A modified ‘one-stitch’ hamstring tendon suture fixation technique for ACL graft preparation

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ABSTRACT

Hamstring tendon autografts are very often used for anterior cruciate ligament (ACL) reconstruction. After harvesting of the tendons each end is most commonly fixed with a running whipstitch suture technique, that permits adequate handling and tensioning of the graft. This conventional technique, that uses multiple locking stitches running up and down the ends of both tendons, is time consuming and carries a risk for tendon damage and needle stick injuries. As a result of the conventional whipstitch technique suture material is left behind within the tendon inside the tibial canal, which may lead to a local inflammatory response during resorption of the sutures. We introduce a new technique involving a modified ‘one stitch’ hamstring tendon suture fixation technique.

KEYWORDS

Anterior cruciate ligament graft; ACL graft; Hamstring tendon suture fixation technique; One stitch hamstring tendon suture fixation technique; Surgical technique; Orthopedic surgery.

TECHNIQUE

We report a modified ‘one stitch’ hamstring tendon suture fixation technique, that is quick, cost effective and does not leave any suture material behind within the tendon inside the tibial canal. This modified technique uses a vicryl No. 2 braided suture with a needle attached. The vicryl suture is folded in half and looped twice around the distal end of the hamstring tendon (Figure 1A & 1B), after which both loose suture ends are passed through the loop (Figure 2). This knot construct is tightened by pulling both loose sutures end firmly (Figure 3). For final fixation the suture end with the needle is passed once from proximal of this construct in the
tendon through the knot, after which the needle comes out of the tendon in the most distal part (Figure 4). For confirmation of a strong fixation the sutures can be pulled firmly, thereby demonstrating that a secure tendon fixation has been achieved.

**DISCUSSION**

Several hamstring graft preparation techniques have been published as alternatives to conventional whipstitching [1]. Some needleless ‘loop-the-loop’ or ‘finger-trap’ techniques have been published [2,3,4,5], which often require to be applied slightly proximal of the most distal part of the tendon to prevent slippage and failure of the graft fixation. Sacrificing tendon length can make tripling of a hamstring tendon graft impossible though in case the diameter of a doubled graft is too small. This current modified technique retains the longest possible tendon length by additional ‘one stitch’ fixation through the double looped construct, which allows firm placement of the knot on the very distal end of the tendon without risking slippage. Also, pre-manufactured suture constructs are commercially available, although off course at higher cost than standard available suture material [6].

The effect of maintained suture material on the bone-tendon interface in the tibial tunnel is not known [7]. A higher amount of suture material left within the graft after preparation by the conventional whipstitch technique will invariably lead to an inflammatory response. Although the clinical relevance is unknown an excess of retained suture material may possibly lead to impaired tendon ingrowth in some cases. We present this modified ‘one stitch’ hamstring tendon graft preparation technique as a quick, safe and cost-effective alternative to conventional whipstitching. This modified technique does not leave any suture material behind in the hamstring tendon graft within tibial tunnel. Whether improved tendon ingrowth is achieved, will need further study though on the bone-tendon interface.
REFERENCES


**LEGEND**

Figure 1A & 1B: The suture is folded in half and looped around the distal end of the hamstring tendon that has been released from the attachment on the proximal tibia.

Figure 2: Both loose suture ends are passed through the double suture loop around the hamstring tendon.

Figure 3: The knot construct is tightened by pulling both suture ends firmly.

Figure 4: For final fixation the suture is passed from proximal with the needle once through the knot coming out of the tendon distally.