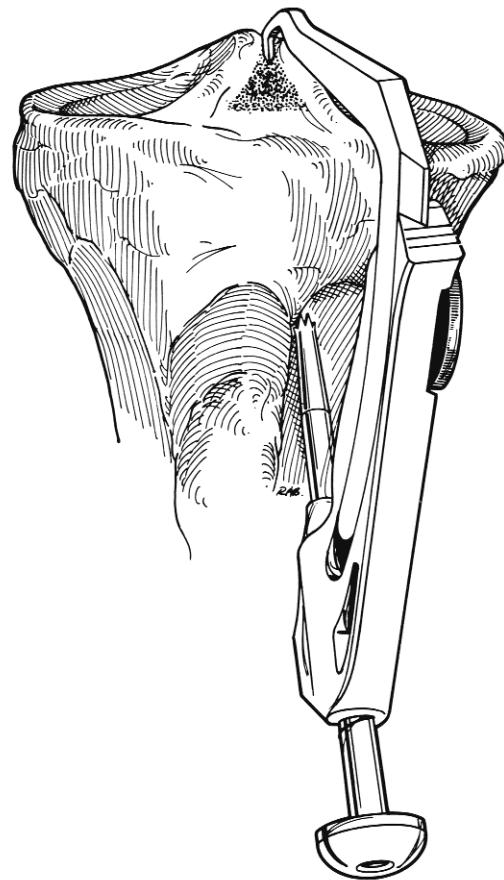


ACL reconstruction with the ACUFEX[◇] Director Drill Guide and ENDOBUTTON[◇] CL Fixation System

Thomas D. Rosenberg, MD



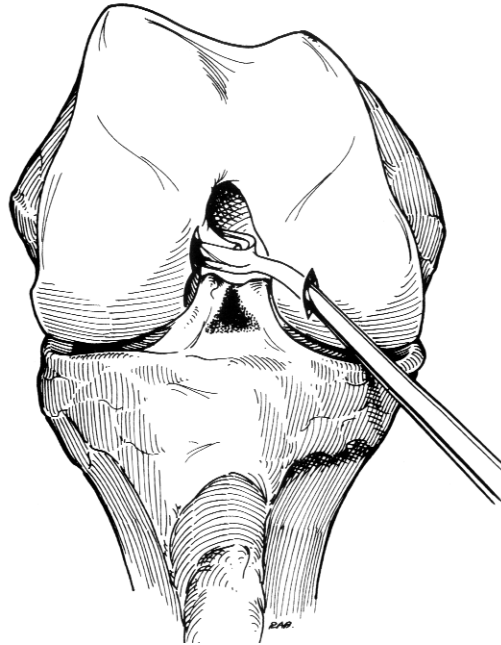


Figure 1

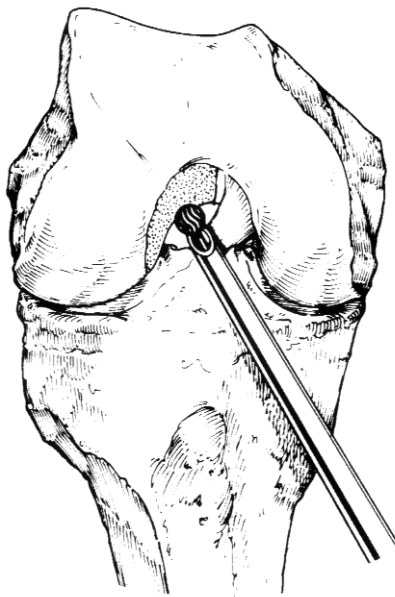


Figure 2

ACL Reconstruction with the ACUFEX[®] Director Drill Guide and ENDOBUTTON[®] CL Fixation System.

Introduction

In the late 1980s, Smith & Nephew's ACUFEX instrumentation helped standardize ACL reconstruction. In 1999 the Smith & Nephew ENDOBUTTON CL Fixation Device further simplified ACL reconstruction and increased initial reconstruction strength.

The Smith & Nephew ACUFEX Director Drill Guide Systems offer a complete system of instruments for the accurate, reproducible placement and drilling of tibial and femoral tunnels during ACL reconstruction. ACUFEX Drill Guide System features include:

- the ACUFEX Director Guide, which achieves rigidity, accuracy and simplicity with one-handed operation.

- the Anti-Impingement Device, which simplifies monitoring of the intrachondral notch prior to the creation of the tibial tunnel.

- the 2–5 mm and 3–9 mm offset drill guides, which facilitate precise guide pin placement.

- the Endoscopic Femoral Aimer with 3 mm or 4 mm offset, which optimizes femoral positioning for semitendinosus constructs.

- the ENDOBUTTON CL Fixation System, which consistently provides very strong and versatile endoscopic femoral fixation utilizing soft tissue grafts.

- the NOTCHMASTER[®] Curette, which facilitates removal of bone and soft tissue from the notch during notchplasty.

Notch Preparation

If necessary, perform appropriate notchplasty using the Smith & Nephew NOTCHMASTER Curette (Figure 1) or Smith & Nephew NOTCHBLASTER Burr (Figure 2).

Autografts typically require a 2 mm clearance. The proximal outlet of the notch should not be enlarged; rather, it is carefully identified with the knee at 90° flexion.

Tibial Tunnel Location

Position the tibial tunnel using the Smith & Nephew ACUFEX® Director Drill Guide as follows (Figure 3):

The remaining distal stump of the torn ACL is the major orientation guide.

Using the Elbow Aimer: place the tip of the aimer in the posterior fibers of the ACL footprint. The 2.4 mm guide wire will protrude through the tibial plateau several millimeters anterior (depending on the angle of the tibial tunnel) to the elbow of the aimer.

Using the Tip Aimer: place the tip of the aimer exactly at the point where the 2.4 mm guide wire will protrude through the tibial plateau.

Advance the 2.4 mm guide wire in the preferred position (Figure 4). The angle of the aimer may be adjusted depending on the graft length. To achieve a longer tibial tunnel, increase the angle of the aimer arm.

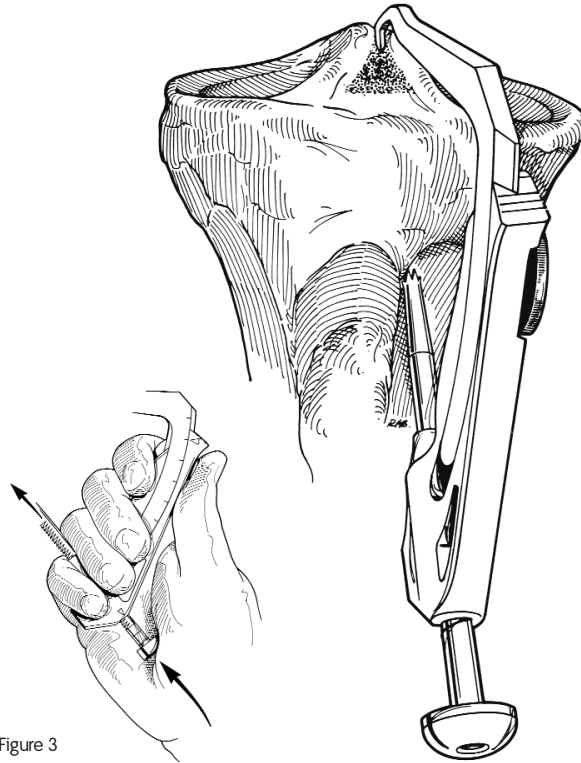


Figure 3

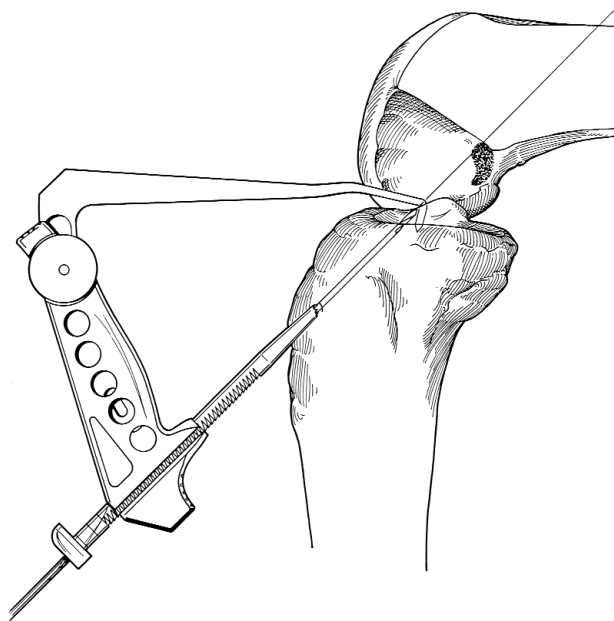


Figure 4:

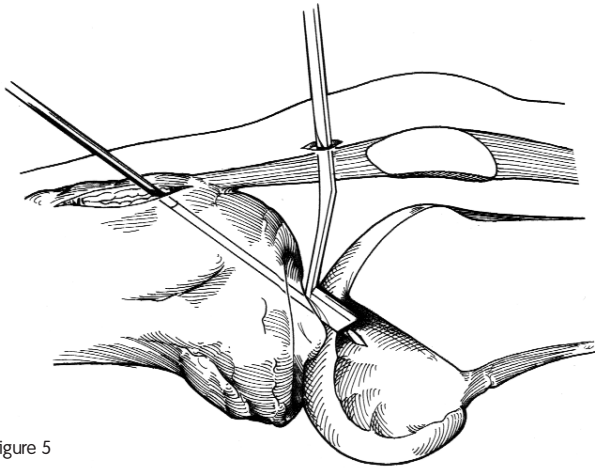


Figure 5

Notch Assessment

Before drilling the tibial tunnel, use the Anti-Impingement Device to assess the Notch (Figure 5). Place the Anti-Impingement Device over the guide wire and view the knee as it is extended through a range of motion.

If the guide wire is sub optimally positioned, use the 2–5 mm Offset Drill Guide to reposition it (Figure 6).

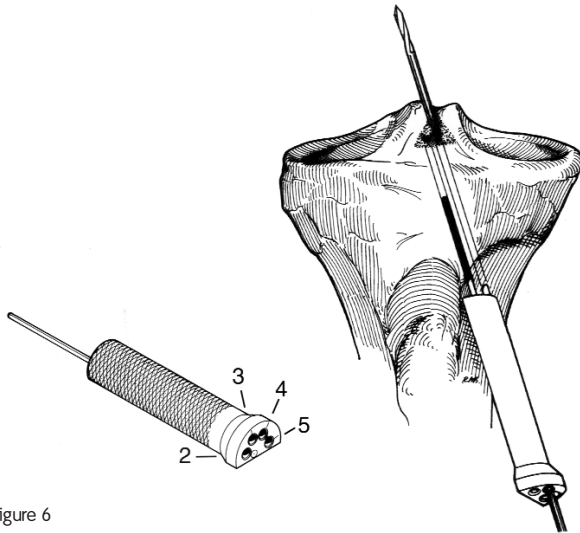


Figure 6

Tibial Tunnel Drilling

Drill the tibial tunnel using a standard Cannulated Drill Bit that matches the graft diameter. Advance the drill bit over the guide wire and drill the tibial tunnel (Figure 7).

Femoral Tunnel Location

The knee is usually flexed at 90°. Position the endoscopic femoral aimer with the appropriate offset hook (Figure 8: X mm) at the over-the-top position, in direct contact with the bony cortex.

Note: When using the ENDOBUTTON CL System for femoral fixation, break-through of the posterior femoral cortex does not compromise fixation. If a longer femoral tunnel is desired (e.g., with an exceptionally long graft), the knee can be flexed slightly less than 90°.

Advance the 2.7 mm passing pin through the femoral offset guide and drill through the femur until the passing pin penetrates the lateral femoral cortex (Figure 8). Feel the 2.7 mm passing pin just under the skin after it exits the cortex to determine its position with respect to the tourniquet.

Femoral Tunnel Drilling

Select an Endoscopic Drill bit which matches the graft diameter and use it to produce the femoral socket. Depth is regulated according to the desired insertion length. Depth is 9–10 mm greater than the desired graft insertion, to allow ENDBUTTON device rotation (Figure 9).

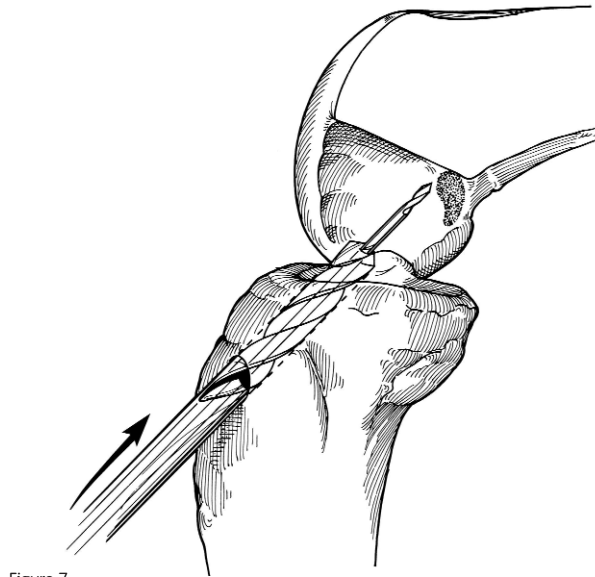


Figure 7

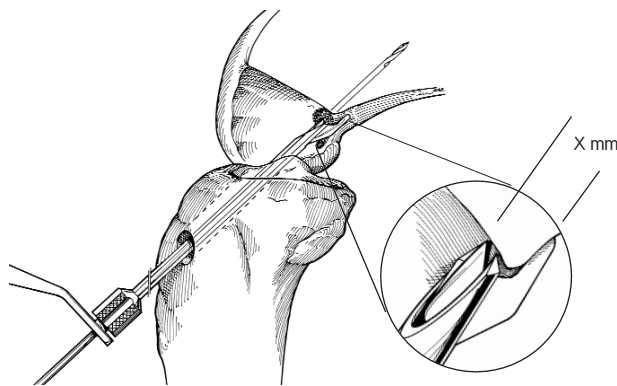


Figure 8

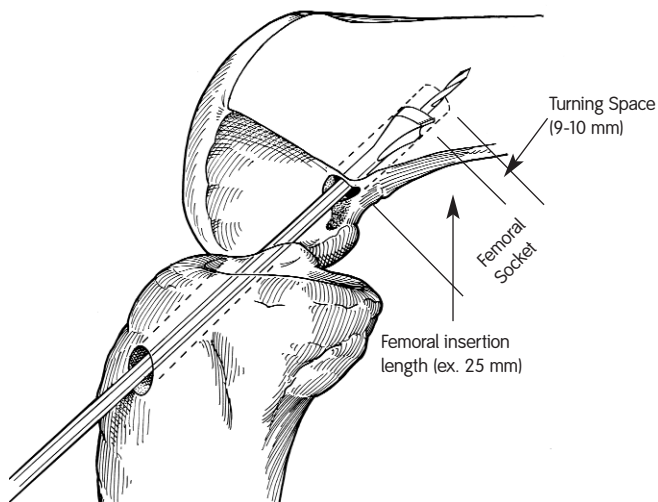


Figure 9

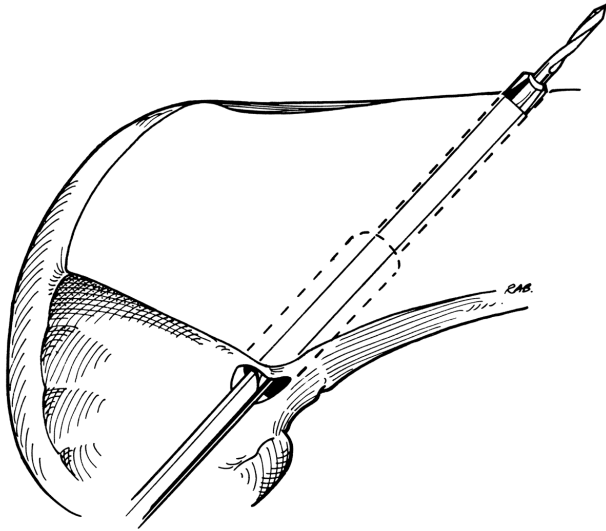


Figure 10

The knee should now be flexed at least 90°. A 2.7 mm Passing Pin and a 4.5 mm Endoscopic Drill are used to produce the passing channel (Figure 10).

An ENDOBUTTON Depth Gauge is used to measure the total length of the femoral channel (Figure 11).

Note: Bi-socket femoral tunnels may be used with soft tissue grafts to better reproduce the anatomy of the original ACL. For instructions on this technique see the *Double Bundle ACL Reconstruction using the ENDOBUTTON® CL Fixation System* technique guide (REF 10600005).

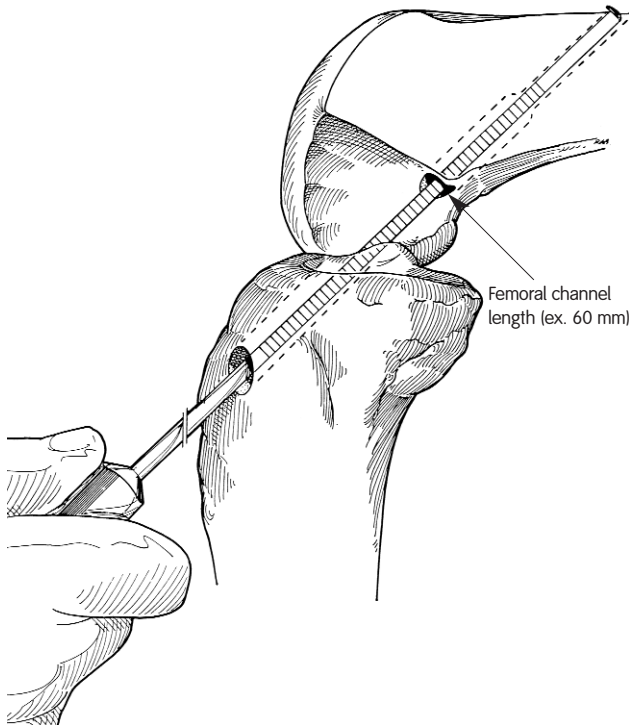


Figure 11

Graft Preparation

Working on the GRAFTMASTER® board, the semitendinosus graft can be cut into two portions of equal length, or use semitendinosus and gracilis grafts.

Each half, or semitendinosus and gracilis, can be doubled-over to produce a quadrupled construct which is pre-sized as shown (Figure 12).

If desired, pretensioning may be standardized by placing the graft construct around the Tensioning Post (Figure 13), utilizing the Tensiometer (usually 20 pounds for 10 minutes).

ENDOBUTTON CL Device Sizing

The ENDOBUTTON CL device length is determined by the difference between the total femoral channel length and the desired femoral graft insertion length. If this falls between two ENDOBUTTON CL device sizes, round-up or down to the closer size.

Note: The ENDOBUTTON CL device is currently available in 5 mm increments. If the required size falls outside the available range or if the ENDOBUTTON CL device is not available, see Appendix A.

Pass the grafts through the continuous loop and load the construct into the ENDOBUTTON Holder.

Place a line on the graft 6 mm distal to the total channel length. This line indicates the rotation point for the ENDOBUTTON CL (Figure 14).

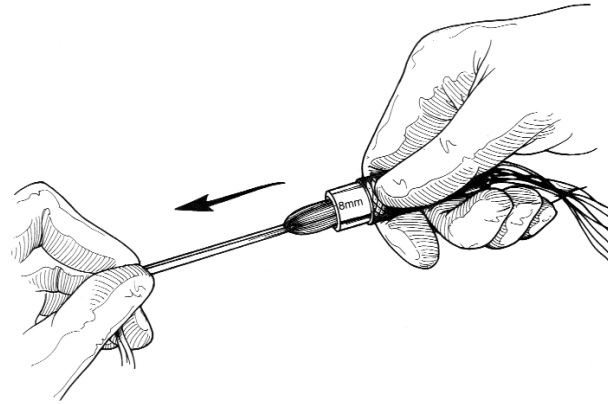


Figure 12

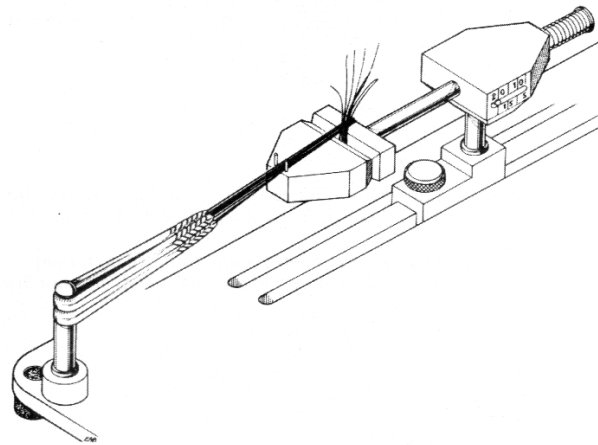


Figure 13

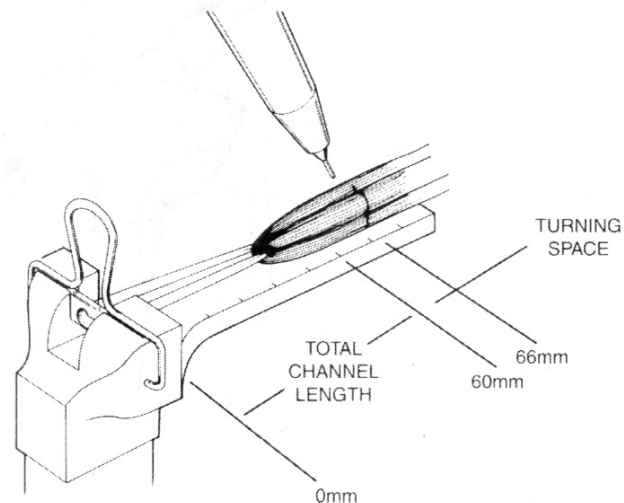


Figure 14

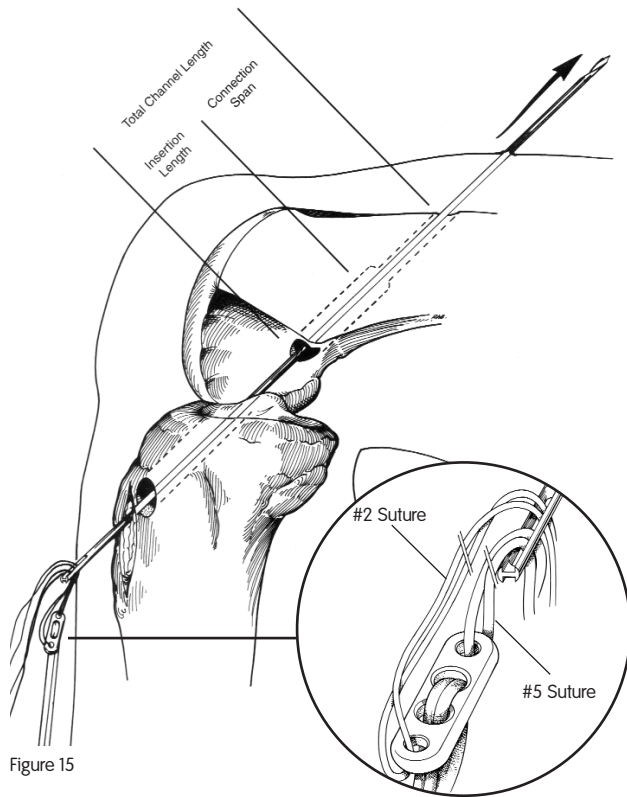


Figure 15

Graft Passage

Attach a #5 polyester braided suture to one outside hole of the ENDOBUTTON device to lead and pass the ENDOBUTTON device. Attach a trailing #2 polyester braided suture to the opposite outside hole of the ENDOBUTTON device to rotate the ENDOBUTTON device as it exits the anterolateral femoral cortex. Both sutures are passed through the eyelet of a passing pin (Figure 15 inset).

The passing pin is used for suture passage by piercing the quadriceps and skin proximally (Figure 15). The #5 suture is pulled first, advancing the ENDOBUTTON/graft complex into the femoral tunnel. When the marking line reaches the internal femoral aperture, the trailing #2 suture is pulled, rotating the ENDOBUTTON device immediately external to the femur (Figure 16).

Hold the ENDOBUTTON device perpendicular to the femoral cortex and pull back on the graft, locking the ENDOBUTTON device on the outer femoral cortex. Secure fixation should be felt at that point with the “blue line” retreating 6 mm.

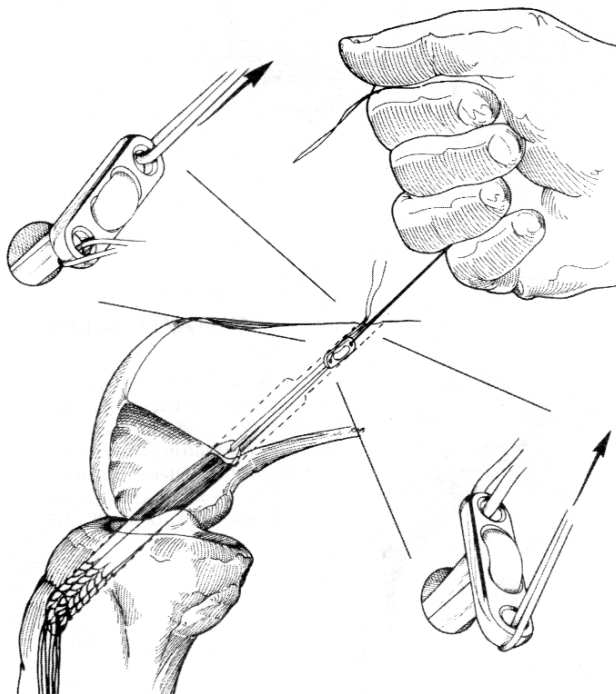


Figure 16

Graft Tensioning

Cycle the knee through a range of motion prior to tibial fixation to pretension the graft (Figure 17).

Tibial Fixation

Tension the graft and fix as desired, i.e., with a Smith & Nephew interference screw, tying over a screw and washer, or both (Figure 18). Knotting is usually achieved at 20–30° of knee flexion.

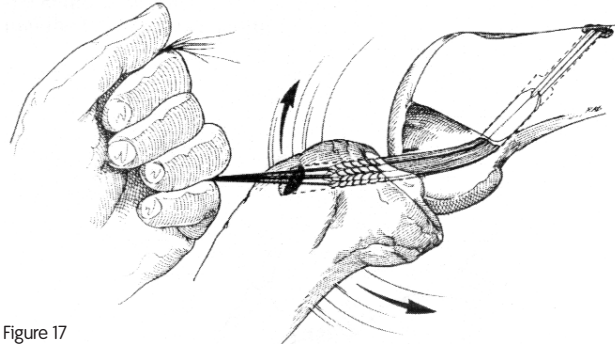


Figure 17

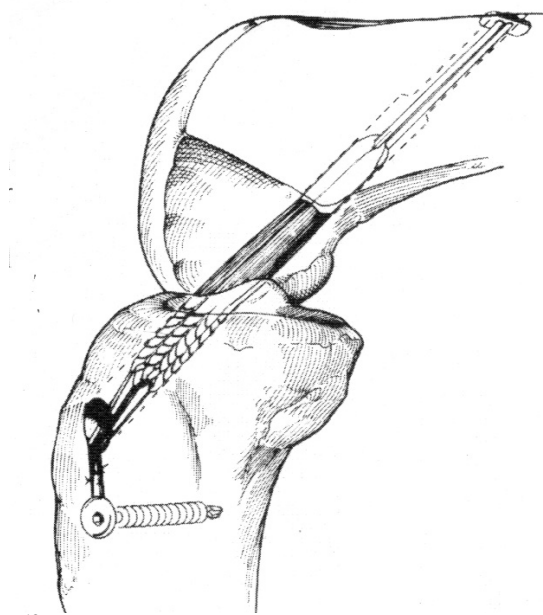


Figure 18

Appendix A
ENDOBUTTON® Fixation
Device Technique (with
knotted connector)

Attach the ENDOBUTTON Tape
using the ENDOBUTTON Holder.
A doubled surgeon's knot is used
(Figure 19). The ENDOBUTTON
Tape length plus the insertion
length combine to equal the total
channel length.

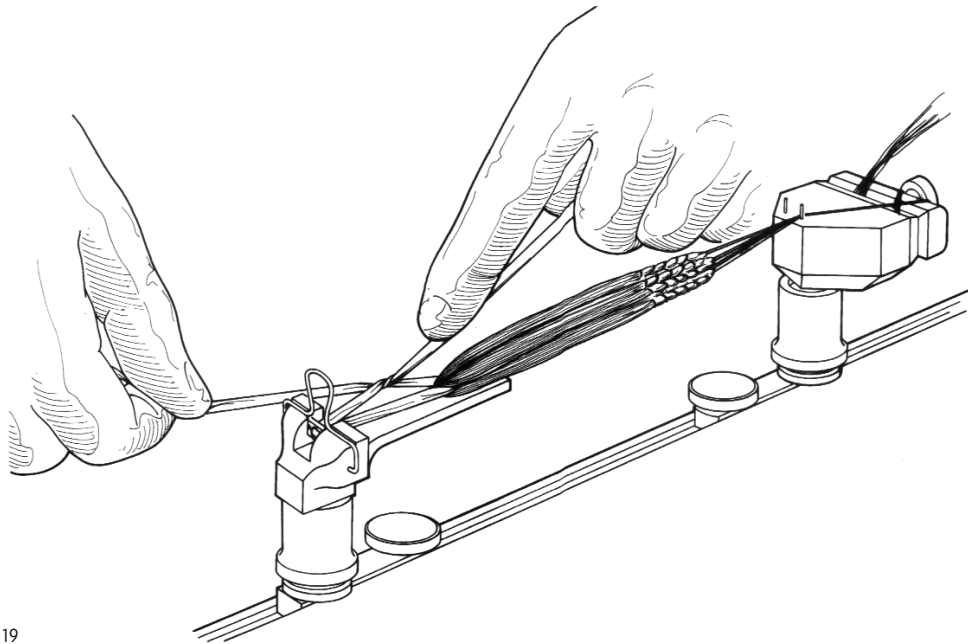


Figure 19

Appendix B Patellar Tendon Graft Preparation and Technique with the ENDOBUTTON Fixation Device

Attach the graft through the two central holes of the ENDOBUTTON device using the GRAFTMASTER® Board (Figure 20).

Connect the ENDOBUTTON device to the bone block using either #5 sutures, or 4–6 mm wide polyester tape. The desired length of the graft insertion added to the span of the sutures must equal the total channel length (Figure 21).

Lead and pass the ENDOBUTTON device using a #5 suture. A trailing #2 suture is later used to rotate the ENDOBUTTON as it exits the anterolateral femoral cortex.

The Drill Passing Pin (2.7 mm x 15") is used for passage of the graft, piercing the quadriceps and skin proximally.

Drilling perforation of the posterior cortex does not compromise graft fixation and may optimize femoral graft placement. Patellar tendon grafts may be seated more proximally with the ENDOBUTTON device, eliminating graft protrusion from the tibial tunnel.

An interference screw can be used for distal fixation (Figure 22).

Note: For more information, see the *ACL reconstruction with bone-tendon-bone transplants using the ENDOBUTTON CL BTB Fixation System* technique guide (REF 10615040).

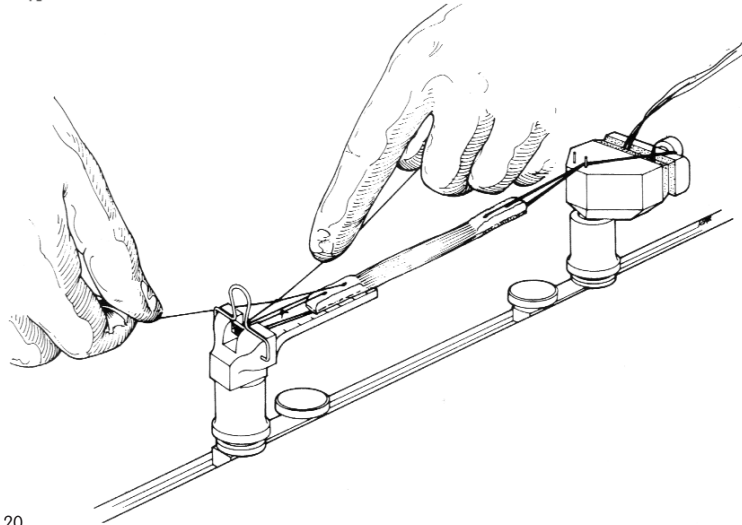


Figure 20

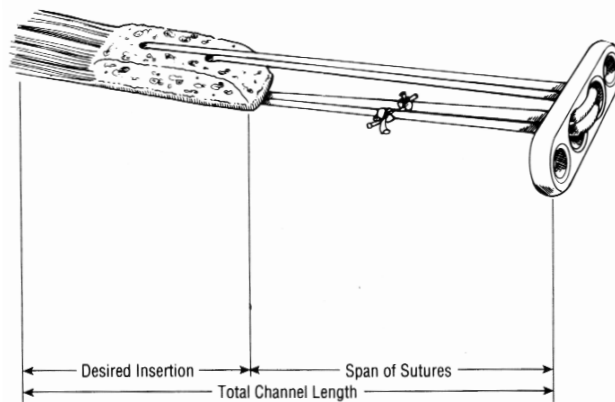


Figure 21

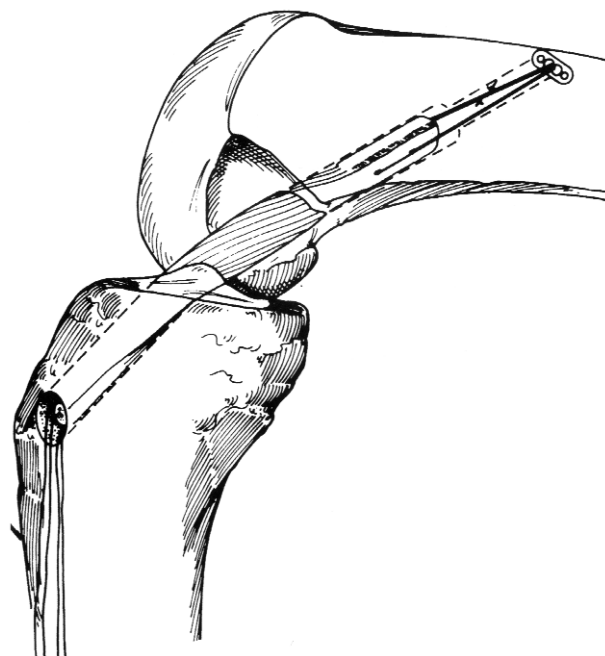


Figure 22

Additional Instruction

Prior to performing this technique, consult the Instructions for Use documentation provided with individual components — including indications, contraindications, warnings, cautions, and instructions.

Courtesy of Smith & Nephew, Inc.,
Endoscopy Division

Caution: U.S. Federal law restricts this device to sale by or on the order of a physician.