

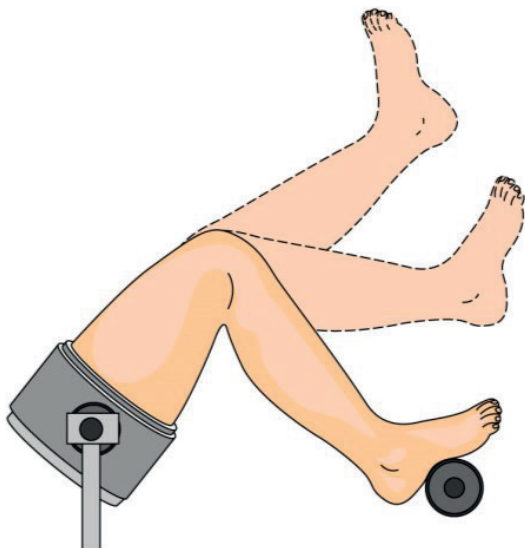
SURGICAL TECHNIQUE  
RECONSTRUCTION OF THE ACL USING THE BTB METHOD



## Reconstruction of the ACL using the BTB method

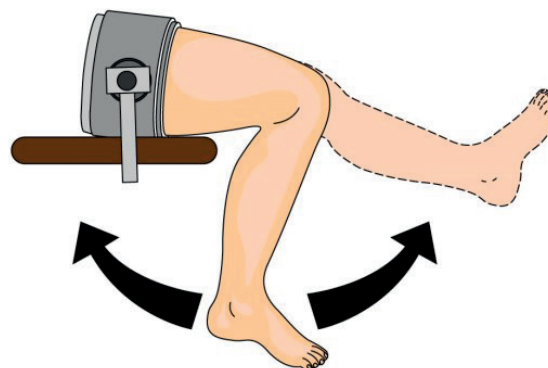
### 1. The patient's position

a) The patient lies on his/her back, the operated limb is supported by the adjustable stand which will ensure movement of the extremity from full extension into full flexion.



b) The patient lies on his/her back, operated extremity is loosely hanging through knee support which allows to bend the knee up to 120 degrees.

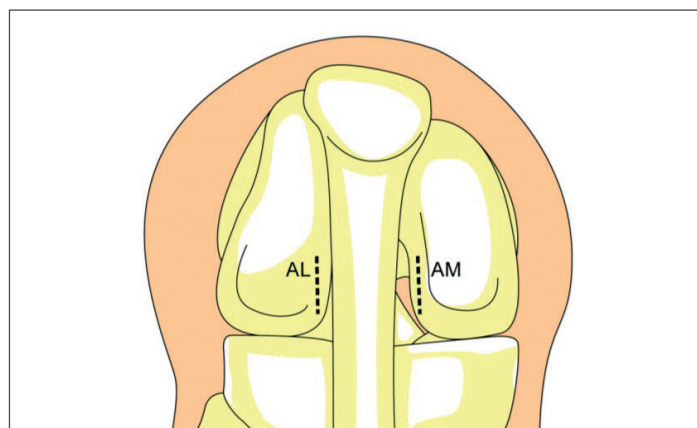
Cover the extremity with drapes using usual sterile manner.



### 2. Examination of the patient and arthroscopy of the knee joint for verification of an intra-articular finding and for the clarification of the subsequent procedure (ligament reconstruction)

#### Arthroscopic portals

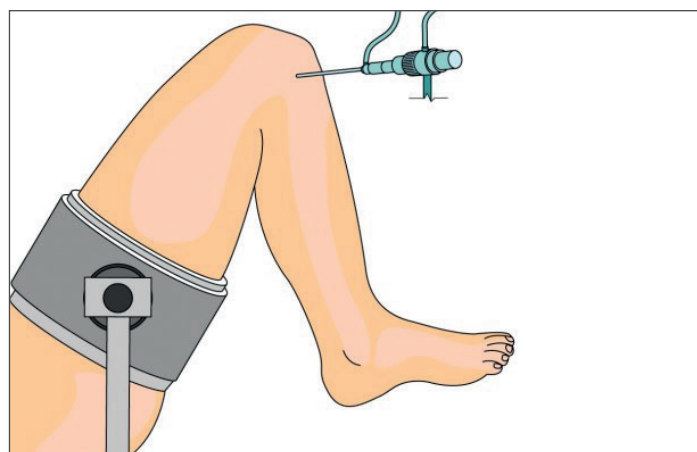
By incision into the skin create AL (anterolateral) and AM (anteromedial) arthroscopic portals, which allow sufficient overview of the knee joint to the extent that it is necessary for the reconstruction of the ligament.



#### Diagnostics

Perform a complete diagnostic arthroscopy, treat any intra-articular pathology of the meniscus, cartilage etc., remove loose debris of the torn anterior cruciate ligament.

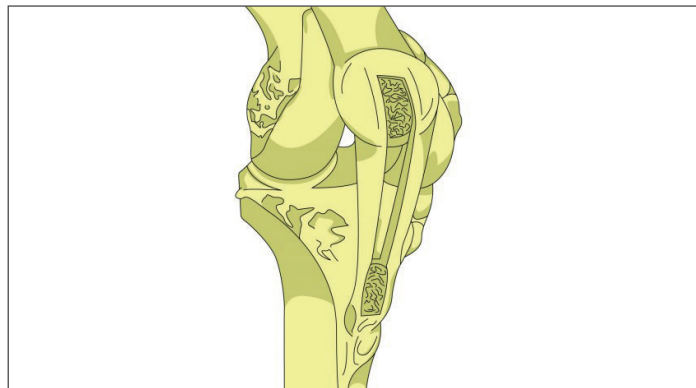
After examination of the joint and clarification of the scope of the operations (ACL reconstruction) move on to the next points.



## 3. Collection of the graft and treatment of patellar tendon BTB (Bone Tendon Bone)

The graft comes from the middle 1/3 of lig. patellae, with two bone pieces (where the ligament is attached to the bones).

One of the bone pieces comes from the patella, the other from the proximal portion of tibial tuberosity.



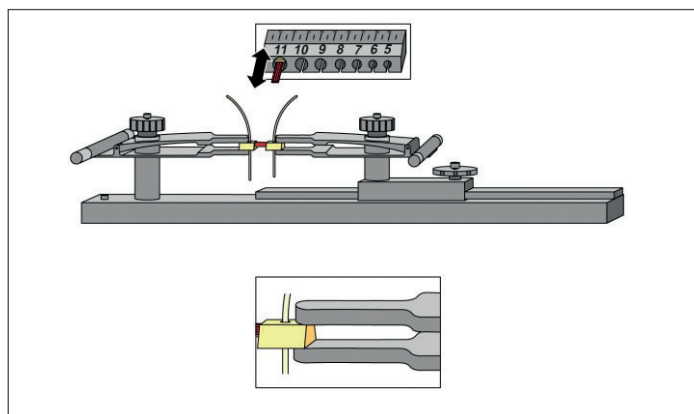
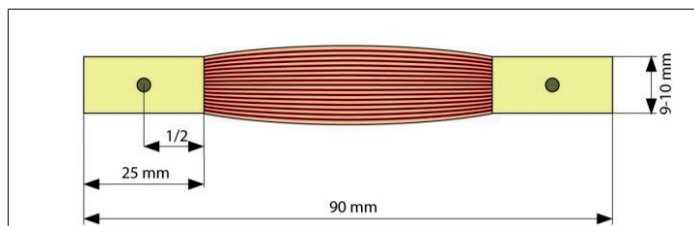
The total length of the tendon is approx. 90 mm, width 9–10 mm, the recommended size of the bone piece is approximately 25 x 9 x 5 mm.

Drill a 2 mm hole into the centre of the bone pieces from each side for fitting a thread to allow pulling the graft through the bone tunnel.

Adjust the bone pieces according to the sizes needed and ensure smooth edges. Pull the thread (nylon no. 6) through the tunnel in the bone pieces and check the size of the graft and bone pieces by pulling through the gauge for the graft diameter.

Drill diameters for the drilling of tunnels for the reconstruction of the anterior cruciate ligament and screw diameters to secure ligaments are later selected according to the graft diameter.

It is recommended to drill the tunnels approximately 1 mm greater in diameter than the diameter of the prepared tendon (piece) for the reconstruction of the ACL by the BTB method.



## 4. The installation of the aiming device

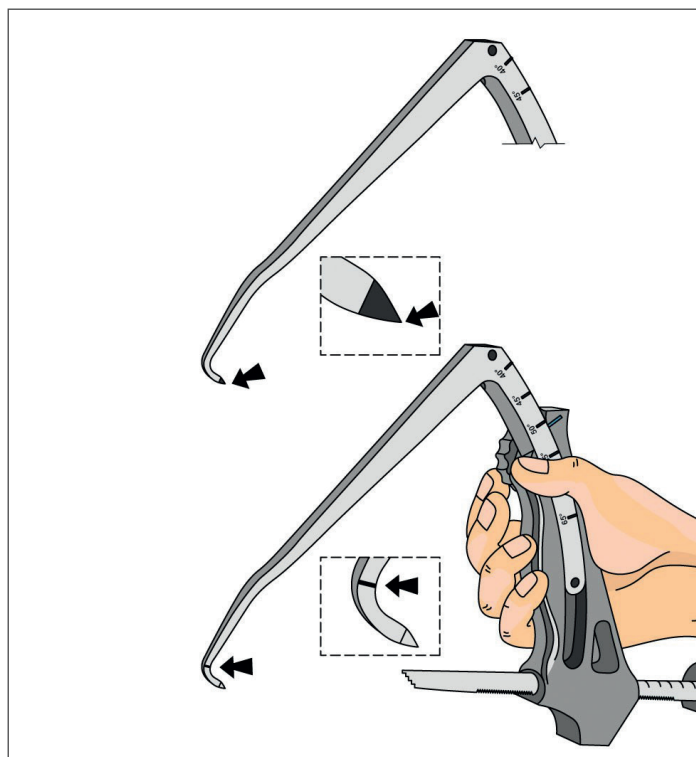
Use the handle 129 12 0510 with the arm ACL Elbow 129 12 0520 or with the arm ACL Tip 129 12 0550, according to the method of use.

When introducing the aiming wire it comes onto the marked tip of the arm in case of the arm ACL Tip 129 12 0550.

When introducing the aiming wire it comes onto the marked groove which is 7 mm from the tip of the arm in case of the arm ACL Elbow 129 12 0520.

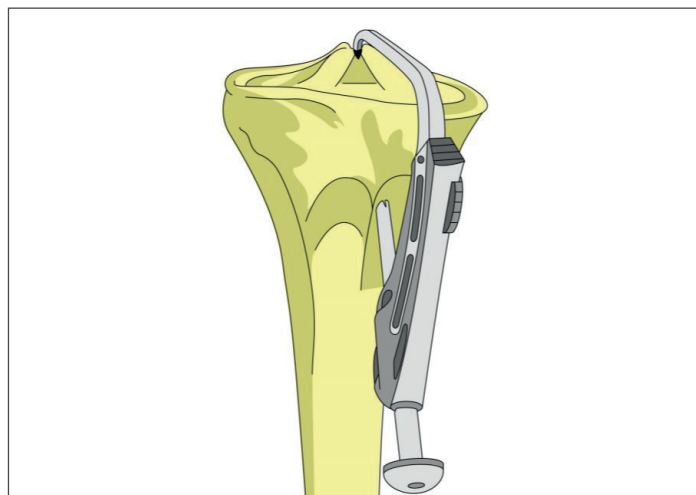
Insert the arm into the groove of the handle, adjust the angle on the scale with the colourful groove on the handle and firmly fix the arm with the handle.

The angle setting on the scale depends on the height of the working portal, this determines the drilling angle which is in the range 45–50° by the reconstruction of the anterior cruciate ligament.



## 5. The aiming and drilling of the tibial tunnel using drilling wire

The main point of reference for targeting of the arm is the remaining distal piece of ACL.

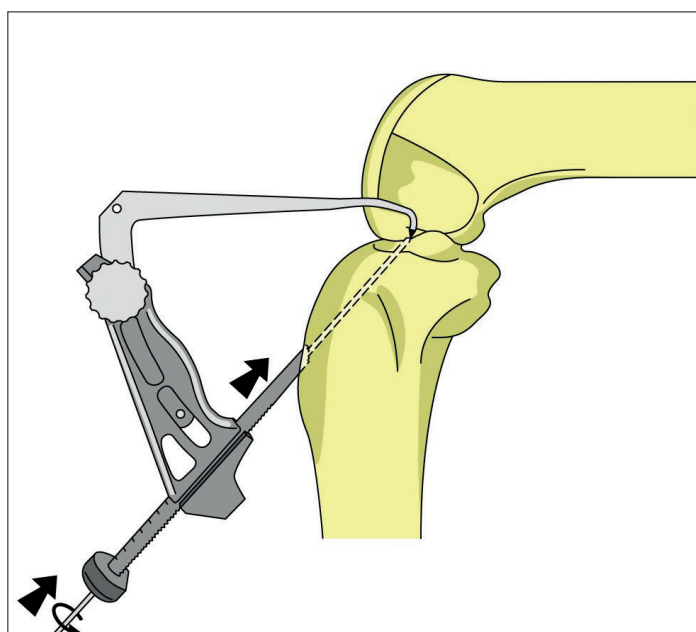


The centre of the intra-articular opening of the tibial tunnel should be approximately 7 mm in front of the edge of LCP at bent knee in 90 degrees, and in the middle of the intercondylar fossa at extended knee.

When using the arm of ACL Elbow 129 12 0520 hook the tip into the tibia at place of the back part of the piece of ACL. The drilling wire of Ø 2.4 mm intersects tibial plateau 7 mm in front of the tip, depending on the angle of the tibial tunnel.

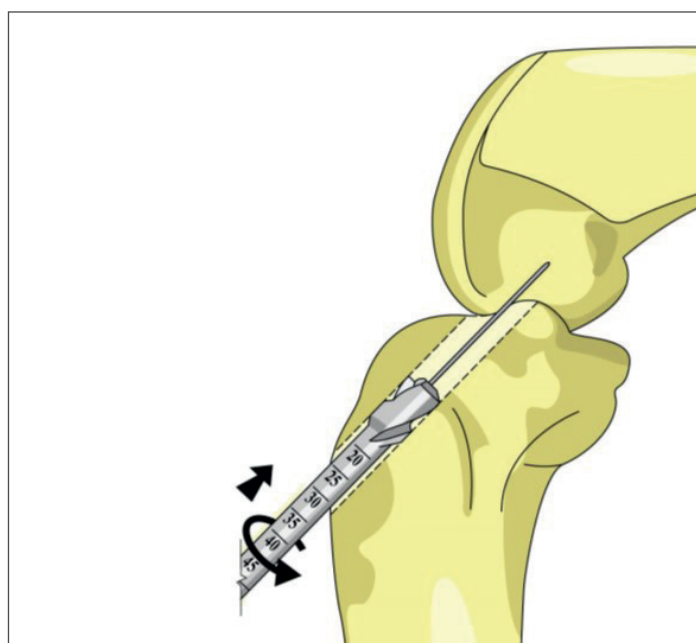
When using the arm ACL Tip 129 12 0550 hook the tip exactly into the place where the drilling wire of Ø 2.4 mm should intersect the tibial plateau.

Hook the arm, lean the drilling sleeve firmly against tibia and create a hole in the tibia using a drilling wire of Ø 2.4 mm. The introduction of the drilling wire is necessary to monitor using an inserted arthroscope and the force applied to a drill is necessary to adapt according to position of the wire which comes through the bone.



## 6. The drilling of the tibial tunnel using cannulated drill

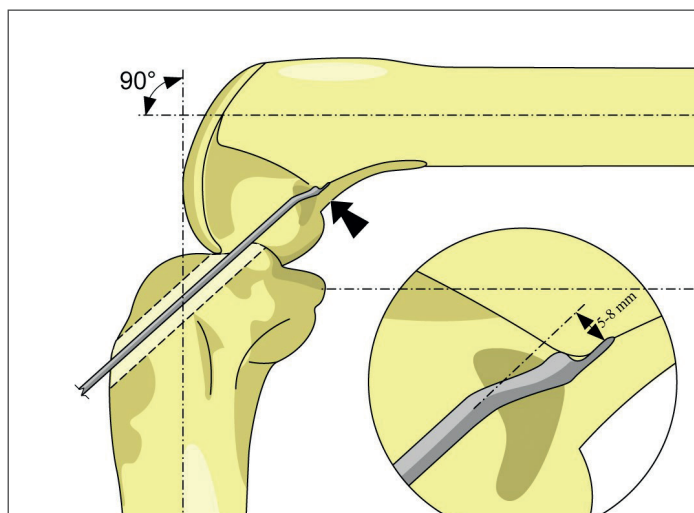
Check the diameter of the patellar tendon graft, choose diameter of the drill accordingly and overdrill the drilling wire using the standard cannulated drills.



## 7. The aiming of the femoral tunnel

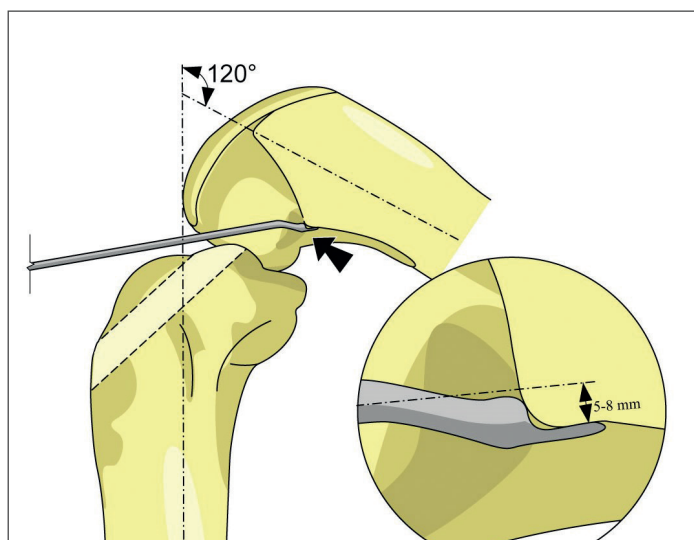
### a) Through the tibial tunnel (transtibial drilling)

- the knee is bent at 90°
- depending on the diameter of the selected drill for drilling of the tibial hole and on the wall thickness of the femur introduce corresponding size of the femoral aiming device into the drilled hole in tibia and lean the aiming device ending against the direct contact with proximal edge of the intercondylar fossa of femur according to the rules of the correct positioning of femoral tunnel.



### b) Through the anteromedial portal (aiming is not affected by the shape of the tibial tunnel)

- the knee is bent at 120°
- insert the femoral aiming device of adequate size through the AM portal and drill the femoral tunnel (procedure as pos. 7).
- depending on the diameter of the selected drill for drilling of the tibial hole and on the wall thickness of the femur introduce corresponding size of the femoral aiming device through anteromedial portal and lean the aiming device ending against the direct contact with proximal edge of intercondylar fossa.



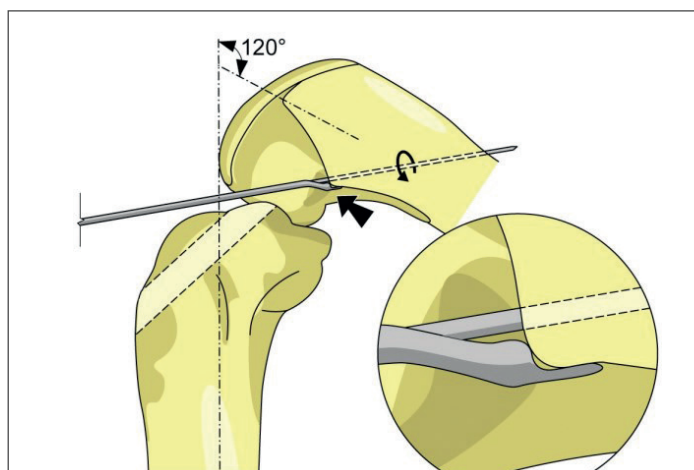
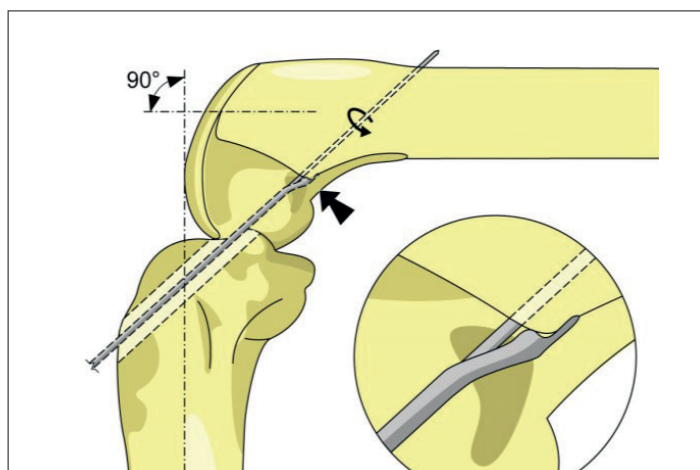
The centre of the tunnel by the single bundle method is located on the cap of an intercondylar fossa at 1,30th hour for the knee on the left or 10,30th hour for the knee on the right.

The introduction of the drilling wire is necessary to monitor using an inserted arthroscope and the force applied to the drill is necessary to adapt according to position of the wire which comes through the bone.

Průměr vrtáku pro vrtání fem. kanálu	Tloušťka zadní stěny kanálu 1–1,5 mm	Tloušťka zadní stěny kanálu 2–2,5 mm
8 mm	5 mm fem.cílič	6 mm fem.cílič
9 mm	6 mm fem.cílič	7 mm fem.cílič
10 mm	6 mm fem.cílič	7 mm fem.cílič
11 mm	7 mm fem.cílič	8 mm fem.cílič

## 8. The drilling of the femoral tunnel using drilling wire

Drill the tunnel in femur through the femoral aiming device using drilling wire Ø 2.4 mm. The centre of the future tunnel must be precisely aimed.

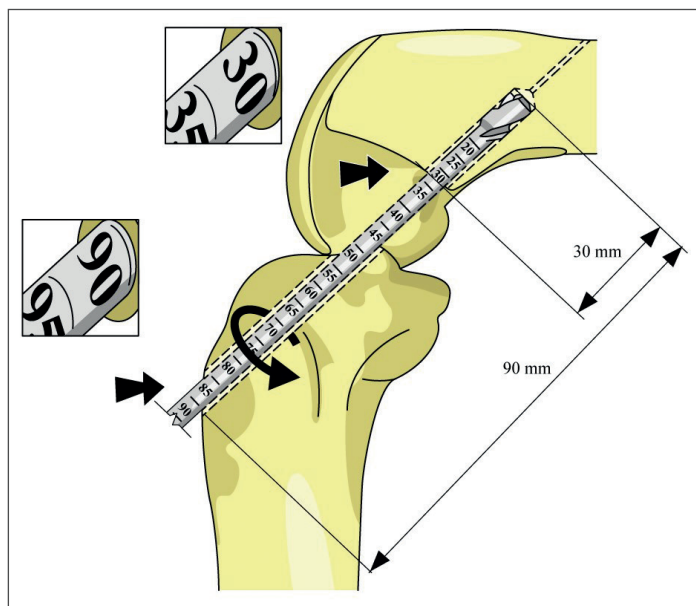




## 9. The drilling of the femoral tunnel using cannulated drill

### a) Through the tibial tunnel

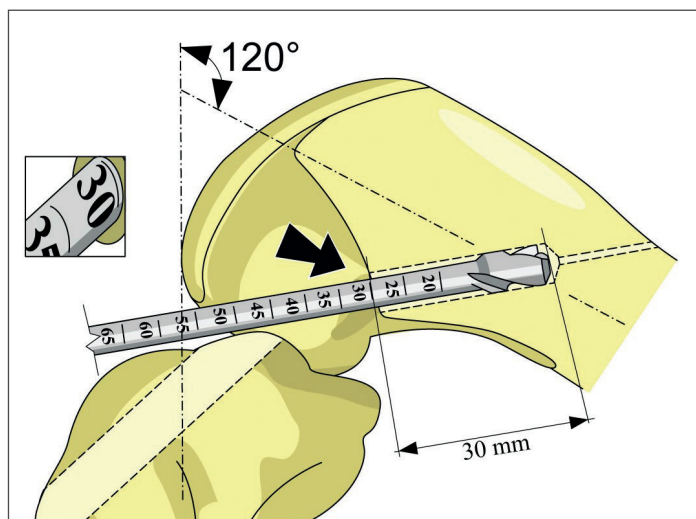
Drill an approximately 25–30 mm long tunnel in the femur with the pre-selected cannulated drill guided by the drilling wire. The drilling of the tunnel goes through the tibial tunnel according to the selected way of aiming. The depth of the femoral tunnel and the total necessary length of the graft can be measured from the marks on drill (25–30 mm). The length of the tunnel is drilled according to the type of the interference screw.



### b) Through AM portal

Drill an approximately 25 mm long tunnel in the femur with the pre-selected cannulated drill guided by the drilling wire. The drilling of the tunnel goes through AM portal, the depth of the femoral tunnel and the total necessary length of the graft can be measured from the marks on drill (25–30 mm).

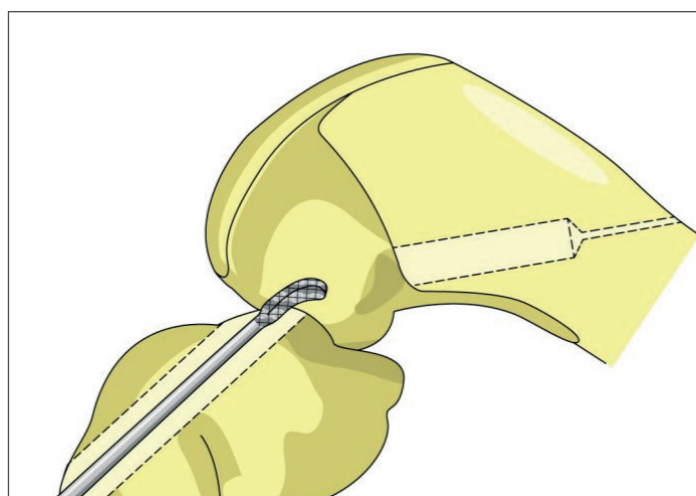
The length of the tunnel is drilled according to the type of the interference screw.



## 10. The adjustment of the tunnels

If necessary adjust the drilled holes by the rasp 129 12 0150 or bone file 129 12 0130.

If necessary dilate drilled holes by the dilators of the given diameter 129 12 0630 – 0680.

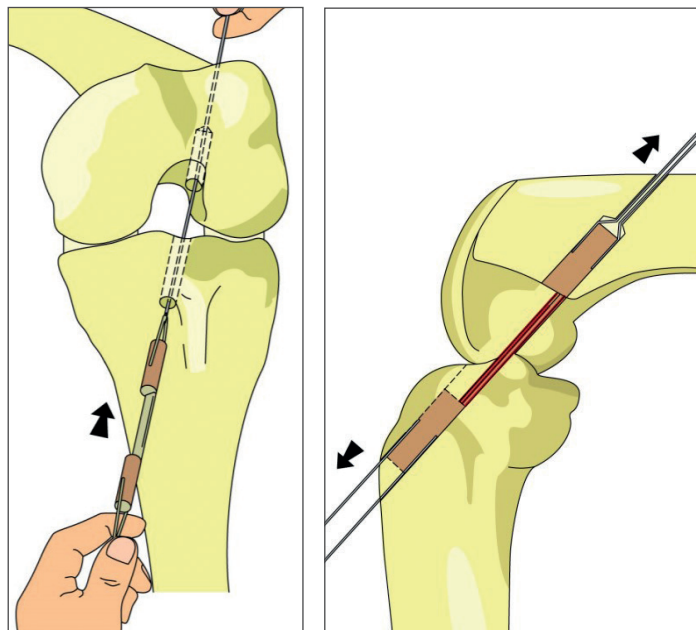


## 11. The introduction of the graft

Insert a long Kirschner wire with an eyelet for the graft passing through both tunnels retrogradely. Using the guide wire introduce a prepared graft retrogradely into the femur through the tibial tunnel.

Pass the wire through the tunnels and drill through the femur until it penetrates the skin of the AL part of the thigh. Drilling is necessary to check so that the KI wire does not come out of the surgical field as defined by the drapes.

Then pull the KI wire with fibres from the graft out on the AL side of the thigh. The graft is inserted by that into the tunnels, passing is without rotation.

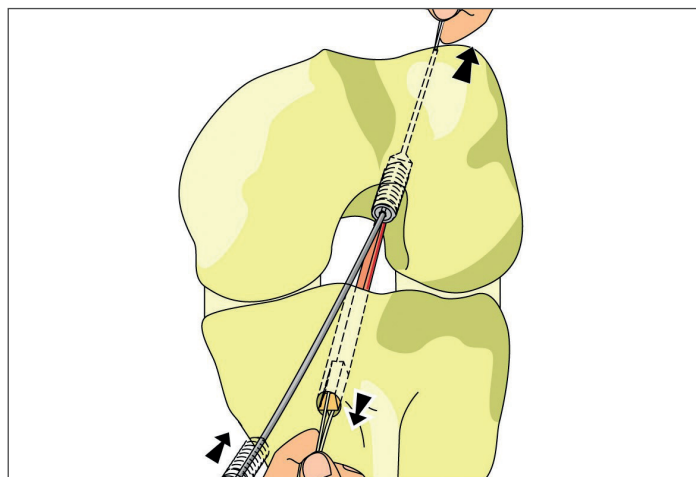


## 12. The securing of the graft in the femur using an interference screw

Check the correct positioning of the graft in the tunnels.

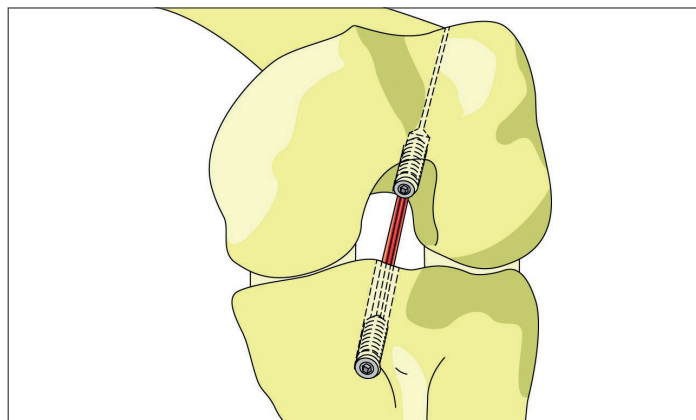
Insert the introduction wire of  $\varnothing$  1 mm 129 12 0690 through the AM portal into the femoral tunnel along the bone piece. First pre-drill the cortical bone along the introduction wire using the bone tunnel dilator of the given diameter 129 12 0630 – 0680 and then insert the selected diameter of the interference screw and tighten securely by the cannulated screwdriver. The screw must be inserted to firmly fix the graft and not to pervade from the tunnel to the fossa.

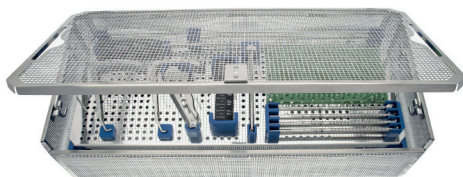
Recommended diameter of the interference screws is approximately 2 mm smaller than the diameter of the drilled tunnel.



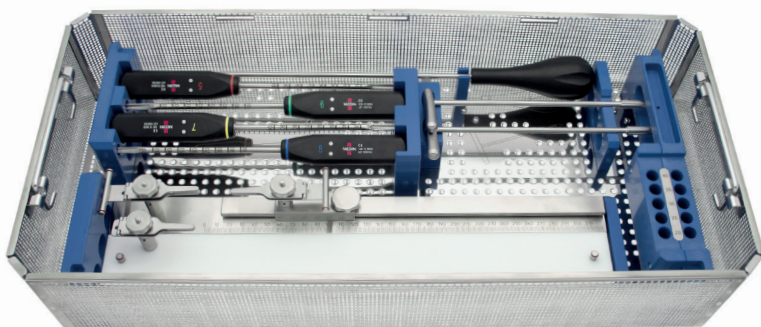
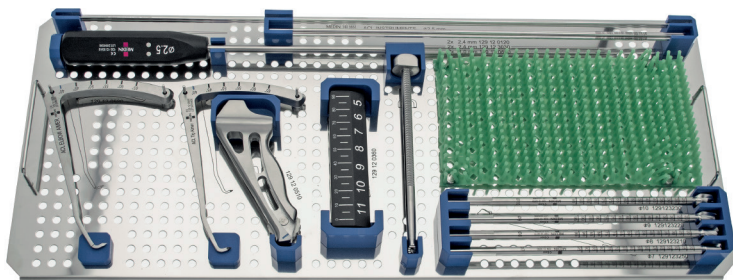
## 13. The securing of the graft in the tibia using an interference screw

Firmly tighten the graft already fixed in the femur, try moves in a range of 0 to 90 dg. The graft has to be isometric. Then fix the graft in tibia by semiflexed knee at 20 dg. First pre-drill a cortical bone along the introduction wire of  $\varnothing$  1 mm 129 12 0690 inserted around the graft in the tunnel using dilator of the bone tunnel of a given diameter 129 12 0630 – 0680 and then fix the graft using interference cannulated screw and tighten securely. It is necessary to keep the graft tighten when introducing the screw. The screw has to firmly fix the bone piece, if it is inserted further behind the bone piece, fixation is not firm.





**397 139 09 0960** Set for ACL reconstruction



ks/pcs	objednáací číslo ordering number	název	name
2	<b>129 12 0690</b>	Zaváděcí drát; NiTi; 1,0 mm	Introducing wire; NiTi; 1.0 mm
1	<b>129 12 3250</b>	Vrták; 7/2,5 × 180 mm	Drill; 7/2.5 × 180 mm
1	<b>129 12 3210</b>	Vrták; 8/2,5 × 180 mm	Drill; 8/2.5 × 180 mm
1	<b>129 12 3220</b>	Vrták; 9/2,5 × 180 mm	Drill; 9/2.5 × 180 mm
1	<b>129 12 3230</b>	Vrták; 10/2,5 × 180 mm	Drill; 10/2.5 × 180 mm
2	<b>129 12 0120</b>	Drát vodicí; 2,4 mm	Guide wire; 2.4 mm
2	<b>129 12 3030</b>	Drát Kirschnerův ;2,4 × 300 mm	Kirschner wire; 2.4 × 300 mm
2	<b>129 12 3190</b>	Drát vodicí; 2,4 × 450 mm s ouškem	Guide wire with eylet; 2.4 × 450 mm
1	<b>129 12 0360</b>	Měřič průměru štěpu	Graft sizer
1	<b>129 12 0510</b>	Držadlo	Holder
1	<b>129 12 0550</b>	Rameno ACL Tip	ACL Tip arm
1	<b>129 12 0520</b>	Rameno ACL Elbow	ACL Elbow arm
1	<b>129 12 9010</b>	Šroubovák ;3,5/2,5 × 230 mm; šestihran	Cannulated screwdriver hexagonal; 3.5/2.5 × 230 mm
1	<b>136 99 0355</b>	Přípravek na obšívání šlach	Instrument for graft preparation
1	<b>129 12 0660</b>	Dilatátor kostních kanálů; 8 mm	Bone canals dilator; 8 mm
1	<b>129 12 0650</b>	Dilatátor kostních kanálů; 7 mm	Bone canals dilator; 7 mm
1	<b>129 12 0610</b>	Nůž pro odběr šlachového štěpu otevřený; 6 mm	Tendon stripper; open; 6 mm
1	<b>129 12 0040</b>	Cílič tibia-femur; vel. 8 mm	Offset aimer tibia-femur; 8 mm
1	<b>129 12 0030</b>	Cílič tibia-femur; vel. 7 mm	Offset aimer tibia-femur; 7 mm
1	<b>129 12 0020</b>	Cílič tibia-femur; vel. 6 mm	Offset aimer tibia-femur; 6 mm
1	<b>129 12 0010</b>	Cílič tibia-femur; vel. 5 mm	Offset aimer tibia-femur; 5 mm





# REFID