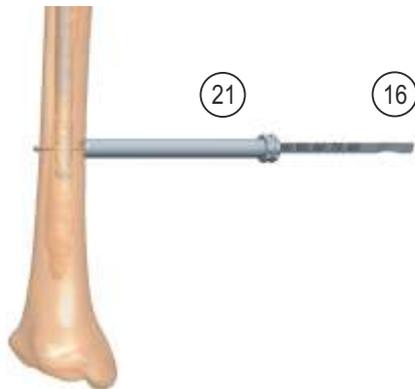
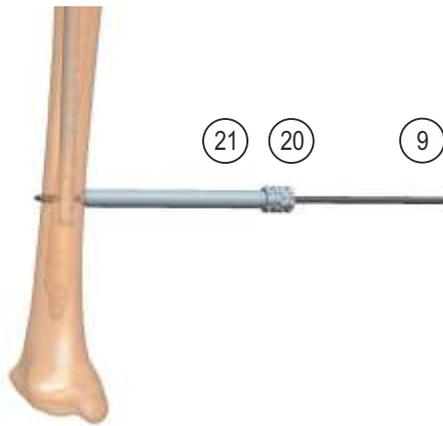
We fix to the nail clamping device (14) the attachment for hammer guide (15), which connects the hammer guide (18). The locking surfaces are kept together by the fixation sleeve for removal device (13).

We install the slide hammer (11) to the stem, then we close the end by bumper for hammer guide (19).

With gentle hits drive the nail to the required position.

Check on the image intensifier if the reposition is correct and the nail stands in the appropriate position.





## 8 Distal locking

First of all we make the distal locking. The distal end of the nail allows us for using four locking planes, so the different fracture cases can be fixed from optimal direction.

The distal holes are created by hand. The accurate drill axes are determined by the two way records of the X-ray image intensifier.

We create a core hole through both side of the corticalis with the use of the soft tissue protector (21), the drill guide sleeve (20) and the 4x280mm spiral drill.

By keeping the soft tissue protector (21) we measure the length of the screw. We hang the length gauge (16) to the corticalis which stands on the other side. We can read the value from the edge of the soft tissue protector, which shows directly the necessary screw length.

We build up the screw driver with the help of the T-wrench with quick coupling (12) and the screw driver, quick coupling (7), we drive the selected locking screw through the soft tissue protector (21).

## 9 The operational principle of the proximal aiming holes

The targeting of the proximal locking holes is possible by only one universal aiming arm. The aiming arm can be turned over and we need to fix to the direction which enables that the finger stands in one line (e.g.: the marking of the sagittal plane: "I") with marked hole for locking ("I" "II" or "III").

The MTT nail is universal, so we can use it for the left and right tibia as well. The location of the lateral proximal lockings is only possible by left and right aiming arm attachment (3). The marking is placed –avoiding the fibula- as the driving in of the locking screws need to be done from the medial.

## 10 Perfection of the proximal locking

We can ensure the sagittal position of the aiming arm („I” marking) with the help of the clamp screw (2).

We lead soft tissue protector (21) and drill sleeve (20) to the aiming hole marked with „I”, we create a core hole by a spiral drill (9).



We drive the length gauge (16) through the soft tissue protector (21) to the prepared hole, we choose the screw length according to the read value.



With the help of the T wrench (12) and the screw driver we make the locking.

If necessary the aiming arm (5) could be turned to the anterolateral („II” marking) and anteromedial („I” marking) direction. After fixation we can drill the core hole and we can make the length measuring and locking.

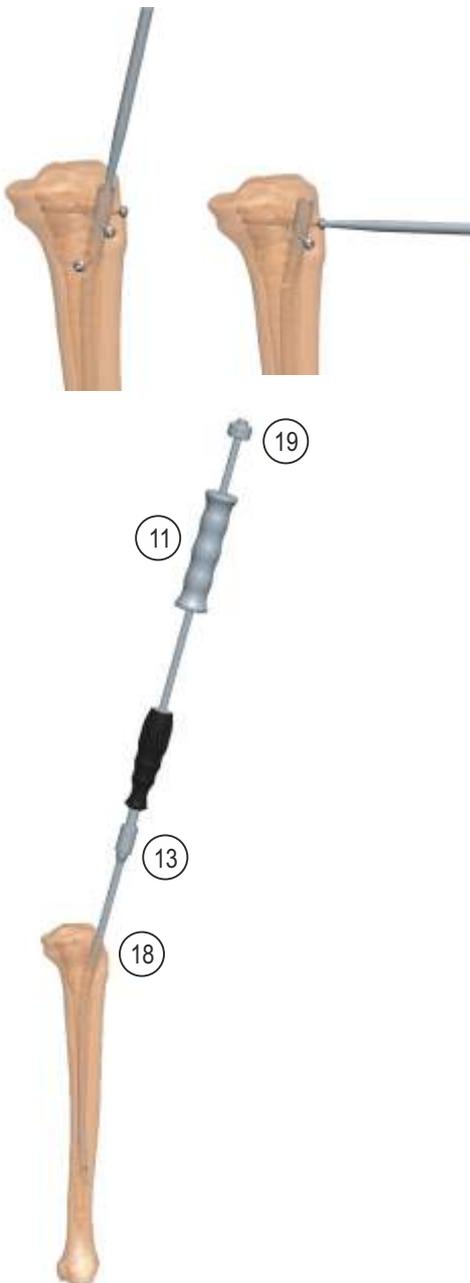


The side locking can be done through the aiming arm attachment (3). Whether we use it for the right or left tibia we insert the attachment (5) according to the „L” or „R” sign to the aiming arm (5) and we can fix them by clamp screw (6).

If the setting of the aiming arm attachment (3) is right, it can be found at the medial position.

For the simple locking, we install soft tissue protector to the selected hole according to static and dynamical screw position. We can fix the soft tissue protector by screw for clamping of the sleeve (4). The locking can be done after core hole drilling and length measuring as before.





## 11 Finishing the operation and control

After the locking procedure we need to check once more the position of the implants.

We can remove the sleeves, and then we can remove the aiming device from the MTT nail with the loosening of the nail clamping device (14).

We can put the end cup at the end of the MTT nail, then we knots.

Examine the regeneration process several times during the healing. Check the position of the implants 24 hours, 7 days, 4 - , 8 and 12 weeks after surgery.

The check needs to be done in each case by using two-way X-ray.

## 12 Removal of the MTT-implants

With the help of the screw driver (12), (7) remove the end cup from the proximal end.

We can remove all of the lockings and we can drive in the attachment for hammer guide (15) to the place of the end cup.

We can connect it to the hammer guide shaft (18), we can ensure the connection with the fixation sleeve for removal device (13).

We can install the hammer (11), close the end of the stem by bumper (19).

Then we can remove the free MTT nail, with gentle beats from the intramedullary.









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