Arthrex®

Anterolateral Ligament Reconstruction

Surgical Technique

Anterolateral Ligament Reconstruction

Anterolateral Ligament Reconstruction (ALL)

In 1879, the French surgeon Paul Segond described a remarkably constant avulsion fracture pattern at the proximal-lateral tibia as a result of forced internal rotation. He described the existence of "a pearly, resistant, fibrous band" connecting the femur with the lateral tibia that seemed to show "extreme amounts of tension during forced internal rotation of the knee". Later, Hughston described the importance of the "middle third capsular ligament" and how it was frequently torn in combination with an ACL tear, and this structure was essentially in this same anatomic location Segond described. However, only recently related to Claes' 2013 publication, this anatomical structure has been comprehensively characterized as the anterolateral ligament (ALL).[1]

Given its location at the anterolateral aspect of the knee, the ALL was found to act as an important restraint to internal tibial rotation. With the pivot-shift consisting of a coupled translation/rotation phenomenon, experimental sectioning of the ALL was found to invariably induce high-grade pivot-shifts in ACL-deficient cadaveric knees, unlike isolated ACL injury. In other words: high-grade pivot-shifts were only seen in the combination of ACL plus ALL injuries. With the continued occurrence of unsettled rotational laxity despite appropriately performed anatomic ACL reconstruction being a significant issue in current practice, the aforementioned new insights of the anatomy and function of the ALL could open the door to a potential solution. Specifically, reconstruction of the ALL could play a major role in improving results of isolated ACL reconstruction by providing better rotational control of the knee.

The goal of ALL reconstruction is to eliminate any residual rotational laxity and also reduce the risk of ACL graft rupture. Although contemporary ACL reconstruction is generally thought to deliver good results with excellent control of anterior-posterior (AP) laxity, the persistence of some degree of rotational instability characterized by a positive pivot-shift test in some patients is not uncommon. Rotational laxity after ACL injury is best quantified in the pivot-shift phenomenon, which is the most specific test that correlates best with functional outcome after reconstruction. However, the problematic persistence of a positive pivot-shift remains an unsolved issue in a significant amount of cases after both single and double ACL reconstruction.[2]

Historically, anterior laxity in anterior cruciate ligament deficient knees was treated surgically by isolated extraarticular iliotibial band tenodesis, as described by Lemair, Jacob and MacIntosh.[3,4] This procedure in isolation was largely abandoned when arthroscopic single-bundle intraarticular ACL reconstruction emerged as the gold standard surgical treatment of ACL tear. More recently, the anterolateral ligament (ALL) has been shown to have an effect on rotational stability in several studies when performed in association with a standard intraarticular reconstruction of the ACL.[5,6,7]

Anterolateral Reconstruction Indications

Anterolateral ligament reconstruction is aimed at augmenting rotational stability in the ACL reconstructed knee. Because combined injuries to both the ACL, and ALL or deep IT Band, act as a prerequisite for the occurrence of an IKDC grade III pivot-shift, ACL-injured patients with a high-grade pivot shift might benefit from an additional anterolateral reconstruction in order to avoid persistent rotational laxity. Hyperlax females with excessive recurvatum and physiologic joint laxity are potentially appropriate candidates for combined ACL reconstruction and extra-articular stabilization. Furthermore, in ACL-injured pivoting athletes who require absolute stability, anterolateral reconstruction should be contemplated if only an IKDC grade II pivot-shift is present. Finally, revision ALR reconstruction cases commonly exhibit significant rotational laxity due to a tendency for increased joint laxity from previous meniscus removal or resultant laxity of secondary ligamentous restraints. Especially in the absence of frank retrauma or obvious technical errors explaining graft failure, concomitant ALR reconstruction should always be considered as a means of improving stability in these complex cases.

[1] Claes et al., *Journal of Anatomy*, 2013.

[2] Suomalainen et al., *AJSM*, 2012.

[3] M. Lemaire et al., *Rev Chir Orthop Reparatrice Appar Mot*, 1980.

[4] J. Ireland et al., *J Bone Joint Surg Br,* 1980.

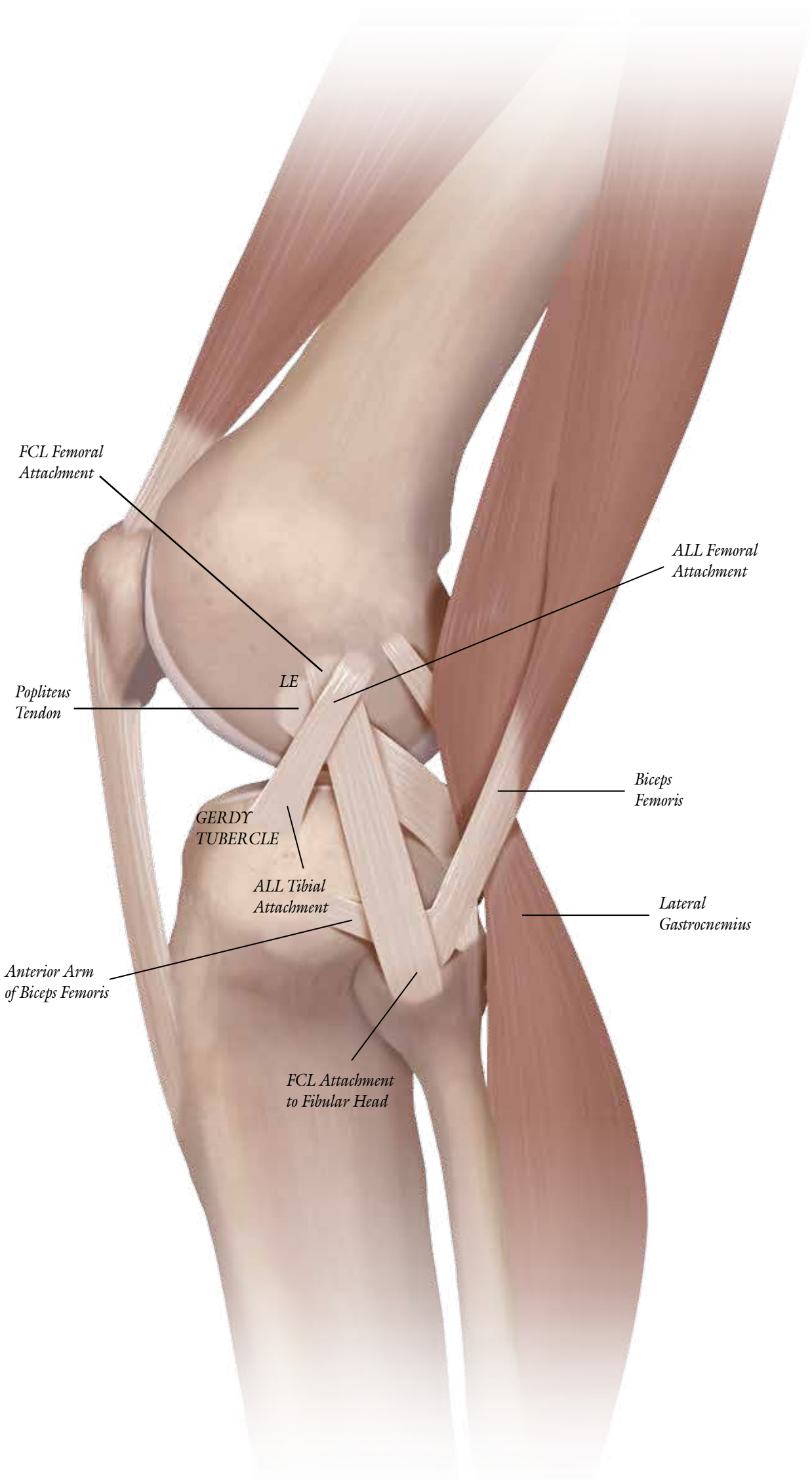
[5] Sonnery-Cottet et al, *American Journal of Sports Medicine*, 2015.

[6] Pomajzl et al, *Journal of Arthroscopic and Related Surgery,* 2014.

[7] Parsons et al, *American Journal of Sports Medicine*, 2015.

[8]Helito et al, *The American Journal of Sports Medicine,* 2014.

[9]Amis et al, *The Journal of Bone and Joint Surgery,* 2013.

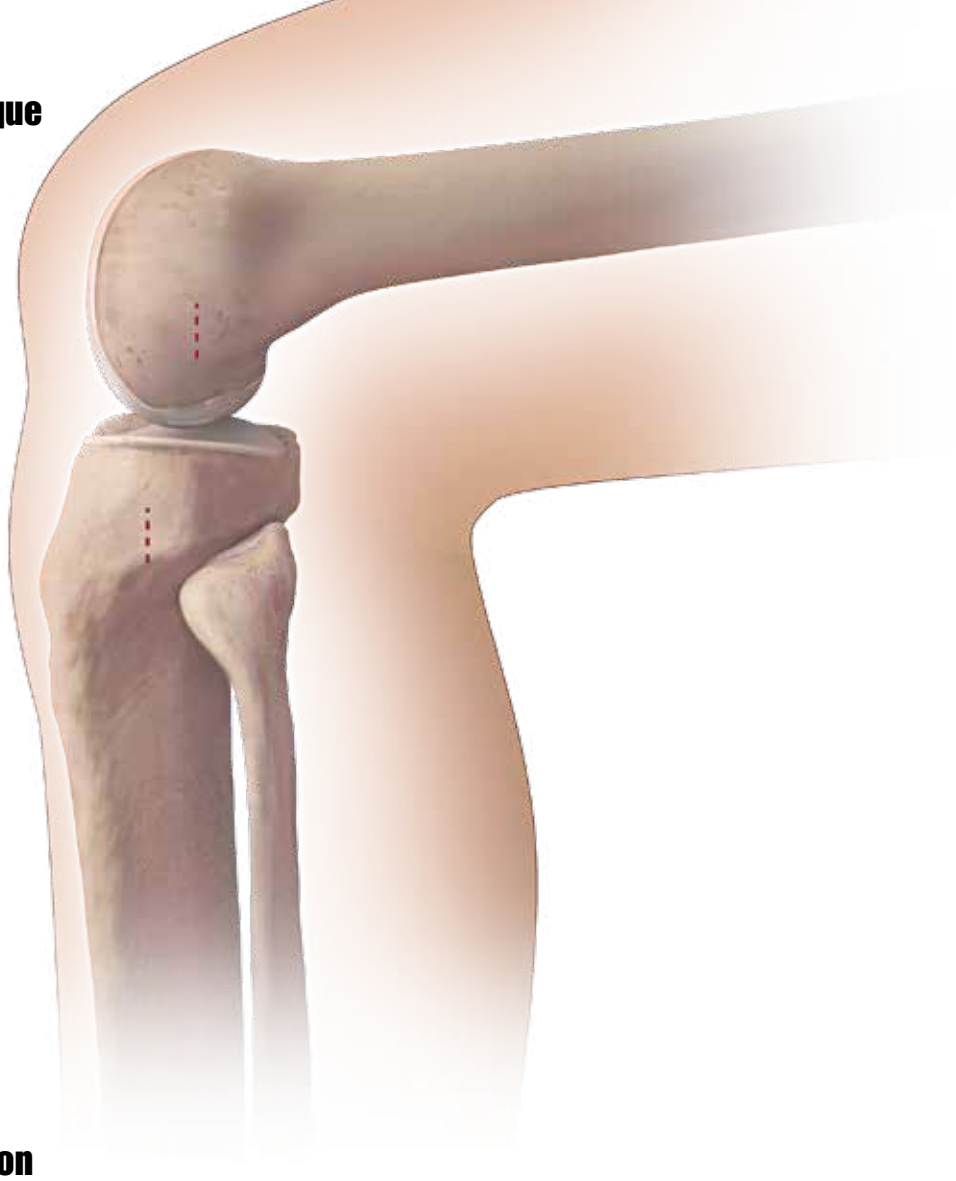

FCL Femoral Attachment
ALL Femoral Attachment
LE
Popliteus Tendon
Biceps Femoris
GERDY TUBERCLE
ALL Tibial Attachment
Lateral Gastrocnemius
Anterior Arm of Biceps Femoris
FCL Attachment to Fibular Head

Anterolateral Ligament Technique

1

The Anterolateral Ligament (ALL) will run obliquely to the anterolateral tibia. The femoral stab incision is made slightly proximal and posterior to the lateral epicondyle. The tibial stab incision is made 22 mm posterior to Gerdy's tubercle, which is approximately halfway between Gerdy's tubercle and the center of the fibular head.

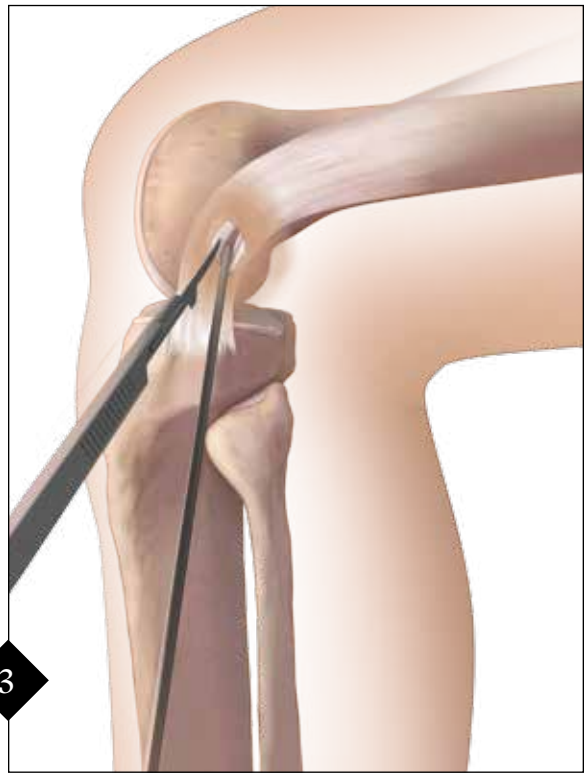
A gracilis tendon autograft is utilized, as the cross-sectional area, length, and ultimate loads provide sufficient anatomical and mechanical properties for ALL reconstructions.[7] Minimum graft length is 12 cm, whipstitched 20 mm at one end with a 2-0 FiberWire® suture. The graft should be tapered at the whipstitched end to facilitate insertion of the graft into the femur.



Femoral Preparation and Fixation

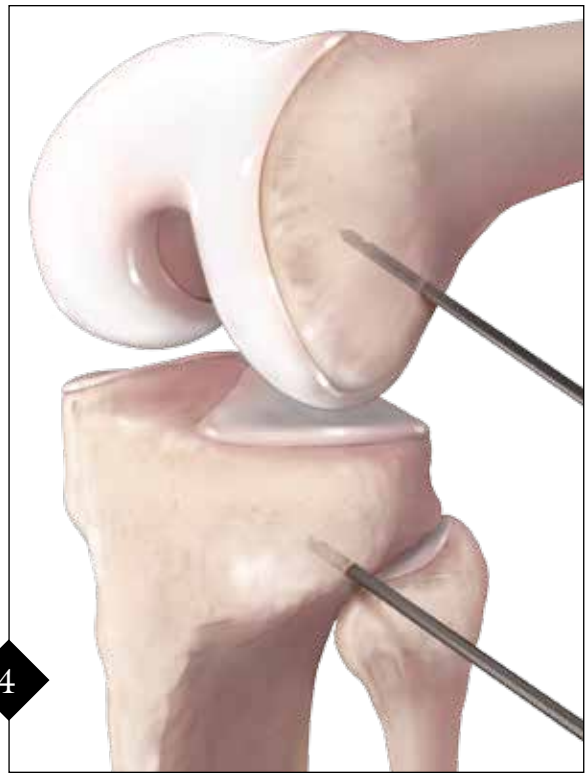
2

On the femur, the insertion point for the 2.4 mm guide pin is 8 mm proximal and 4.3 mm posterior to the lateral epicondyle. When drilling the 2.4 mm pin, aim slightly anterior and proximal in order to avoid drilling into the femoral socket of the ACL reconstruction.[8,9]



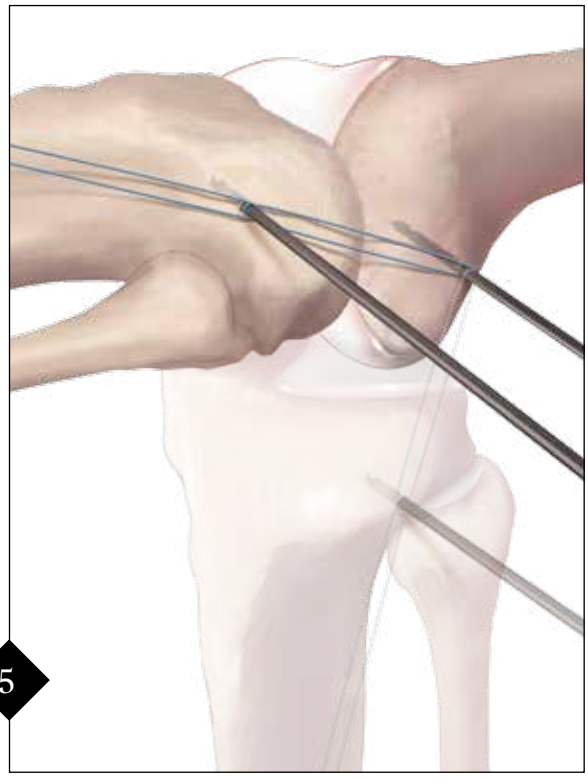
3

After the pin is drilled, split the iliotibial band around it with a scalpel to facilitate the insertion of a SwiveLock® anchor.



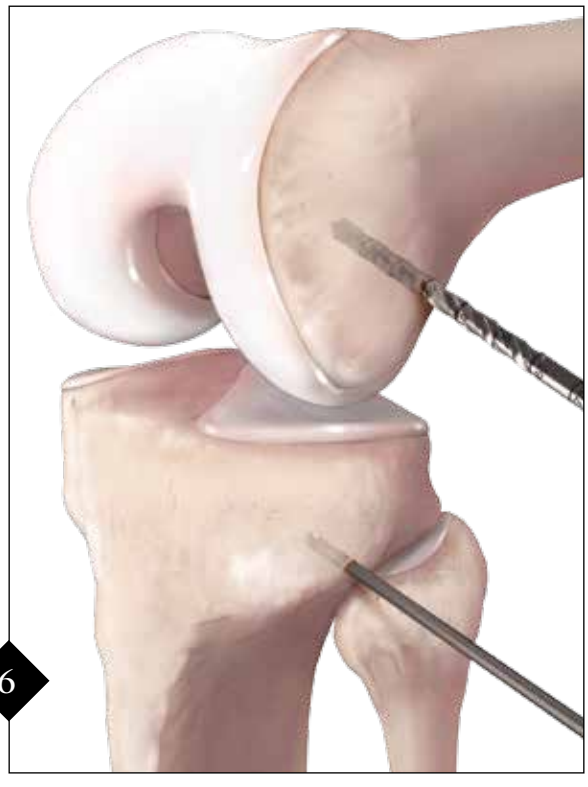
4

Drill a 2.4 mm guide pin 22 mm posterior to Gerdy's tubercle and 10 mm distal to the joint line. This should also be the approximate midpoint between Gerdy's tubercle and the center of the fibular head.



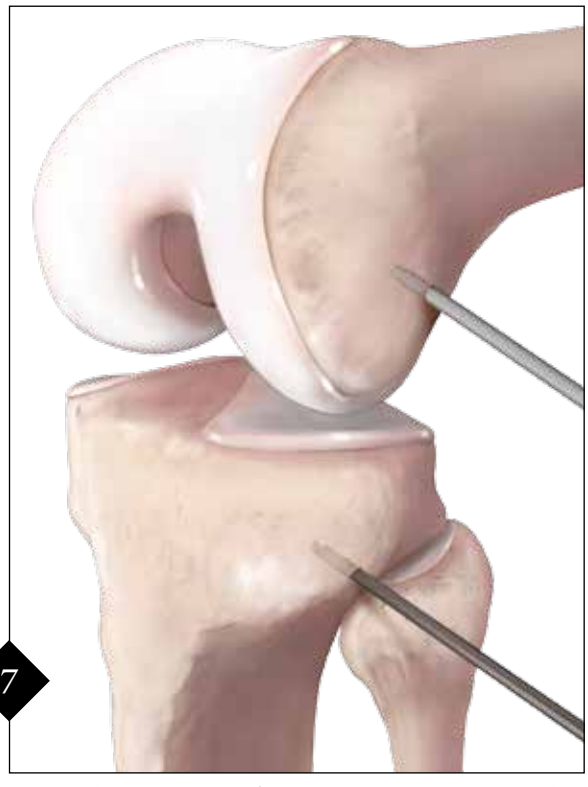
5

The isometry of the graft can be tested by wrapping a FiberWire around the pin and moving the leg through the range-of-motion. When the FiberWire is held taut at extension, it should be isometric or become slightly shorter by no more than 5 mm as it moves to 90° of flexion. If it becomes shorter by more than 5 mm, adjust the femoral pin.



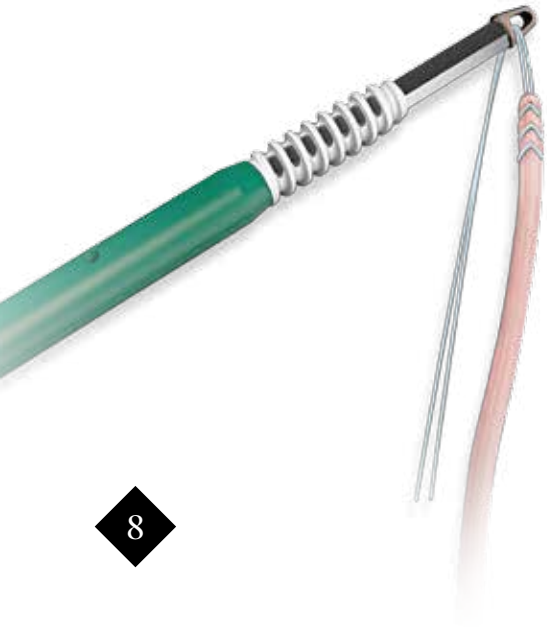
6

Overdrill the guide pin with a 4.5 mm Cannulated Drill to a depth of 20 mm.



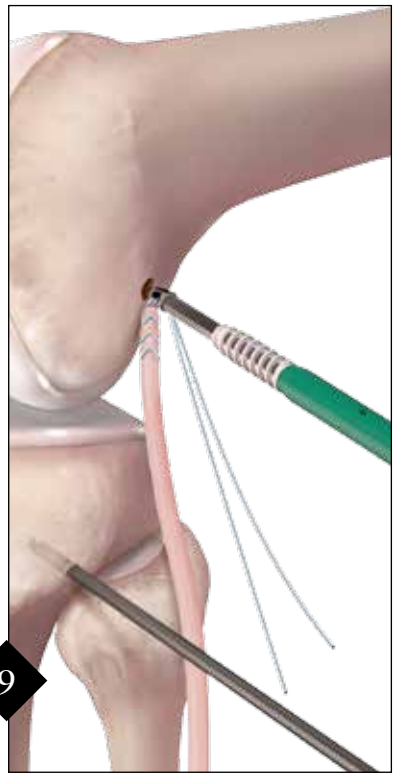
7

For hard bone, the 4.75 mm SwiveLock® Tap can be used.



8

Load the whipstitched sutures of the gracilis graft through the PEEK eyelet of the 4.75 mm SwiveLock® anchor.



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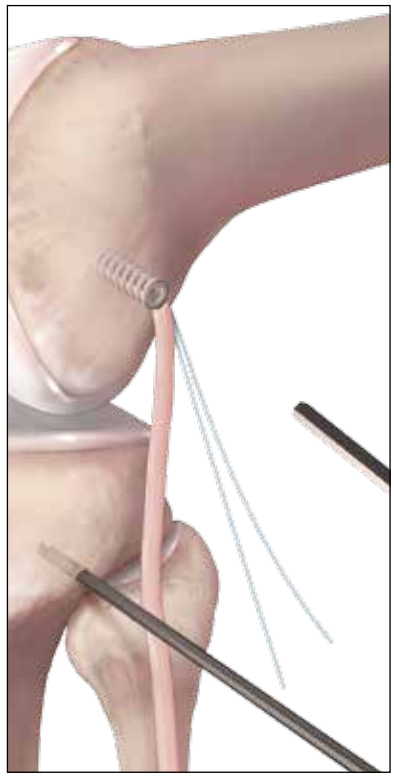
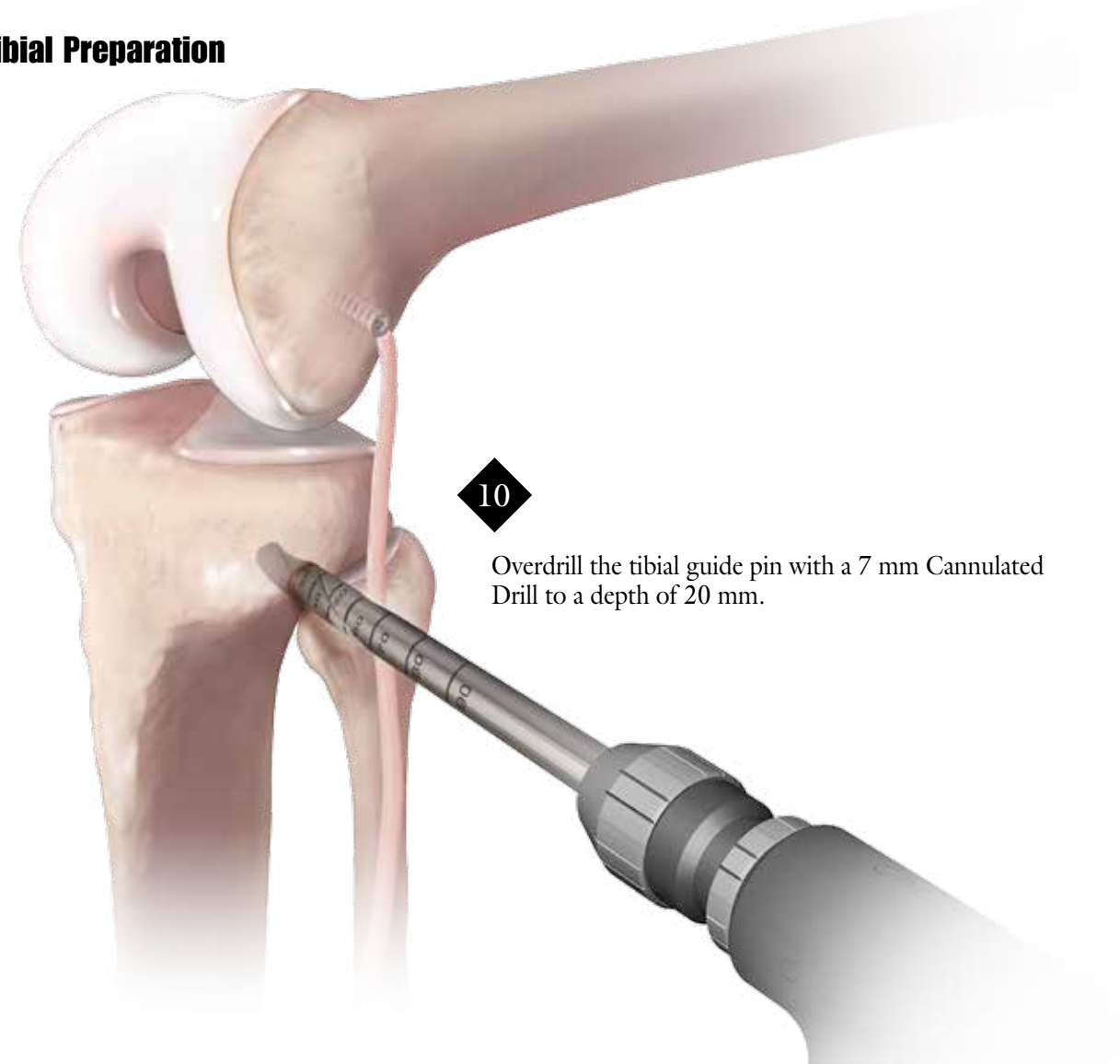


Insert the SwiveLock into the drilled hole. Ensure the eyelet is fully seated so that the threads of the SwiveLock anchor have started to touch the bone. Hold the paddle of the SwiveLock and turn the knob to insert the anchor. The SwiveLock sutures can be removed.

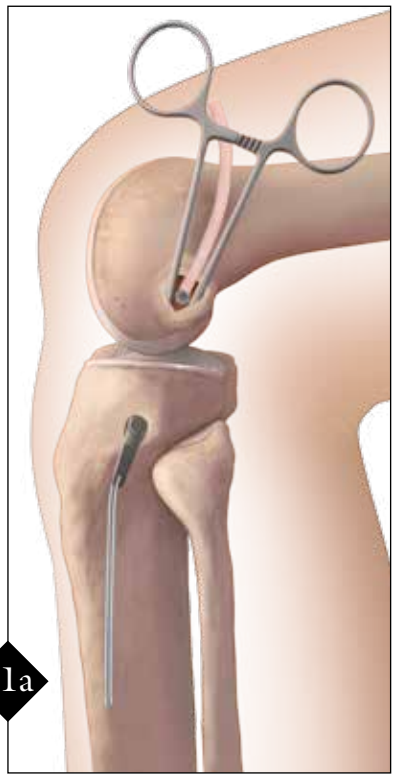
Tibial Preparation



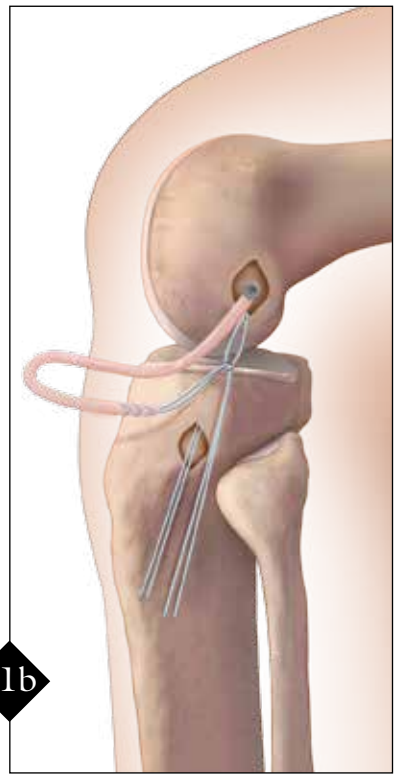
10

Overdrill the tibial guide pin with a 7 mm Cannulated Drill to a depth of 20 mm.

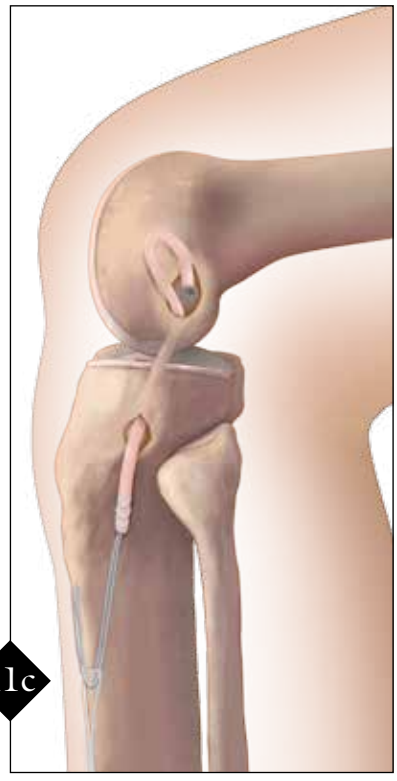
Graft Passage



11a

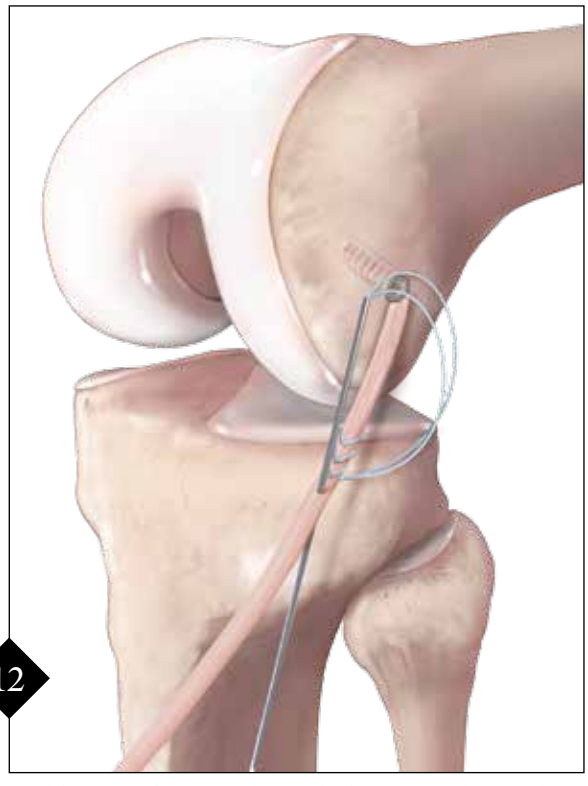


11b



11c

Use a curved hemostat to dissect underneath the iliotibial band to create a plane from the femoral incision to the tibial incision. Place a passing suture from distal to proximal with the hemostat. Use the passing suture to pass the graft to the tibial side.



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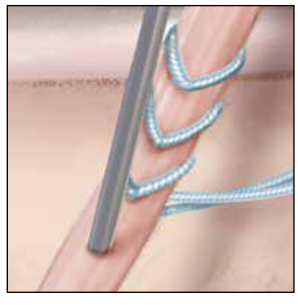
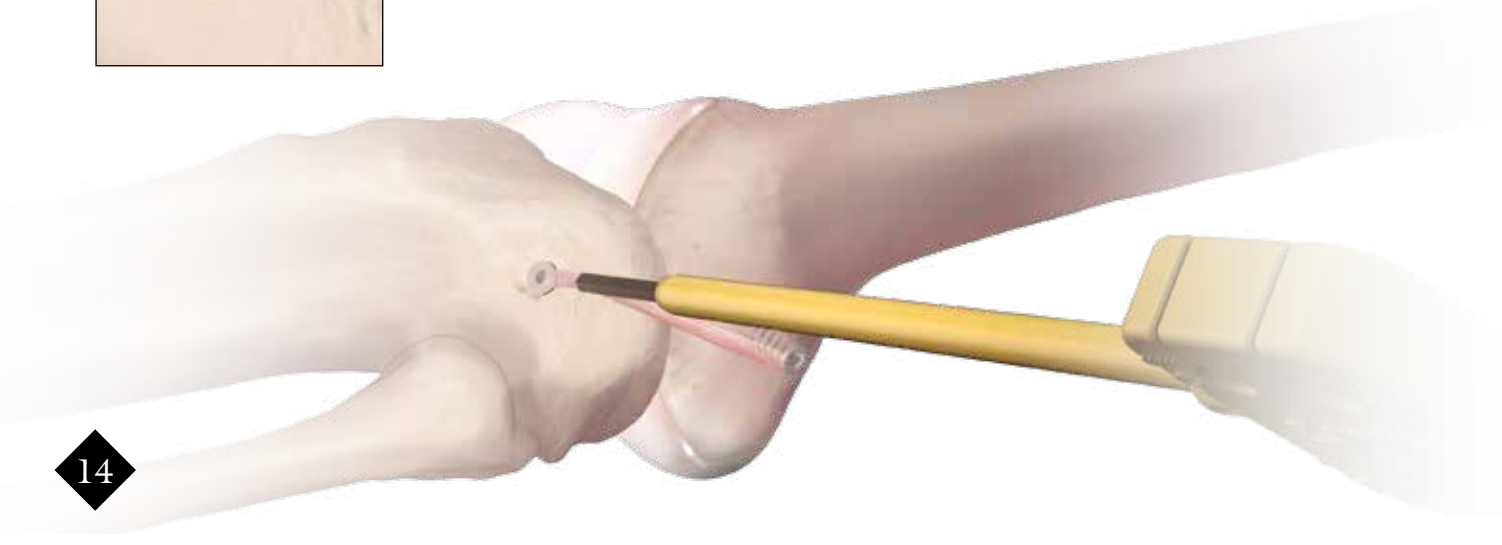


Hold the graft to the drilled hole and mark it at that location. Whipstitch 20 mm of the graft distally from the mark, using a #2 FiberLoop® suture. This will allow the whipstitched section to enter the drilled socket with the SwiveLock® and increase the pull-out strength of the graft.*

Fixation

13

Place the 7 mm forked Tenodesis SwiveLock® anchor over the graft. Push the forked end into the tunnel and adjust tension by pulling on the graft. It is important not to overconstrain the anterolateral ligament.



14

Fix the anchor with the knee in extension and neutral rotation. Once the anchor is in place, the sutures can be removed. Cut the end of the graft exiting the tibial socket.

Ordering Information

Anterolateral Ligament
Reconstruction Implant System (AR-5522) includes:

BioComposite SwiveLock C Vented,
w/closed eyelet, 4.75 mm x 19.1 mm
BioComposite Suture Anchor,
SwiveLock Tenodesis, 7 mm x 19.5 mm
#2 FiberWire suture
#2 FiberLoop suture
#2 TigerLoop suture
Drill Pin, 2.4 mm, qty. 2
Cannulated Drill, 4.5 mm
Cannulated Drill, 7 mm
SwiveLock Punch/Tap, disposable, 4.75 mm

**Data on file*

This description of technique is provided as an educational tool and clinical aid to assist properly licensed medical professionals in the usage of specific Arthrex products. As part of this professional usage, the medical professional must use their professional judgment in making any final determinations in product usage and technique. In doing so, the medical professional should rely on their own training and experience and should conduct a thorough review of pertinent medical literature and the product's Directions For Use.

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