Instrument Set for
Anterior Cruciate Ligament Reconstruction:
Double-bundle technique

Prof. Dr. Wolf PETERSEN, Dr. Thore ZANTOP, Münster, Germany
Instrument Set for Anterior Cruciate Ligament Reconstruction: Double-bundle technique

The complex anatomy of the anterior cruciate ligament (ACL) can be divided into 2 functional bundles. Initial experiences with open reconstruction of the anterior cruciate ligament using a double-bundle technique were gathered in the 1980s.

However, as a consequence of the arthroscopic techniques for single-bundle reconstruction emerging at the time, the double-bundle technique was not pursued further.

A large number of biomechanical studies have nevertheless shown that with reconstruction of both bundles of the anterior cruciate ligament (the anteromedial and the posterolateral bundle), restoration of the functions of the knee joint is more effective than with a single-bundle technique. In addition, arthroscopic techniques have also been gradually improved, which now also enables a double-bundle technique to be performed arthroscopically.

With single-bundle reconstruction, the reciprocal tension behavior of the two functional bundles is not restored. Flexion tightens the anteromedial bundle while extension and rotation tighten the posterolateral bundle. Single-bundle reconstruction can, however, only satisfy part of the complex requirements.

Comparative clinical studies of the single-bundle and double-bundle techniques have successfully shown that reconstruction using the double-bundle technique provides significantly better stability results for the knee joint when a pivot-shift mechanism is simulated as well as improved AP stability.

The continued advances in arthroscopic techniques and new findings focus increasing attention on the anatomically correct position of the tunnels.

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To facilitate the arthroscopic performance of this technique, KARL STORZ, in cooperation with Prof. Dr. Wolf Petersen and Dr. Thore Zantop, has developed a range of instruments and implants perfectly adapted to meet the demands of the technique.

The instruments set for arthroscopic cruciate ligament reconstruction using the double-bundle technique is characterized by its precision and takes anatomical variability into account. It is the complement to the portfolio of instruments available for cruciate ligament reconstruction.

**Advantages**

- Fully compatible with the instruments normally used for cruciate ligament reconstruction
- Easy handling
- Developed using anatomical specimens and clinical testing
- Variability in spacing of tunnels
Surgical procedure

Advantages
- Anatomical surgical procedure
- Only semitendonous tendon required for graft preparation
- Greater freedom when selecting the femoral tunnel position as both tunnels are drilled via the medial portal.
- Excellent visualization of lateral condyle wall and ACL insertion via anteromedial portal.
- Reproducible femoral landmarks: intercondylar line and transition between cartilage and bone

Indications
- Symptomatic anterior instability with anterior cruciate ligament rupture

Contraindications
- Children who have not reached skeletal maturity
- Multi-ligament interventions
- Osseous defects found during revision situations

Technique

Positioning of arthroscopic portals:
- High anterolateral portal
- Low anteromedial ‘drilling portals’
- Skin incision medial to tibial tuberosity for removal of tendons

Removal and preparation of grafts.
Both grafts (AM and PL) are prepared as double-strand grafts with a FLIPPTACK™ and MINI-ENDOTACK™.
Creation of an anteromedial femoral tunnel with a normal femoral target guide (e.g. 28729 ZD) via medial anteromedial access.

- Knee at flexion exceeding 110°
- Predrill with Kirschner wire 28729 E, then redrill with cannulated 4.5 mm drill bit (28729 BA).

One of the special femoral target guides (e.g. 28729 WV) is now used to create the posterolateral tunnel. This allows a second Kirschner wire (28729 E) to be positioned at a specific distance from the AM tunnel. The target guide is available with different drilling distances in order to cater for the individual anatomy of the femoral ACL insertion (8-10 mm).

- Knee at 110° flexion
- Target guide is virtually horizontal in joint
- Predrill with Kirschner wire 28729 E, then redrill with cannulated 4.5 mm drill bit (28729 BA).
- Check tunnel positions via AM portal.
Measure tunnel length (AM between 35 and 45 mm; PL between 30 and 45 mm) and drill blind-hole threads according to transpalant diameter (length 28 mm).

The special double-bundle target guide 28729 WT is used to create the tibial tunnel. The target guide is equipped with a hook for fixing in the cruciate ligament stump as well as a target opening. Level with the exit of the Kirschner wire there is a little wing, which can be positioned at the anatomical landmark for the AM bundle (Anterior horn of lateral meniscus).

The second longitudinal opening can then be hooked into the drilled Kirschner wire for the AM tunnel. This allows the Kirschner wire to be drilled for the PL tunnel at a specific distance from the AM tunnel.

Depending on the size of the knee joint and the tunnel diameters, the position can be varied based on the longitudinal form.
Check position of Kirschner wire. The position of the wires should be corrected if there are any signs of impingement.

Redrill using appropriate drill bits depending on the graft diameter.

Insert grafts and femoral fixation using the FLIPPTACK™.

Tibial hybrid fixation of both grafts with MegaFix® (dia 6.0 mm) and MINI-ENDOTACK™.
- The AM graft is tensioned at 45° flexion and fixed.
- The PL bundle is tensioned at 15° flexion and fixed.

Double-bundle graft in situ.
Instruments

28729 AB  **Tendon Stripper**, diameter 7 mm, working length 30 cm

28729 AC  **Slotted Tendon Stripper**, diameter 7.5 mm, working length 30 cm, graduated

28729 SH  **Tendon Hook**

28729 D  **Drilling-Wire**, diameter 2.4 mm, length 38 cm, spiral-shaped polishing

28729 SB  **Tendon Board**, including Flipptack retainer 28729 SC

28729 SC  **Flipptack Retainer**, only

28729 SA  **Tendon Thickness Tester**, for the determination of the thickness of the graft, from 6.0 – 10.5 mm in 0.5 mm increments
Thread Clip

Flipptack Femoral Fixation Button, sterile

Thread Hook for the use in cruciate ligament surgery

Femoral Target Guide, anterior cruciate ligament, drill distance 5.5 mm for drilling diameter 9 mm and 10 mm

Same, drill distance 4 mm for drilling diameter 7 mm and 8 mm

Same, drill distance 3 mm for drilling diameter < 7 mm

Handle with locking mechanism
28729 WU  Femoral Aimer for double bundle, 8 mm offset, for the use with handle 28729 ZG

28729 WV  Same, 9 mm offset

28729 WW  Same, 10 mm offset

28729 WT  Tibial Aimer for double bundle, exit point on tibia plateau adjustable between 8 – 10 mm

28729 E  Larding Wire, diameter 2.4 mm, length 32 cm, pyramidal tip, package of 10

28789 GW  Nitinol Guide Wire, diameter 1.1 mm, length 38.5 cm
28729 BA  Bone Drill, diameter 4.5 mm
28729 BB  Same, diameter 5 mm
28729 BC  Same, diameter 6 mm
28729 BD  Same, diameter 7 mm
28729 BE  Same, diameter 8 mm
28729 BF  Same, diameter 9 mm
28729 BG  Same, diameter 10 mm
28729 BH  Same, diameter 11 mm
28729 BI  Same, diameter 5.5 mm
28729 BK  Same, diameter 6.5 mm
28729 BL  Same, diameter 7.5 mm
28729 BM  Same, diameter 8.5 mm
28729 BN  Same, diameter 9.5 mm
28729 BO  Same, diameter 10.5 mm

28171 SG  SilGrasp™ Suture Grasper, working length 15 cm

28729 P  Tissue Forceps, 1 x 2 teeth, length 14.5 cm, medium size, distally curved left

28729 L  Length Gauge, graduated, working length 23 cm
28729 MT  **Mini-Endotack**, tibial fixation device, sterile

28729 KK  **Knot Holder**, small, 1.0 mm x 1.0 mm

28729 SM  **Positioning Device**, for the use with 28729 MT Mini-Endotack

28729 MM  **Button Wrench**, for the use with 28729 MT Mini-Endotack

28729 TM  **Tensiometer**, gauge for measuring and controlling the tension of the graft
28789 SK  **Screwdriver**, size 8/9/10/11, cannulated, for use with MegaFix® screws diameter 8 – 11 mm

28770 SK  **Screwdriver**, size 7, cannulated, for use with MegaFix® screws diameter 7 mm

28760 SK  **Screwdriver**, size 6, cannulated, for use with MegaFix® screws diameter 6 mm

28789 SD  **Screwdriver**, size 8-9, noncannulated, for use with MegaFix® screws diameter 8 – 9 mm

28770 SD  **Screwdriver**, size 7 noncannulated, for use with MegaFix® screws diameter 7 mm

28760 SD  **Screwdriver**, size 6 noncannulated, for use with MegaFix® screws diameter 6 mm

28729 N  **Notcher**, with fine-shaped blade to facilitate the accurate placement of screws, working length 15 cm

28729 NN  **Notch Chisel** with broad handle, to create a bone wedge in ACL surgery

28729 NM  **Chisel** for crating a bone wedge for Cruciate ligament surgery

174800  **Mallet**, with NYLON replacement, length 22.5 cm
### MegaFix®-B

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### MegaFix®-P

**MegaFix® Screw, perforated**

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Plastic Container for Sterilizing and Storage, perforated, with transparent lid, with silicone mat, for two-level storage, for use with 16 forceps and 8 instruments, external dimensions (w x d x h): 520 mm x 250 mm x 145 mm
Literature