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## **A NEW TECHNIQUE OF GRAFT HARVEST FOR ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION WITH QUADRUPLE SEMITENDINOSUS TENDON AUTOGRAFT**

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**Abstract:** A new technique of graft harvesting was used in 8 cases for arthroscopic anterior cruciate ligament reconstruction with quadruple semitendinosus tendon autograft. The graft is acquired through a small incision on the posteromedial aspect of the knee at the flexor crease instead of the standard anteromedial approach through a paramedian incision. Compared with the standard technique of graft harvesting, this new method of graft harvest facilitates easier identification of the semitendinosus and avoids inadvertent amputation of the semitendinosus tendon during graft harvest, disinsertion of the pes anserinus, or injury to the infrapatellar branch of saphenous nerve. The surgical scars, in addition to the standard portal scars, include a small scar on the posteromedial aspect, which merges into the flexor crease and a 1-cm anteromedial scar. This provides improved cosmesis and better patient compliance for early rehabilitation with less pain in the immediate postoperative period. There is no compromise on the intraoperative ligament reconstruction with good postoperative results. No intraoperative or postoperative complications were encountered. It would be advisable to follow this technique of graft harvesting for all individuals undergoing arthroscopic anterior cruciate ligament reconstruction using quadrupled semitendinosus tendon to avoid the problems encountered with the standard technique, and also to achieve an excellent cosmetic and functional outcome.

**Keywords:** New, Technique, Semitendinosus tendon, Graft, Anterior cruciate ligament, Reconstruction

The standard technique used for harvesting the semitendinosus tendon requires an anterior para-median skin incision. Sometimes it is difficult to identify the hamstrings, and complications can occur, such as disinsertion of the pes anserinus, amputation of the graft, and injury to the infrapatellar branch of the saphenous nerve. To overcome these problems, the first author devised a new technique that at the same time provided for a more cosmetically appealing knee by use of strategic surgical incisions. The surgical incisions at the end of the procedure included the inferomedial and inferolateral arthroscopy portals, a 1-cm vertical incision medial to the tibial tuberosity, and a 1- to 1.5-cm transverse posteromedial incision within the flexor crease.

### **SURGICAL TECHNIQUE**

The patient, under anesthesia, is positioned in the standard supine position with the operated leg placed in a loosely fitting leg holder around the thigh to permit enough mobility of the leg and thigh. After the arthroscopic examination of the knee and preparation of the intra-articular ligament reconstruction sites, we proceed to graft harvesting.

Both the knees are left to hang at 90° at the edge of the table. The semitendinosus tendon is palpated at the medial corner of the popliteal fossa at the level of the flexor crease of the knee. The semitendinosus in this region is an easily palpable tendon forming the medial border of the popliteal fossa. The knee is then held in 30° of flexion and externally rotated to gain access to this region. A transverse 1- to 1.5-cm incision is made at the flexor crease directly overlying the tendon. Following dissection through the skin and subcutaneous tissues, the tendon is identified by its thick cord-like structure. The fascia overlying the tendon is cut longitudinally along its direction and the tendon is hooked out of the incision using a mixer forceps (Fig 1). The knee is then further flexed to deliver a further length of the tendon

through the wound. The slip of tendon and crural fibers inserting onto the gastrocnemius muscle are identified and cut (Fig 2), thus mobilizing the tendon even further. The tendon is now held using an Ethibond suture (Ethicon, Somerville, NJ) lassoed around the tendon. An open tendon stripper is threaded over the proximal part and slipped proximally to detach the tendon from its muscle attachment (Fig 3). This free proximal end is then threaded into a closed tendon stripper and slid over to its point of insertion. The knee is flexed completely and the leg held in internal rotation. The end of the tendon stripper is confirmed to lie at the insertion of semitendinosus tendon by palpating it beside the tibial tuberosity. With rotatory movements of the stripper and simultaneous traction over the tendon, the tendon gets disinserted and is delivered out. (The semitendinosus tendon may be detached first from its insertion at the pes anserinus with an open tendon stripper followed by its detachment from the muscle proximally with a closed tendon stripper.) The graft is then prepared in the standard manner as is for a quadrupled semitendinosus tendon reconstruction using an EndoButton (Smith & Nephew Endoscopy, Andover, MA) and suture disc fixation.

The anterior cruciate ligament jig is then positioned through the inferomedial portal for passing the guide-wire. The point of entry of the guidewire is assessed over the skin on the tibia and a 1-cm vertical incision is made accordingly to permit access to the guidewire, reamers, and the graft. This 1-cm incision is adequate enough to proceed with the tibial and femoral tunneling, which is carried out in the standard manner. The quadrupled graft is then pulled through along with the EndoButton and Mersilene tape (Ethicon), which locks onto the femoral cortex, and the distal end is anchored onto the tibia over a suture disc. The antero-medial and posteromedial incisions are closed with subcutaneous sutures using No. 2-0 or 3-0 undyed absorb-



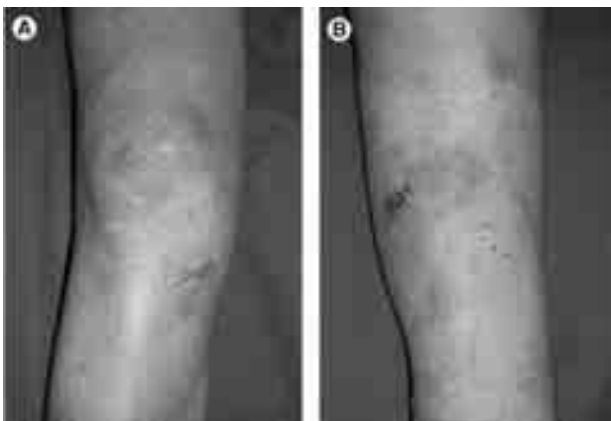
**FIGURE 1.** The semitendinosus tendon indentified through the posteromedial incision.



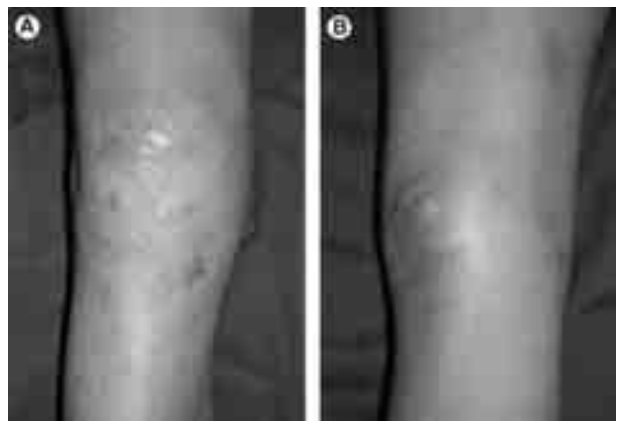
**FIGURE 2.** The band to the gastrocnemius muscle (over artery forceps) is identified.



**FIGURE 3.** The semitendinosus tendon detached from its proximal end.



**FIGURE 4.** Small (A) anterior and (B) posterior incisions (early postoperative period).



**FIGURE 5.** Minor surgical scars 1 month postoperatively ([A] anterior and [B] posterior).

able sutures and the skin with No. 3-0 Ethilon (Ethicon). With good approximation it may even obviate the need for skin sutures. The surgical wounds were dressed with providone-iodine ointment and a compression dressing given. Incisions were examined on postoperative day 5 (Fig 4) and sutures removed on postoperative day 14. Other methods of fixation (using interference screws/Transfix [Arthrex, Naples, FL]) could also be used along with the same technique, providing equally good cosmetic results.

#### **DISCUSSION**

Because arthroscopic anterior cruciate ligament reconstruction is a minimally invasive procedure, patients expect minimal scars following surgery. The procedure described leaves very small negligible scars on the anterior aspect of the knee.

The surgical wounds healed very well in all 8 of our cases; no wound complications were encountered. The surgical scars were barely visible at the end of 1 month (Fig 5). The scar on the posteromedial side appeared to merge into the skin flexor crease. All the patients were less bothered with the scar on the posterior aspect of the knee and were

very satisfied with the cosmesis.

The exposure of the semitendinosus tendon from the posteromedial aspect provides direct access to the tendon without any problems in identification. The band to the gastrocnemius muscle is easily identified directly and amputation of the graft during harvesting is avoided, giving a full adequate length of the tendon. Because the stripping of the tendon is underneath the sartorius muscle without needing to incise the sartorial fascia, damage to the saphenous nerve is completely averted as is dissection at the pes anserinus.

No intraoperative complications were encountered of scars, giving an additional placebo effect. It is related to this new technique of graft harvest-would be advisable to follow this technique for all ing and anterior cruciate ligament reconstruction. individuals undergoing arthroscopic anterior cruciate ligament reconstruction. No compromise on tibial or femoral tunneling or ate ligament reconstruction using quadrupled semigraft fixation was encountered. The patient complained of tenderness of the semitendinosus tendon and expecting a good cosmetic result was found to be better in the early rehabilitation period in addition to an excellent functional outcome period owing to less pain

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