

Postoperative Pivot Shift and Retear Rates are Equally Decreased Using Quadriceps Autograft Alone and Hamstring Autograft with Extra-Articular Tenodesis when Compared to Hamstring Autograft Alone: A 2-Year Comparison

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INTRODUCTION:

Anterior cruciate ligament (ACL) reconstruction using hamstring autograft (HA) has been found to have a high re-tear rate in high risk patients including those with a Pivot shift of 2 or higher and those with generalized ligamentous laxity (GLL). Because of this, the use of lateral extra-articular tenodesis (LET) has gained traction in the sports community. Several studies have shown lower ACL graft re-tears with the addition of LET and is felt by many to be necessary when using a HA in high risk patients. However, no study has compared hamstring autograft + LET versus other graft types. The purpose of our study was to compare the surgical outcomes of HA+LET vs. an all-soft-tissue quadriceps autograft (QA) without LET. We hypothesized that a QA would lead to similar graft re-tear and rotational instability rates as HA+LET.

METHODS:

This retrospective study compared high risk patients including those with a Pivot shift of 2 or more and GLL undergoing ACL reconstruction with either a HA, HA+LET, and QA. In this study, GLL was defined as patients with a Beighton score of 4 or more. Patients were included in the study if they were undergoing a primary ACL reconstruction with either hamstring autograft (HA group), hamstring autograft with extra-articular tenodesis (HA+LET group), or all-soft-tissue quadriceps autograft (QA group) and no other procedures other than meniscal work. All surgeries were performed by the senior surgeon and followed the same rehabilitation protocol after surgery regardless of what type of graft was used during the surgery. Graft choice was dependent on the when during the study the procedure was performed. Early in the study period, HA were used on most patients regardless of whether they were high risk or not. Later, HA+LET was performed due to emerging studies showing higher failure rates in high risk patients undergoing HA alone compared to those undergoing HA+LET. Finally, the senior author transitioned to using QA for most cases. Patient-reported outcomes (PROs) were obtained on each patient preoperatively, 3, 6, 12, and 24-months after surgery. The PROs used in this study included the International Knee Documentation Committee (IKDC) and Lysholm scores. Clinical failure was defined by a patient who had a graft re-tear or those with a residual pivot shift of 2 or more after surgery. Pivot shift was tested for at the 6, 12, and 24-month follow up. Other complications associated with the procedure were also documented.

RESULTS:

A total of 166 high risk patients underwent ACL reconstruction over the 7 year study period. There were 63 patients in the HA group, 47 in the HA+LET, and 56 in the QA group. The demographics between the three groups was similar with an overall age of the patients in the study being 17.8 years. The mean Beighton score was 3.2 for the group with 24% of the population having GLL. The overall rate of Grade 2 or higher pivot was 82%. There was no difference between the groups with regard to percentage GLL or 2+pivot shift. All three groups had a higher percentage of women than men (HA group 66%; HA+LET group 62%, and QA group 56%), but there was no significant difference between the groups. The QA group had a significantly larger graft diameter (9.6mm) compared to the HA group (7.9mm) and the HA+LET group (8.1mm) ($p < .001$). The number of meniscal repair and partial meniscectomy was similar between all three groups with 21.1% of the population undergoing meniscectomy and 48% of the entire population undergoing meniscal repair. The study was made up of 68.4% athletes for the HA group, 62.4% for the HA+LET, and 72.6% for the QA group ($p = .32$). A significant increase in both IKDC and Lysholm scores were seen at every timepoint compared to preoperative levels. There was no difference between the three groups at any timepoint for either the IKDC and Lysholm scores. The preoperative IKDC score for the HA group increased from 51.7 to 90.3 at the 2-year follow up. The HA+LET IKDC scores increased from 53.1 preoperatively to 88.4 at the 2-year follow up. The QA group had IKDC scores of 49.8 preoperative and 90.6 at 2 years. The Lysholm scores increased from 53 to 91.9, 54.8 to 89.4, and 51.9 to 92.6 preoperatively to the 2-year follow up for the HA, HA+LET, and QA groups respectively. The graft re-tear rate of the HA group was significantly higher than the HA+LET and QA groups (14.3%, 2.1%, and 1.8% respectively). Residual pivot shift of 2 or more was found in 36.5% of the HA group, 14.9% in the HA+LET group, and 19.6% in the QA group. The residual pivot shift in the HA group was significantly higher than the HA+LET and QA groups, but no difference was identified between the HA+LET and QA groups. Return to sport (RTS) was similar between the three groups with 80% of athletes returning to sport with HA grafts, 81% with HA+LET, and 86% with QA grafts. The use of a QA in this high-risk population led to a significantly faster RTS (8.6 months) compared to the HA and HA+LET groups; however, the addition of a LET did not lead to a shorter time to return to sport (10.7 months for the HA group and 11.7 months for the HA+LET group). There was no difference between the three groups for contralateral ACL tears, arthrofibrosis or infection.

DISCUSSION AND CONCLUSION:

The use of an all-soft-tissue QA or the addition of an LET to a HA both led to significant decreases in graft retear rate and residual pivot shifts of 2 or greater compared to a HA graft alone in high risk patients undergoing primary ACL reconstruction. However, the use of QA and LET do not improve the patient-reported outcome scores at 2-year follow up compared to HA alone. RTS was significantly faster with QA compared to the HA and HA+LET; however, the addition of an LET to a HA did not increase the rate to which an athlete was able to return to play. In conclusion, high risk patients including those with GLL and pivot shifts greater than 2 should undergo ACL reconstruction with either a quadriceps autograft or have a LET added to a hamstring autograft.