

Clinical Outcome of Arthroscopic Reconstruction of ACL with Lateral Extra-Articular Tenodesis (Let) to Reduce Anterolateral Rotatory Laxity

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Abstract

Original Research Article

Background: The primary issue after isolated intra-articular anterior cruciate ligament (ACL) surgery is the continuation of pivot shift. By limiting rotational laxity, the lateral extra-articular tenodesis (LET) treatment added to the ACL surgery improves knee stability. This study's objective was to assess the long-term clinical and radiological results of ACL restoration coupled with LET utilizing a continuous hamstring graft as the first operation. **Method and Analysis:** Four years postoperatively, 20 patients were examined. Collecting subjective outcome ratings (IKDC, Lysholm, KOOS, and Tegner). A clinical and radiological evaluation was conducted. The anteroposterior laxity of the knees was assessed using a rollimeter. Using SPSS version 23, the statistical analysis was conducted. The mean and standard deviation of quantitative data were used to summarize the data. Fischer's exact test was used to compare qualitative characteristics, whereas Student's t-test was used to compare mean values. A p value of 0.05 or less was regarded as significant. **Result:** The mean IKDC subjective score was 83.1, the mean Lysholm score was 89.02 and 75% of patients had exceptional or excellent scores. In 85% of patients, there was no pivot shift, and 60% of patients had a definitive endpoint on the Lachman test. **Conclusion:** The addition of primary LET to ACL restoration enhances rotational laxity control over time without raising the risk of complications.

Keywords: Arthroscopic reconstruction, Lateral extra-articular tenodesis (LET), ACL, Anterolateral Rotatory Laxity.

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INTRODUCTION

Injury to the anterior cruciate ligament (ACL) causes laxity in both translation and rotation. It is widely known that ACL repair may fall short of providing a complete recovery of rotational stability in the knee [1, 2] and that persistent rotational laxity is linked to subpar patient-reported end results [2]. The primary issue after intra-articular anterior cruciate ligament (ACL) repair is the continuation of pivot shift. In fact, following an isolated ACL restoration, 25% to 38% of patients still have a pivot shift [3, 4]. This may be explained by the fact that up to 93% of people who have an ACL rupture may also have a ruptured anterolateral ligament (ALL) [5]. Double-bundle ACL restoration is one of the methods suggested for this issue [6]; nevertheless, despite its effectiveness in lowering the remaining pivot shift, this operation has

several negative side effects (cyclops syndrome, tunnel fracture) [7]. Another option is to combine the intra-articular ACL repair with lateral extra-articular tenodesis (LET) (Fig 1). Due to Claes *et al.*, 2013 rediscovery of the ALL, LET has recently seen a revival [8]. According to certain research, doing LET to treat the ALL rupture reduces the residual pivot shift after ACL repair (Fig 2). Given its peripheral orientation in relation to the joint by extending the moment arm, it actually improves the stability of the knee by limiting rotational laxity [9]. Up to 43% of the stresses are distributed across the LET and ACL graft [10]. Last but not least, the LET may prevent the ACL transplant from malfunctioning if there is necrosis or straining. However, LET has been linked to a number of negative consequences. The first is restricted internal rotation and knee stiffness in flexion and extension [11].

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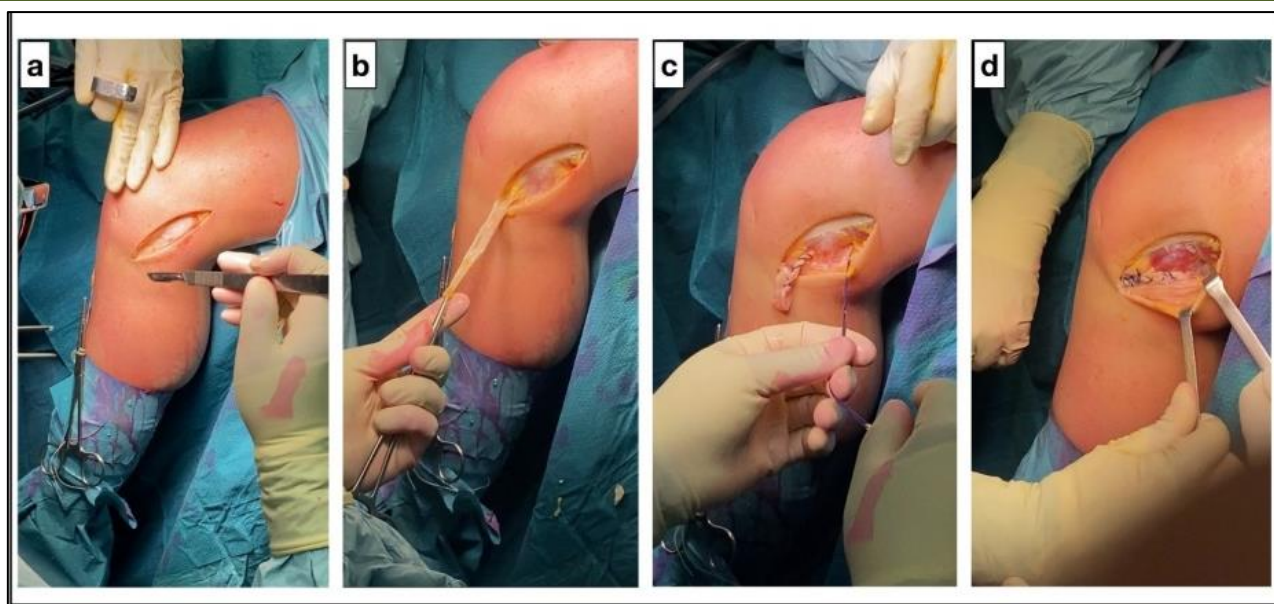


Fig. 1: Lateral Extra-Articular Tenodesis

As lateral tibiofemoral osteoarthritis (OA) progresses over time, there are also increasing strains on the lateral side of the knee [12]. The results of numerous additional studies, which claim that LET and ACL repair reduces the incidence of subsequent meniscal lesions and OA mostly because to improved rotational laxity management, have called into doubt these findings [13].

This aim of the study was to examine the long-term clinical and radiological effects of combined ACL restoration with LET utilizing a continuous graft as a primary operation.

METHOD AND MATERIAL

This was a retrospective single-center standard of care study in which the clinical and radiological results of patients operated between November 2018 and November 2022 was reassessed. 76 patients had ACL reconstruction and LET with a continuous graft over this time frame. The same surgeon (S.C.) operated on each patient following the procedure outlined below. Patients had to be under 40 years old at the time of surgery to limit the likelihood that radiographic symptoms of osteoarthritis were related to aging. The ACL tear must be unilateral. The preoperative evaluation of the knee included AP and lateral weight-bearing radiographs and an MRI. These individuals were eliminated from the trial when osteochondral lesions larger than 3 cm² were discovered intraoperatively. In all, 20 patients were evaluated between January and November 2022 following a minimum of two years of follow-up. 5 patients were eliminated, 19 were lost to follow-up because they did not reply to our invitations, and 15 were unable to

attend the clinic for an in-person evaluation because they no longer resided in the region. 8 individuals experienced meniscal tears, of which 5 occurred before to ligament restoration and 11 simultaneously. All of the patients completed the IKDC subjective, KOOS, Lysholm, and Tegner questionnaires at the final evaluation. A single surgeon used the IKDC objective score from the final exam to do an objective evaluation. During this session, the Ahlback grade was calculated from the anteroposterior knee laxity measured in millimeters using the digital Rollimeter® [14] and the AP and lateral weight bearing images of the knee. During the follow-up period, meniscal lesions and other clinical occurrences on the operated knee were recorded.

Statistical Analysis

Using SPSS version 23, the statistical analysis was conducted. The mean and standard deviation of quantitative data were used to summarize the data. Fischer's exact test was used to compare qualitative characteristics, whereas Student's t-test was used to compare mean values. A p value of 0.05 or less was regarded as significant.

RESULTS

Table 1 contains all patient and injury mechanism-related information. Most of the patients were male (70%). The mean age at the time of surgery was 26.1 ± 7.6 year and mean age at the time of review 33.9 ± 8.3 . Right side (55%) was the most operated side. The BMI was 24.1 ± 3.6 . Maximum mechanism of the injury was due to motorcycle ride (45%), Injury at home (20%), sport (20%) and work related injury (15%).

Table 1: Characteristics of socio-demographic, clinical and mechanical injury

Variable	n	%
Gender		
Male	14	70
Female	6	30
Mean age at the time of surgery (years)	26.1 ± 7.6	
Mean age at the time of review (years)	33.9 ± 8.3	
Side,		
Right	11	55
Left	9	45
Mean follow-up (years) 9.9 ± 2	2.6 ± 1.6	
Time from injury to surgery (months)	6.2 ± 3.1	
Height (m)	1.57 ± 1.	
Mass (kg)	68.1 ± 16	
BMI (kg/m ²)	24.1 ± 3.6	
Mechanism of injury		
Sports	4	20
Football	1	5
Combat sport (judo, karate)	1	5
Badminton	2	10
Motorcycle	9	45
Injury at home	4	20
Work-related injury	3	15

Table 2 displays the subjective outcome ratings at the most recent follow-up. 75% of patients had an IKDC subjective score over 70, whereas 15% had a high or excellent Lysholm score. The KOOS score was likewise excellent, averaging 84.5 ± 18.2.

The subscales 'symptoms,' 'pain,' and 'daily life activities' all received ratings of 90. At the 4-year follow-up, the Tegner score had fallen by 1 point, which was not statistically significant.

Table 2: Subjective outcome

Subjective outcome	Mean ± SD
IKDC subjective	83.1 ± 15.2
Lysholm	89.02 ± 7.8
100-84	15
65-83	5
<64	0
Tegner before ACL injury	8.1 ± 1.3
Tegner at 4 years postoperative KOOS	
Mean	84.5 ± 18.2
Symptoms and stiffness	87.3 ± 16.5
Pain	90.8 ± 15.4
Function daily living	97.4 ± 12.5
Sports and recreation	72.6 ± 21.5
QOL	70.2 ± 21.3

Table 3 presents a summary of the findings. 17 patients (85%) had no pivot shift during the clinical examination for the final evaluation, whereas 12 patients (60%) had a solid endpoint on the Lachman test. On the IKDC objective, the operated knee was deemed "normal" or "almost normal" (grade A or B) in 17 of 20 patients. The average difference in anterior laxity evaluated by the Rollimeter between the healthy

knee and the knee that had been operated on was 1.1 mm.

4 patients had a discrepancy of 6–10 mm; as well as 4 individuals (20%) had a difference of 3–5 mm. Measurements of range of motion revealed a 6 to 15 flexion deficit in 7 individuals and a 10 extension deficit in one patient. The range of motion was not diminished in the remaining 16 individuals.

Table 3: Objective outcome

Objective assessment	n	%
IKDC objective		
None	13	65
Glide	4	20
Clunk	2	10
Gross	1	5
Pivot shift		
None	17	85
Slip	3	15
Clunk	-	-
Locking	-	-
Lachman		
Firm endpoint	12	60
Delayed firm endpoint	4	20
Soft endpoint	4	20
Radiographs (Ahlback classification)		
Stage	10	50
Stage I	6	30
Stage II	4	20
Stage III	-	-
Stage IV	-	-
Knee laxity using Rollimeter		
Mean operated side	3.0mm	
Mean healthy side	4.0mm	
Difference between sides	1.1mm	

DISCUSSION

With 85% of knees being judged normal or substantially normal after 4 years, combined ACL repair with LET utilizing a continuous graft resulted in satisfactory results. Additionally, 56% of patients were able to resume their previous level of athletics. The LET stands out due of its unusual trajectory, which begins extra-articular as it leaves the femur and changes to intra-articular near the posterior joint capsule. Standard anterolateral reconstruction techniques use a more direct path that closely resembles the anatomical structure of the ALL [15]. A conference on this subject was held in 2016 by the Francophone Society of Arthroscopy (SFA) in light of the fast growth of ALL reconstruction. The 7-year results of 478 individuals were reported in the ensuing multi-center investigation. In 386/478 instances, a continuous graft was employed, with hamstring tendons accounting for 55% of the grafts. Despite the follow-up being shorter, the subjective IKDC and Lysholm ratings [16] were similar to ours. Similar functional ratings to ours are reported in other published research [15, 17], however the follow-up was shortened [17] or the patients were younger [5]. Tegner scores around 4 have been reported in previous research with comparable follow-up^[17], but the mean score in the present study (6.2) was higher.

According to Marcacci *et al.*, [15] and Zaffagnini *et al.*, [18], the only two investigations of continuous hamstring grafts discovered residual pivot shift of 6% after 10 years and 14% at 20 years, respectively. Remaining pivot shift was seen in 27% of patients who received ACL reconstruction alone and

13% in those who underwent ACL repair with LET in a review of the literature by Sonnery-Cottet *et al.*, of seven comparative studies [19]. In the present research, 6% of patients had residual pivot shift. This is less than in studies [20] that simply focused on the results of ACL repair. Thus, it is believed that LET combined with ACL restoration will lessen the incidence of pivot shift over time.

CONCLUSION

The addition of primary LET to ACL restoration enhances rotational laxity control over time without raising the risk of complications.

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