Cohort analysis of ACL reconstruction using a personalized “menu à la carte” approach: age, lateral meniscus injury, posterior tibial slope and static anterior tibial translation are significant predictors of graft rupture

David Mazy, Nicolas Cance[1], Clément Favroul, Lucia Angelelli, Michael Dan, David Dejour
[1]Orthopaedic Surgery

INTRODUCTION:
This study aimed to evaluate anterior cruciate ligament (ACL) graft rupture in a selective “à la carte” approach to lateral extra-articular tenodesis (LET), with a particular focus on the impact of posterior tibial slope (PTS) and static anterior tibial translation (SATT) on graft rupture rate.
METHODS:
This retrospective, single-center, single-surgeon study included patients who underwent primary ACLR between 2014 and 2017, with a minimum follow-up of six years. Demographic variables, ACL graft rupture, graft type, associated procedures, and time to rupture were recorded. Preoperative radiographs were used to measure PTS and SATT. Subgroup analyses were conducted based on age, PTS, and SATT. Univariate and multivariate analyses were performed to identify independent risk factors for graft rupture.
RESULTS:
A total of 851 patients were eligible. Follow-up was obtained for 717 patients (mean age 30.6 ± 11.3 years; 38% female). Forty-one ACL graft ruptures were identified (5.7%). Among adult patients (≥18 years), the graft rupture rate was 4.3% in the ACLR + LET group versus 5.3% in the isolated ACLR group (p = 0.644). Risk factors significantly associated with graft rupture included PTS ≥ 12° (OR 3.0; 95% CI, 1.4–6.1; p = 0.003), SATT ≥ 5 mm (OR 2.7; 1.3–5.6; p = 0.008), age < 18 years (OR 2.3; 1.0–3.9; p = 0.019), and lateral meniscal injuries (OR 2.3; 1.1–5.0; p = 0.033). The lowest graft rupture rate (2%) was observed in adult patients with PTS < 12° and SATT < 5 mm with or without an LET, whereas the highest rate (33.3%) occurred in patients < 18 years with both PTS ≥ 12° and SATT ≥ 5 mm, this is despite universal addition of an LET in patients <18 years.
DISCUSSION AND CONCLUSION:
At a minimum 6-year follow-up, a low graft rupture rate was achieved without systematically performing a LET. In patients less than 18-years-old, we demonstrated the highest rates of ACL graft rupture when the PTS ≥ 12° and SATT ≥ 5mm despite the use of a LET in this population, suggesting these patients may benefit from tibial deflexion osteotomy (TDO) to reduce the rupture rates. However further studies are needed to demonstrate this treatment effect in this at-risk population.