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System for Anterior Cruciate Ligament Reconstruction

with rectangular bone tunnels using the quadriceps tendon

STORZ
KARL STORZ — ENDOSKOPE

The Quadriceps Tendon

The quadriceps tendon is used in cruciate ligament revision surgery and, more and more frequently, for the primary reconstruction of the anterior (ACL) and posterior (PCL) cruciate ligaments.[1]

The quadriceps tendon has also emerged as a suitable graft source for the reconstruction of the medial patellofemoral ligament (MPFL).[2]

This is mainly due to the following properties of the quadriceps tendon:

Benefits of the quadriceps tendon:

- Lower harvest site morbidity in comparison to the patellar tendon
- Harvesting with or without a bone block possible
- Good biomechanical properties

A special tendon harvesting system was designed to provide fast, safe and atraumatic tendon harvesting, featuring the following properties:

- Reproducible technique
- Safe subcutaneous tendon harvesting
- Defined harvesting depth
- Attractive cosmetic results

Studies on the Quadriceps Tendon

[1] Fink C, Herbort M, Abermann E, Hoser C. Minimally invasive harvest of a quadriceps tendon graft with or without a bone block. Arthros Tech 2014

Herbort M, Tecklenburg K, Zantop T, Raschke MJ, Hoser C, Schulze M, Petersen W, Fink C. Single-bundle anterior cruciate ligament reconstruction: a biomechanical cadaveric study of a rectangular quadriceps and bone-patellar tendon-bone graft configuration versus a round hamstring graft. Arthroscopy. 2013 Dec. 29(12):1981-90

Lund B, Nielsen T, Faunø P, Christiansen SE, Lind M. Is quadriceps tendon a better graft choice than patellar tendon? A prospective randomized study. Arthroscopy. 2014 May 30(5): 593-8

Sasaki N, Farraro KF, Kim KE, Woo SL. Biomechanical evaluation of the quadriceps tendon autograft for anterior cruciate ligament reconstruction: a cadaveric study. Am J Sports Med. 2014 Mar 42(3): 723-30

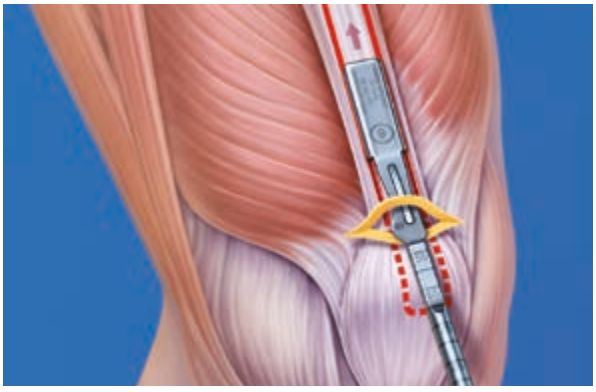
Adams D Ph.D., Mazzocca A M.D., and Fulkerson J M.D. Residual strength of the quadriceps versus patellar tendon after harvesting a central free tendon graft. Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 22, No 1 (January), pp 76-79. 2006

Joseph M, Fulkerson J, Nissen C, Sheehan TJ. Short-term recovery after anterior cruciate ligament reconstruction: a prospective comparison of three autografts. Orthopedics. 2006 March 29(3):243-8

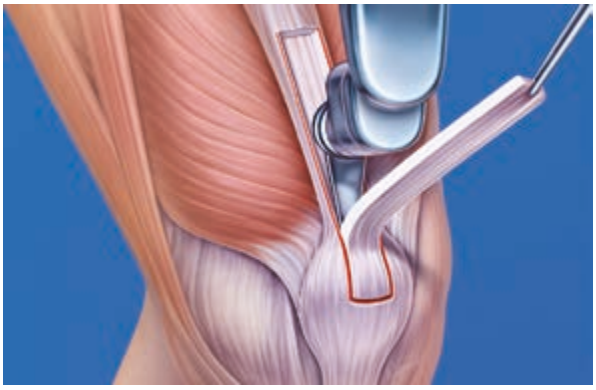
DeAngelis J and Fulkerson J. Quadriceps Tendon: A reliable alternative for reconstruction of the ACL. Clin Sports Med 26(4), October, 2007

[2] Fink C, Veselko M, Herbort M, Hoser C, 2014. Minimal invasive reconstruction of the MPFL using the quadriceps tendon. Arthros Tech 2014, 3(3) e325 - e329 [Epub ahead of print]

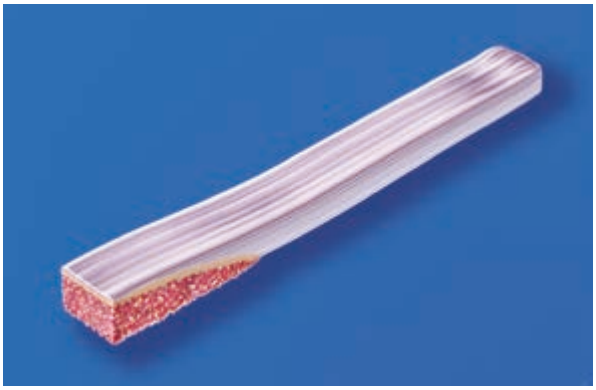
Note
ENDOWORLD® “Quadriceps Tendon Harvesting System” (96152047) is available on request.



Subcutaneous harvesting of quadriceps tendon using a special system via a minimal skin incision.



For cruciate ligament reconstruction, an oscillating saw can be used to harvest a bone block from the proximal patella.



The quadriceps tendon (QT) can be used with or without a bone block.

Cruciate ligament reconstruction techniques using the semitendinosus and/or gracilis tendon have gained increasing attention in recent years. However, there has been little focus on the quadriceps tendon.

Today many knee surgeons value the quadriceps tendon not only as a revision graft, but also use the quadriceps tendon more and more frequently for primary reconstruction of the anterior (ACL) and posterior (PCL) cruciate ligaments.

For more information about the System for Anterior Cruciate Ligament Reconstruction with rectangular bone tunnels using the Quadriceps tendon, please refer to the Silver Book, code 96155016: Anatomic reconstruction of the Anterior Cruciate Ligament – Quadriceps tendon and rectangular bone tunnels. Fink C, Hoser C, Gföller P and Herbort M.

Link to video

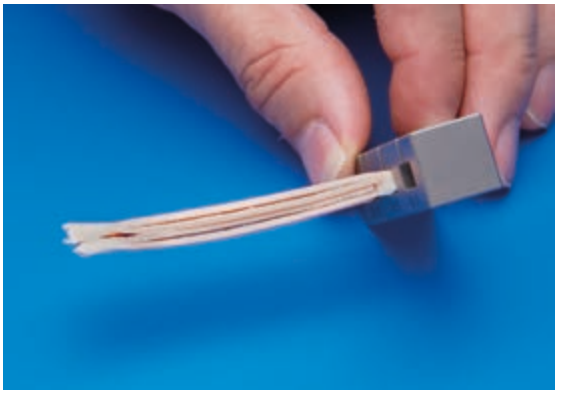
System for ACL Reconstruction with Rectangular Bone Tunnels using the Quadriceps Tendon

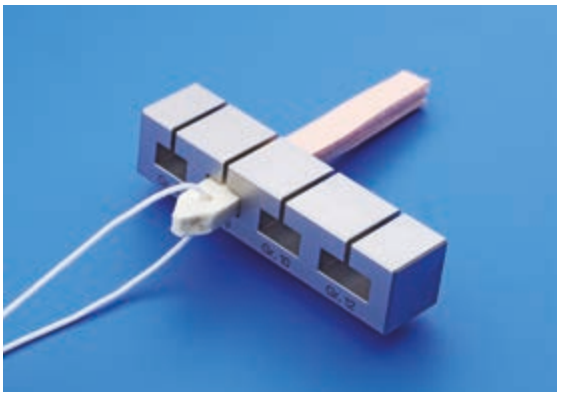
The actual anatomy of the anterior cruciate ligament insertion site gave rise to the idea of a system that would best match the insertion-site anatomy.

In cooperation with Prof. Christian Fink, Sportsclinic Austria (Innsbruck, Austria), a compact system was developed for creating rectangular femoral and tibial bone tunnels.

Application Description

1. Measuring the graft diameter with the tendon thickness tester





2. Rasps and Dilators for creation of the femoral bone tunnel

A range of different target guides with various offsets are available for use in positioning the femoral tunnel. The femoral tunnel is created using the “Medial Portal Aimers”.

QR code for the femoral tunnel

3. Dilators for creating the tibial tunnel

QR code for the tibial tunnel

The **tibial aimer** features a special tip design.
This allows the placement of two K-wires to align the tunnel on the tibial plateau.

A **conventional round** or a **rectangular** tibial tunnel can be created.

Tips

In revision surgery, it is often advantageous to reuse a previously placed round tibial tunnel and only create a rectangular femoral tunnel.

If a patellar tendon graft is used as a bone-ligament-bone graft, it is also recommended to create a femoral bone tunnel and a conventional round tibial tunnel.

Benefits of creating rectangular bone tunnels:

- Enables the creation of both femoral and tibial rectangular tunnels
- Rasp with smooth side to protect the PCL
- Distal tip of the tibial aimer with target marks for additional K-wires to align the tunnel on the tibial plateau
- Anatomical insertion area for the graft used
- Compact instrument set
- Compatible with existing instruments for cruciate ligaments
- Suitable for primary and revision ACL
- Provides good anatomical and cosmetically attractive results for the patient in combination with minimally invasive harvesting system for the quadriceps tendon

System Components

- **Tendon thickness tester**
- **Rasps and dilators for femoral rectangular bone tunnels**
- **Target aimer and dilators for tibial rectangular bone tunnels**

Tendon thickness tester:

– For measuring the following bone blocks: 8.0 mm, 9.0 mm, 10.0 mm and 12.0 mm x 5.0 mm

Rasps:

– 8.0 and 10.0 mm widths
– Each with 11.0 mm rasp depth
– 3 sides with cutting teeth
– 1 smooth side
– Tip with 4.5 mm outer diameter to accommodate 2.4 mm K-wires
– Laser marked in 5.0 mm increments
– Removal aid at the handle

Dilator, femoral:

– 8.0, 9.0, 10.0 and 12.0 mm wide and 5.0 mm thick
– 20.0 mm at full dilation width
– Laser marked in 5.0 mm increments
– Removal aid at the handle

Aimer, tibial:

- 98° fixed bending angle
- Distal tip with target marking for additional K-wires to align tunnel on the tibial plateau
- Target sleeve with additional ventral and dorsal K-wire guide
- Target sleeve with measuring scale for tibial tunnel length

Dilator, tibial:

- 8.5, 9.5, 10.5 and 12.5 mm wide and 5.5 mm thick
- 55.0 mm at full dilation width
- Laser marked in 5.0 mm increments
- Removal aid at the handle

Graft diameter	Rasp, femoral	Dilator, femoral	K-wires, tibial	Drill bit, tibial	Dilator, tibial
8.00 mm	8.00 mm	8.00 mm not absolutely necessary	2	5.00 mm	8.5 mm
9.00 mm	8.00 mm	9.00 mm	2	5.00 mm	9.5 mm
10.00 mm	10.00 mm	10.00 mm not absolutely necessary	2	5.00 mm	10.5 mm
12.00 mm	10.00 mm	12.00 mm	2	5.00 mm	12.5 mm

Instruments

28185QS **Quadriceps Tendon Cutter,** for subcutaneous terminal cutting of the quadriceps tendon

28185MH **Handle,** for use with Quadriceps Tendon Knives 28185FA – FF and Quadriceps Tendon Separators 28185EA – EC

28185MB **Tendon Thickness Tester,** for determining the thickness of the quadriceps tendon

28185GA **Rasp,** femoral, cannulated, straight, coarse, one side smooth, width 8 mm, height 5 mm, working length 15 cm

28185GB **Same,** width 10 mm

28185HA **Dilator,** rectangular, femoral, width 8 mm, height 5 mm, working length 15 cm

28185HB **Same,** width 9 mm

28185HC **Same,** width 10 mm

28185HD **Same,** width 12 mm

28729CF **Tibial Target Guide,** for the placement of a maximum of 3 parallel drilling wires

28185IA **Dilator,** rectangular, tibial, width 8.5 mm, height 5.5 mm, working length 15 cm

28185IB **Same,** width 9.5 mm

28185IC **Same,** width 10.5 mm

28185ID **Same,** width 12.5 mm

Knives for quadriceps tendon harvesting for cruciate ligament reconstruction

	Cutting	Dimensions (w x h)	Art. No.
Tendon Knife	Vertical parallel	8 x 6 mm	28185FC
Tendon Knife	Vertical parallel	9 x 6 mm	28185FD
Tendon Knife	Vertical parallel	10 x 6 mm	28185FE
Tendon Knife	Vertical parallel	12 x 6 mm	28185FF
Tendon Knife	Horizontal parallel	5 mm height	28185EC

Knives for quadriceps tendon harvesting for MPFL reconstruction

	Cutting	Dimensions (w x h)	Art. No.
Tendon Knife	Vertical parallel	10 x 4 mm	28185FA
Tendon Knife	Vertical parallel	12 x 4 mm	28185FB
Tendon Separator	Horizontal parallel	2 mm height	28185EA
Tendon Separator	Horizontal parallel	3 mm height	28185EB

Notes

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