Technical Note

Arthroscopic ACL Reconstruction After Failed ACL Repair

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Abstract: For some authors, repair of the torn anterior cruciate ligament (ACL) in selected patients can be considered a valuable surgical treatment option. One of the main advantages is that it leaves all grafts available for any type of reconstruction in case the repair fails. This Technical Note describes arthroscopic ACL reconstruction after failure of an ACL repair.

In the past decade, there has been renewed interest in anterior cruciate ligament (ACL) repair, with the development of arthroscopic repair techniques for proximal tears[1-3] having good reported outcomes.[4] Several techniques have been described using suture augmentation to improve ligament healing, yielding good results in carefully selected patients with a reported failure rate of 10% to 15%[5,6] at 2 years' follow-up. In this Technical Note, we describe arthroscopic ACL reconstruction using the hamstring tendons after failure of ACL repair.

Surgical Technique

This Technical Note presents an arthroscopic ACL reconstruction using the hamstring tendons after failure of ACL repair (Video 1). Pearls/pitfalls and advantages/disadvantages are presented in Tables 1 and 2.

Patient Setup

The patient is supine on the operating table in the standard arthroscopic position, with a lateral post proximal to the knee at the level of the padded tourniquet and a foot roll to keep the knee in 90° flexion. This allows the knee to be moved freely through the full range of motion as needed. First, anteromedial and anterolateral portals are created. General inspection of the knee is performed, finding a proximal tear of the ACL at its femoral insertion (Fig 1).

Excision of Internal Brace

The scope is introduced in the lateral gutter to identify the existing TightRope® button (Arthrex, Naples, FL). A stab incision is made at the level of the button in line with the previous scar on the lateral condyle. A beaver blade is introduced through the stab incision to cut the FiberTape® (Arthrex) loaded on the TightRope. The TightRope is then removed with an arthroscopic grasper through the stab incision under arthroscopic control (Fig 2).

The internal brace is excised through the existing tibial tunnel. The FiberTape is pulled out of the tibial tunnel (Fig 3), and the SwiveLock® anchor (Arthrex) used to secure it below the tibial tunnel is also removed.

Once the internal brace has been removed, revision of the failed repair is performed using the surgeon's

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Table 1. Pearls and pitfalls

Pearls	Pitfalls
Insert the scope in the lateral gutter to visualize the TightRope	Need to remove the internal brace and TightRope before reconstruction
Cut the FiberTape loaded on the TightRope to extract the internal brace via the tibial tunnel	

Table 2. Advantages and disadvantages

Advantages	Disadvantages
All grafts are still available	Using a shaver to remove the FiberTape inside the joint is time consuming and challenging
Standard ACL reconstruction is possible	
Using the outside-in technique for ACL repair allows the initial tunnels to be re-used without drilling new tunnels	
Possibility of remnant-preserving technique to preserve the vascularization and proprioceptive properties of the native ACL	

preferred technique. In our case, a tripled semitendinosus (ST) graft with an outside-in technique was used.[7]

Graft Harvest

The ST tendon is harvested using an open-ended tendon stripper (Pigtail Hamstring Tendon Stripper; Arthrex). The ST is tripled over a suture to evaluate graft size.

Drilling of Femoral ACL Tunnel

The femoral ACL tunnel is established with a FlipCutter® drill (Arthrex) using the same entrance point in the lateral gutter as the one used for the initial ACL repair procedure. The entry point is identified under arthroscopic control with the scope in the lateral gutter. The tip of the FlipCutter is introduced in the femoral tunnel entrance. The outside-in femoral guide is then assembled with the FlipCutter, and the intra-articular target of the guide is placed in line with the previous femoral tunnel's exit (Fig 4).

Drilling of Tibial ACL Tunnel

Drilling of the tibial ACL tunnel is performed in an ACL remnant–sparing manner. The tibial guide is placed at 60° and taken from the external cortex into the ACL insertion. Sequential reaming is performed, first using a 6-mm reamer, followed by the previously measured ACL size reamer.

Graft Preparation and Passage

As previously described,[7] the ST is measured from its insertion to the end of the femoral socket. The graft is then tripled over a TightRope button, tagged with no. 0 FiberWire sutures, and passed from the tibia to the femur (Fig 5A, B). The scope is introduced into the lateral gutter of the knee joint to follow and confirm the button's seating onto the lateral cortex of the femur (Fig 5C, D).

Fixation

Graft passage and femoral fixation are performed by pulling on the reducible suture limb of the TightRope button with the knee extended. Tibial fixation is achieved with an interference screw (Fig 6).

Discussion

The main purpose of this Technical Note is to demonstrate that primary ACL repair does not cause any technical difficulties if it fails and the ACL needs to be reconstructed. During the initial repair procedure, no graft is harvested, minimal tunnels are drilled, and small fixation devices are used. Consequently, from a technical point of view, revision of an ACL repair by an ACL reconstruction procedure is less challenging then a standard ACL revision procedure.

Primary ACL repair has been the subject of renewed interest in the recent literature[8] and yields good results at midterm follow-up.[9] Numerous techniques have been described to repair the ACL.[1-3] Reasons to consider ACL repair are the reduced morbidity with no graft harvesting and drilling of smaller tunnels. Recent studies have introduced the concept of an internal brace to protect the ACL suture repair during early range of motion and rehabilitation, with the rationale of increasing the ACL's healing.[10] Several techniques have been described to augment the ACL suture repair.[11] Additional long-term studies are needed to better define the patients eligible for ACL repair techniques and to determine the best possible

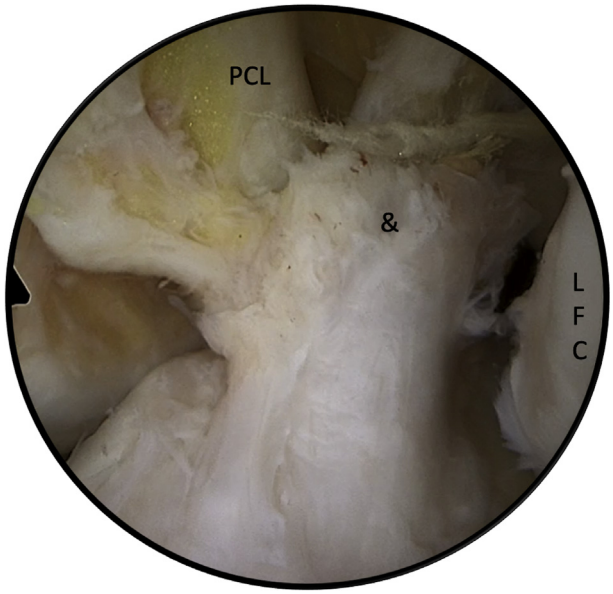


Fig 1. Left knee. Arthroscopic view of the proximal tear (&) of the repaired ACL. Abbreviations: LFC, lateral femoral condyle; PCL, posterior cruciate ligament.

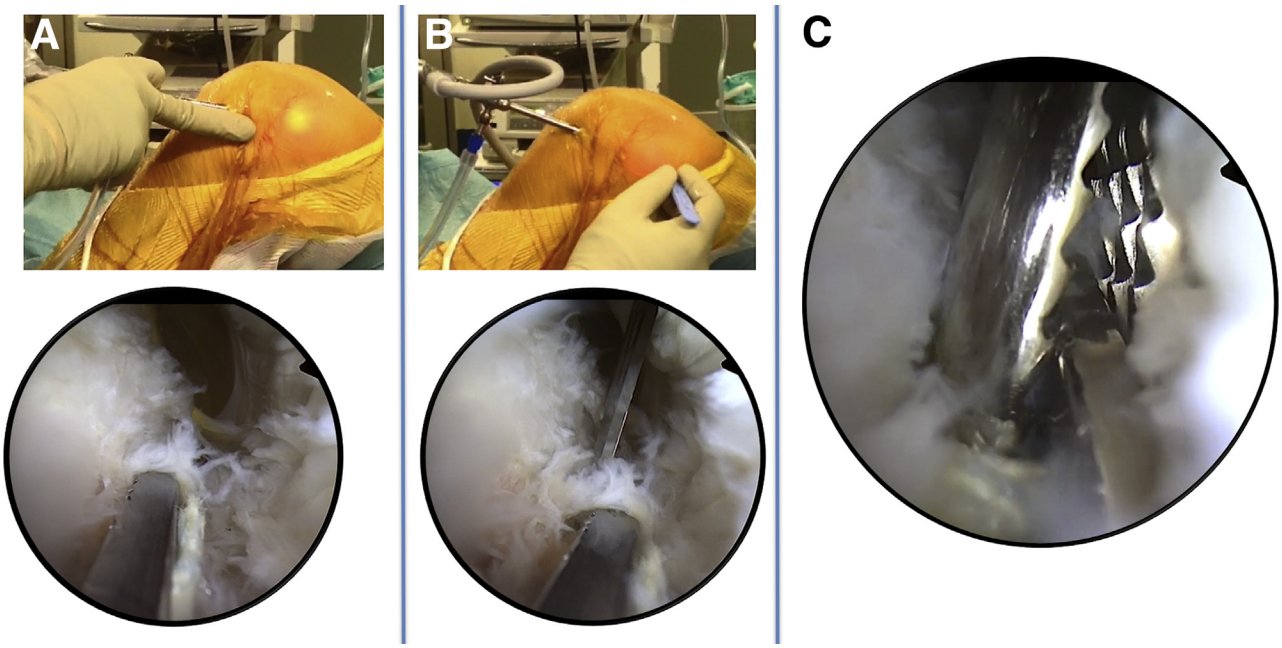


Fig 2. Left knee. (A) External view showing the scope's positioning in the lateral gutter and the corresponding arthroscopic view of the TightRope button in the lateral gutter. (B) External view showing the beaver blade introduced through a stab incision made in line with the button and the corresponding arthroscopic view of the beaver blade cutting the FiberTape loaded on the button. (C) Once the FiberTape has been cut, the button can be removed from the lateral gutter with an arthroscopic grasper introduced through the stab incision.

internal bracing technique and eliminate any stress shielding effects.

Primary ACL repair augmented with an internal brace does not create any technical difficulties if this repair fails and ACL reconstruction needs to be performed for revision. This procedure can be considered an alternative to primary reconstruction in selected patients.

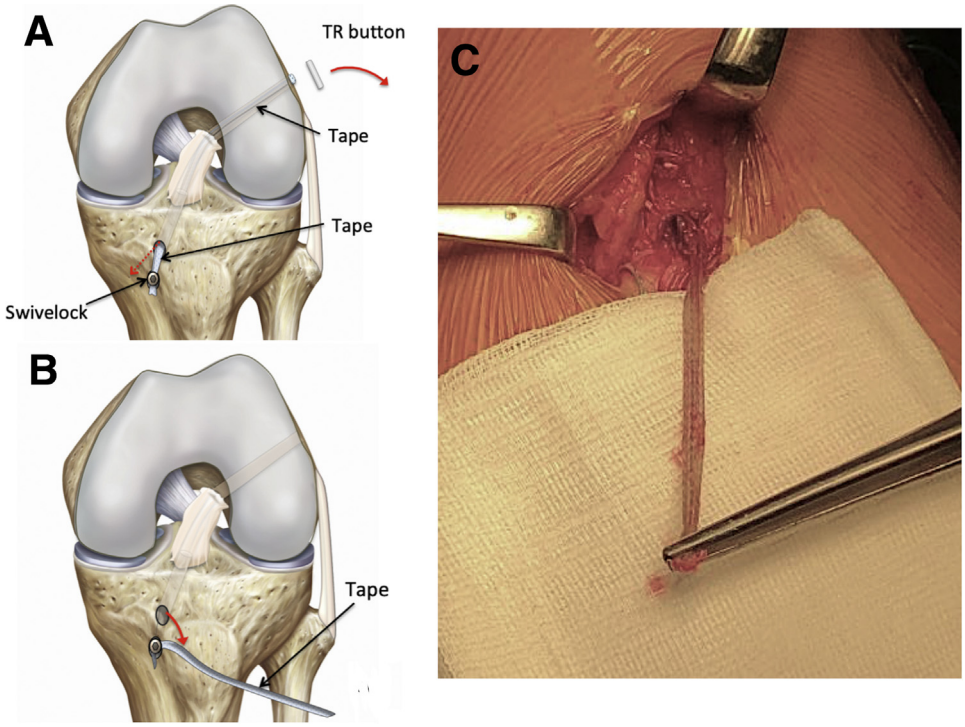
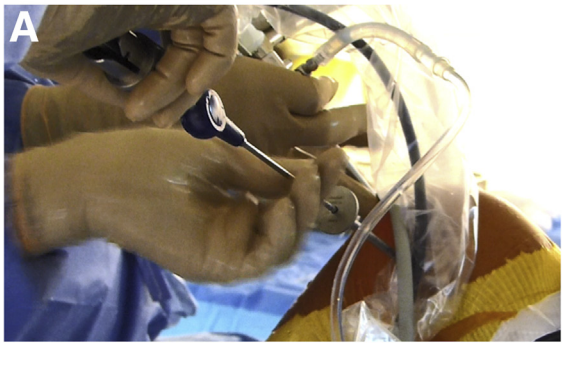


Fig 3. After removing the TightRope button (A), the FiberTape can be pulled out of the tibial tunnel (B). (C) FiberTape after being removed from the joint.



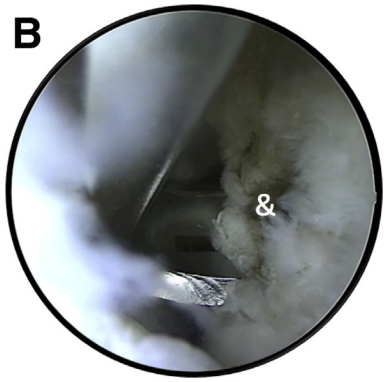
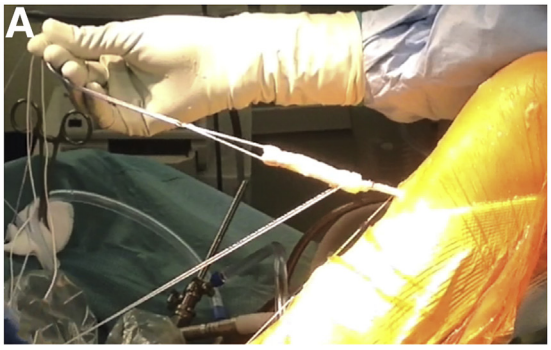
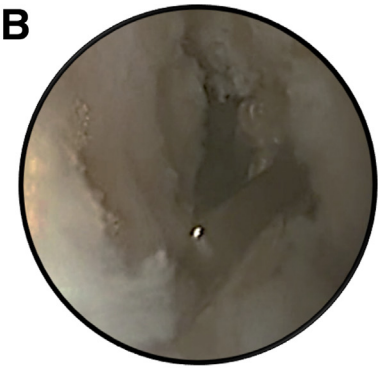


Fig 4. Left knee. (A) The tip of the FlipCutter loaded in the guide sleeve is introduced under arthroscopic vision in the existing femoral tunnel. (B) The intra-articular target of the femoral guide is placed in line with the existing femoral tunnel (&).





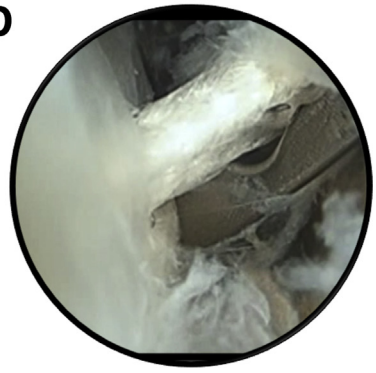
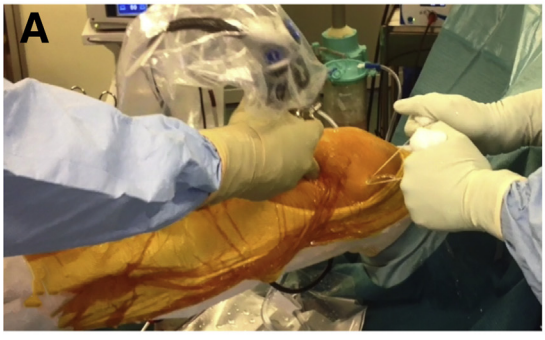


Fig 5. Left knee. (A) Prepared graft consisting of a tripled semitendinosus graft folded on a TightRope button and with its tibial insertion preserved. (B) Scope in anterolateral portal to follow the button's passage from the tibia to the femur. (C and D) Scope placed in the lateral gutter to verify seating (C) and flipping (D) of the button on the cortex under arthroscopic control.



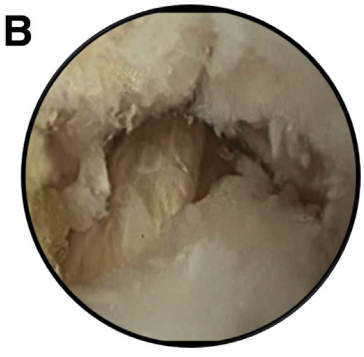


Fig 6. Left knee. (A) Femoral fixation with the knee close to extension. (B) Final appearance of the graft.

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