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Revision ACL reconstruction using a modified iliotibial band–allograft technique for combined ACL and lateral extra-articular procedure achieves comparable outcomes to bone–patellar tendon–bone with modified Lemaire

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Abstract

Purpose: In revision anterior cruciate ligament reconstruction (R-ACLR), adding a lateral extra-articular procedure (LEAP) reduces graft failure and postoperative laxity. Iliotibial band (ITB)-based techniques may avoid patellar tendon harvesting morbidity, but evidence in adults, particularly in revision cases, remains limited. We compared clinical outcomes at ≥2 years after R-ACLR using a modified ITB-allograft (ITB-AG) technique versus bone–patellar tendon–bone with lateral extra-articular tenodesis (BPTB-LET). It was hypothesized that no difference in retear rates between techniques would be found.

Methods: A retrospective analysis of prospectively collected data was performed on consecutive adult patients (≥18 years) undergoing R-ACLR between 2018 and 2023. Patients were included if they received ITB-AG or BPTB-LET R-ACLR, if surgery occurred within 24 months of graft failure and follow-up was ≥2 years. Exclusions were multiligament injury, concomitant osteotomy or refusal to participate. Primary outcome was graft retear, and secondary outcomes were International Knee Documentation Committee (IKDC) subjective score, Lysholm score, complications, side-to-side anterior laxity and pivot-shift grade. Comparisons between groups were performed using Student's *t* test or Mann–Whitney *U* test for continuous variables and chi-square or Fisher exact test for categorical variables, with statistical significance set at $p < 0.05$.

Results: One hundred ninety-five patients were analysed (BPTB-LET, $n = 105$; ITB-AG, $n = 90$). Groups were similar at baseline; follow-up was 38 ± 9 months for BPTB-LET and 34 ± 7 months for ITB-AG ($p = 0.0005$). Meniscal tears and repairs were more frequent with ITB-AG; graft diameter was slightly smaller with ITB-AG (8.8 ± 0.7 mm for ITB-AG vs. 9.3 ± 0.5 mm

Abbreviations: ACL, anterior cruciate ligament; BPTB-LET, bone–patellar tendon–bone with lateral extra-articular tenodesis; IKDC, International Knee Documentation Committee; ITB, iliotibial band; ITB-AG, iliotibial band-allograft; LEAP, lateral extra-articular procedure; LET, lateral extra-articular tenodesis; PASS, Patient Acceptable Symptom State; R-ACLR, revision-anterior cruciate ligament reconstruction.

for BPTB-LET; $p = 0.0001$). Retear rates were not different (5.7% BPTB-LET vs. 4.4% ITB-AG; $p = 0.7551$). IKDC was higher with ITB-AG (90.7 ± 10.8 vs. 88.3 ± 10.1; $p = 0.0026$); 97% (BPTB-LET) and 93% (ITB-AG) achieved the IKDC Patient Acceptable Symptom State ($p = 0.3073$). Lysholm was higher with ITB-AG (94.6 ± 10.8 vs. 90.8 ± 9.0; $p < 0.00001$). A negative pivot-shift was found in 98.9% (ITB-AG) versus 66.7% (BPTB-LET) ($p < 0.00001$), while KT-1000 anterior laxity did not differ significantly ($p = 0.1164$). Complication rates were similar (4.7% vs. 5.5%; $p = 1$).

Conclusion: At midterm follow-up, a modified ITB-AG technique provided comparable graft survival to BPTB-LET, with similarly low complication rates. Patient-reported outcome measures were statistically higher and a greater proportion of patients demonstrated a negative pivot-shift test in the ITB-AG group, although the clinical relevance of these differences remains uncertain.

Level of Evidence: Level III.

KEYWORDS

ACL, allograft, iliotibial band, outcomes, revision

INTRODUCTION

There is broad consensus that revision anterior cruciate ligament reconstruction (R-ACLR) should be coupled with a lateral extra-articular procedure (LEAP) [2, 3, 7, 29]. Adding a LEAP to R-ACLR, compared with isolated R-ACLR, significantly reduces graft re-rupture and postoperative laxity, no matter which kind of anterolateral procedure is chosen [15, 33].

Graft choice in revision settings is constrained by prior harvest. Iliotibial band (ITB) autograft [23] avoids the morbidity associated with bone–patellar tendon–bone (BPTB) harvest, such as anterior knee pain, patellar complications and quadriceps issues [13, 21, 26, 32, 39]. However, compared with hamstring and BPTB grafts, the ITB graft is thinner, resulting in a smaller diameter and a higher risk of graft failure. Consequently, a strategy can be to augment ITB harvest with allograft augmentation to achieve sufficient thickness [12, 14, 23, 24].

BPTB reconstruction combined with a modified Lemaire lateral extra-articular tenodesis (LET) remains a widely used and extensively validated technique for both primary and revision ACLR [10, 11, 17, 38]. In contrast, although ITB ACLR combined with LEAP is frequently employed in skeletally immature patients, clinical evidence in adults, and particularly in revision settings, remains limited [19, 24, 35].

The primary aim of this study was to compare graft survival at a minimum follow-up of 2 years after revision ACLR performed with a modified iliotibial band autograft augmented with allograft (ITB-AG) versus bone–patellar tendon–bone with modified Lemaire lateral extra-articular tenodesis (BPTB-LET). Secondary aims were to compare other clinical outcomes, including patient-reported outcome measures (PROMs), knee stability and postoperative complications between the two techniques.

METHODS

Study design and ethical approval

The study protocol was approved by the local ethics committees of both participating centres. A retrospective analysis of prospectively collected data from consecutive patients receiving R-ACLR in two centres was conducted. At each centre, R-ACLR was performed by a single, experienced orthopaedic surgeon who routinely used a specific technique for revision cases: BPTB-LET at Clinical Hospital of the University of São Paulo (Brazil) and ITB-AG at Toulouse University Hospital (France).

Patient selection

Electronic medical records from both institutions were reviewed to identify all patients who underwent R-ACLR between January 2018 and March 2023. Eligible patients were adults (≥18 years) who experienced ACL graft failure and underwent revision within 24 months from the injury event and had a minimum of 2 years of follow-up. Exclusion criteria included multiligament knee injuries, concomitant osteotomy at the time of revision or refusal to participate in the study.

Primary and secondary outcomes

Clinical outcomes were collected between 1 January 2024 and 1 March 2025, during in-person visits and standardized telephone interviews conducted by an independent examiner who was not involved in the original surgery. The primary outcome was the rate of graft retear at a minimum 2-year follow-up, defined as the presence of subjective instability, characterized by a positive pivot-shift test graded 2+ or 3+ or Lachman test greater than 5 mm and confirmation by magnetic resonance imaging (MRI).

Secondary outcomes included the International Knee Documentation Committee (IKDC) subjective score [14], the Lysholm score [36], the rate of complications, the side-to-side difference in anterior tibial translation measured with the KT-1000 arthrometer [5] and the pivot-shift grade at 2 years postoperatively.

Surgical procedures

Previous femoral and tibial tunnel characteristics were analysed preoperatively on X-rays and all revision procedures were performed as single-stage. A diagnostic arthroscopy was systematically carried out to evaluate tunnel position and treat associated lesions before graft harvesting.

BPTB-LET group (Figure 1)

The patellar tendon graft was harvested with bone plugs obtained from the patella and tibial tubercle (15 × 10 × 10 mm and the 25 × 10 × 10 mm, respectively). A femoral tunnel was created using the outside-in technique. The tunnel was consistently positioned near the anteromedial bundle of the native ACL, while avoiding previous tunnel direction and fixation hardware on the lateral femoral condyle. Initially, a complete tunnel measuring 9 mm in diameter and around 30 mm in length was created, and then the external lateral cortex was drilled for 15 mm with an 11 mm drill bit. The tibial tunnel was drilled from the medial tibial plateau, targeting the native ACL footprint, located between the tibial spines and aligned with the anterior root of the lateral meniscus. Tibial tunnel diameter was matched to the graft size (patellar plug), generally 9 or 10 mm. The graft is passed from the femur to the tibia, with the patellar plug initially passing through the femoral tunnel and then entering the tibial tunnel. The tibial plug was impacted to the femur for press-fit fixation. The tibial plug was harvested to achieve a diameter of 10 mm, allowing press-fit fixation after impaction into the tunnel. Given the outside-in drilling technique used for the femoral tunnel, no bone loss related to the primary surgery was observed that might compromise femoral fixation. The graft was secured in the tibial tunnel with interference screws in full extension, and then the high-strength sutures passing through the plug were tied at a transosseous suture for double fixation. For the LET, a modified Lemaire technique was used. A 10-mm-wide and approximately 10-cm-long strip was harvested from the posterior third of the ITB preserving its distal attachment at Gerdy's tubercle. The graft was passed deep to the

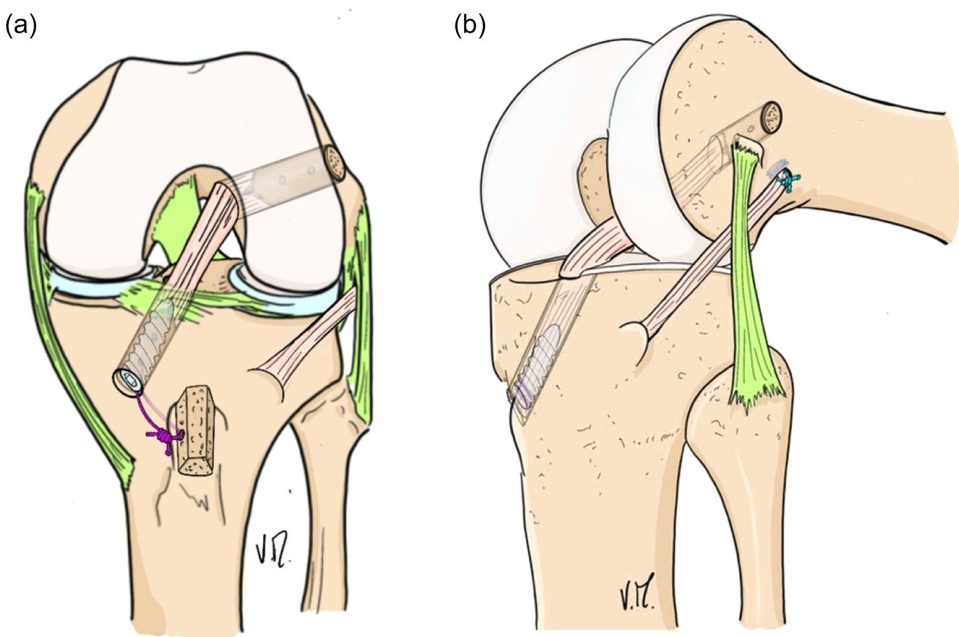

FIGURE 1 BPTB technique combined with modified Lemaire lateral extra-articular tenodesis. Anterior (a) and anterolateral (b) view of a left knee showing the combined BPTB ACLR and modified Lemaire LET technique. ACLR, anterior cruciate ligament reconstruction; BPTB, bone–patellar tendon–bone; LET, lateral extra-articular tenodesis.

lateral collateral ligament and secured to the femur using an inlay fixation technique with a metallic double-loaded suture anchor positioned posterior and proximal to the lateral epicondyle, with the knee maintained near full extension and in neutral rotation.

ITB-AG group (Figure 2)

All allografts were sourced from Ostéobanque®, consisting of posterior tibial tendons cryopreserved at −80°C without chemical preservatives or irradiation to preserve biomechanical integrity [20, 22, 37]. After two longitudinal incisions were made in the ITB, a graft approximately 15 cm long, 3 cm wide proximally, and 1 cm distally was harvested with electrocautery while preserving its insertion at Gerdy's tubercle. The ITB strip was tubularized with a SutureTape (Arthrex) incorporating the tendon allograft to achieve a uniform diameter. Using an outside-in ACL femoral guide (Arthrex), a femoral tunnel matching the graft diameter was drilled at the anatomic ACL footprint. The guide's angulation was adjusted to allow placement of the drill sleeve through the stab incision at the level of the isometric point F9 of Krackow. When feasible, the original tibial tunnel was reused if its position was considered satisfactory. The graft was passed from proximal to distal through both tunnels. Fixation was achieved with two interference screws, one in the femoral tunnel and one in the tibial tunnel, with the knee at 30° of flexion.

The graft was positioned superficial to the fibular collateral ligament to avoid potential iatrogenic injury, as the proximally wide ITB strip could place undue stress on the ligament if passed deep to it.

Postoperative care

No immobilization was used postoperatively. Patients began weight-bearing as tolerated on postoperative Day 1 and followed a structured rehabilitation programme focused on early restoration of range of motion and quadriceps activation. Return to non-pivoting sports was typically authorized at 4 months, non-contact pivoting sports at 6 months, and contact sports at around 9–12 months, contingent on satisfactory functional testing. In cases of associated meniscal repairs, rehabilitation protocol was similar, except for radial tears, which required non-weight-bearing and range of motion restriction for the first postoperative weeks.

Statistical analysis

All statistical analyses were performed on a locked dataset. Continuous variables were expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. Group comparisons were performed using the Student's t test or Mann–Whitney U test for continuous variables and the chi-square or Fisher exact test for categorical variables, depending on distribution and expected counts. All tests were two-sided, and a p value < 0.05 was considered statistically significant. The Patient Acceptable Symptom State (PASS) threshold for the IKDC was calculated based on the threshold of 75.9 reported by Muller et al. [27].

Using retear-free success rates from Abou Al Ezz et al. [1] (91.7% for BPTB-LET vs. 96.0% for ITB-AG), a noninferiority margin of 5 percentage points, a one-sided $\alpha = 0.05$, and 80% power, a Blackwelder noninferiority calculation indicated 82 patients per group (total 164) to

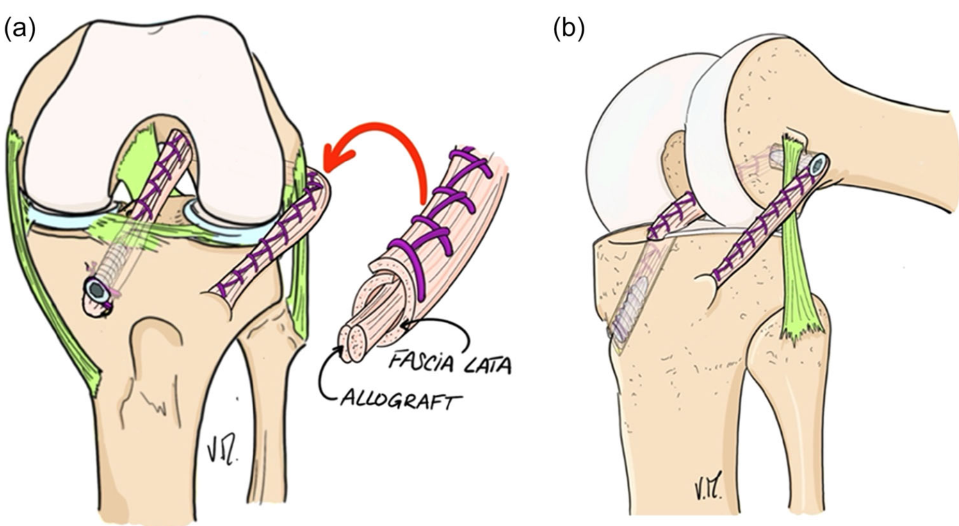

FIGURE 2 ITB ACLR + LEAP technique augmented with allograft. Anterior (a) and anterolateral (b) view of a left knee showing the combined ITB + AG ACL and LEAP technique. ACL, anterior cruciate ligament; ACLR, anterior cruciate ligament reconstruction; AG, allograft; ITB, iliotibial band; LEAP, lateral extra-articular procedure.

ensure the upper bound of the one-sided 95% confidence interval (CI; equivalently, a two-sided 90% CI) excludes a difference favouring the standard group greater than 5%.

RESULTS

Patient characteristics

A total of 195 patients met the inclusion criteria: 105 in the BPTB-LET group and 90 in the ITB-AG group (Figure 3). The two groups were comparable in age, sex distribution, time from graft failure to revision and history of previous meniscectomy. Preoperative pivot-shift grades were similar between groups. The mean duration of follow-up was significantly longer for the BPTB-LET group (38 ± 9 months for BPTB-LET and 34 ± 7 months for ITB-AG; $p = 0.0005$) (Table 1).

Primary and secondary outcomes

At the minimum 2-year follow-up, the graft retear rate did not differ significantly between groups (BPTB-LET, $n = 6$ [5.7%]; ITB-AG, $n = 4$ [4.4%]; $p = 0.7551$). The mean IKDC subjective score was significantly higher in the ITB-AG group compared with the BPTB-LET group (90.7 ± 10.8 vs. 88.3 ± 10.1; $p = 0.0026$). The PASS threshold for the IKDC was achieved by 96 patients (97%) in the BPTB-LET group and by 80 patients (93%) in the ITB-AG group ($p = 0.3073$).

Similarly, the mean Lysholm score was significantly higher in the ITB-AG group than in the BPTB-LET group (94.6 ± 10.8 vs. 90.8 ± 9.0; $p < 0.00001$).

A negative pivot-shift test was observed in 89 patients (98.9%) in the ITB-AG group, compared with 70 patients (66.7%) in the BPTB-LET group, representing a statistically significant difference ($p < 0.0001$). There was no significant difference in side-to-side anterior laxity as measured by the KT-1000 arthrometer (Table 2).

The overall complication rate was low in both groups: 5 patients (4.7%) in the BPTB-LET group and 5 patients (5.5%) in the ITB-AG group ($p = 1$).

In the BPTB-LET group, complications included one superficial wound infection at the Lemaire incision site (resolved with oral antibiotics), one deep vein thrombosis, one case of chronic lateral knee pain, one symptomatic lateral scar, and one case of arthrofibrosis requiring arthroscopic lysis. In the ITB-AG group, complications included one persistent effusion treated by arthroscopic removal of a resorbable screw, one symptomatic popliteal cyst requiring drainage and corticosteroid injection, one bucket-handle medial meniscus tear treated by partial meniscectomy, one superficial infection at the tibial tunnel site that resolved after debridement and antibiotics and one case of patellofemoral pain secondary to pre-existing arthritis.

DISCUSSION

The main finding of the current study was that at a minimum 2-year follow-up, the retear rate after revision ACLR was comparable between the standard BPTB-LET technique and our modified ITB-AG technique. Complication rates were similarly low in both groups. The ITB-AG group demonstrated superior patient-reported outcomes measures with higher IKDC and Lysholm scores. However, the magnitude of these differences was small and unlikely to be clinically meaningful. The vast majority of patients in both groups exceeded the PASS threshold for the IKDC and achieved good or excellent Lysholm scores, confirming that both procedures lead to satisfactory outcomes in the revision setting.

The concept of reinforcing the ITB with an additional tendon to enhance graft strength and diameter is not new. As early as 1986, Zarins and Rowe [40] described a combined ACLR using the semitendinosus tendon and the iliotibial tract, demonstrating that the ITB can effectively function as part of a composite intra- and extra-articular construct. Their pioneering work led to subsequent hybrid approaches, in which the ITB serves as a continuous stabilizer while an added tendon, autograft or allograft, enhances tensile resistance and graft volume [4, 8].

The results of the present study are consistent with those of Abou Al Ezz et al. [1], who reported no significant difference in graft failure rate or functional scores when comparing ITB-AG with BPTB-LET for revision ACLR. Their series showed retear rates of 8.3% for BPTB-LET and 4.0% for ITB-AG, while our study found similar numbers of 5.7% and 4.4%, respectively. The main differences between studies lie in the surgical details. In our cohort, the ITB graft was prepared with an equivalent diameter in both femoral and tibial tunnels and secured with dual interference screw fixation. In contrast, Abou Al Ezz et al. used a single tibial screw fixation without tunnel diameter standardization. Also, the authors assessed outcomes exclusively with patient-reported scores, without objective laxity measurements.

Taken together, these findings provide evidence that ITB-AG reconstruction is a safe and effective alternative to BPTB-LET in revision ACLR. Moreover, our data support expanding the indications for ITB-based techniques, which historically have been used primarily in skeletally immature patients. Meta-analyses in the primary ACLR setting have already shown that ITB grafts produce knee stability and graft survival comparable with those achieved using BPTB constructs, while reducing donor-site morbidity [23].

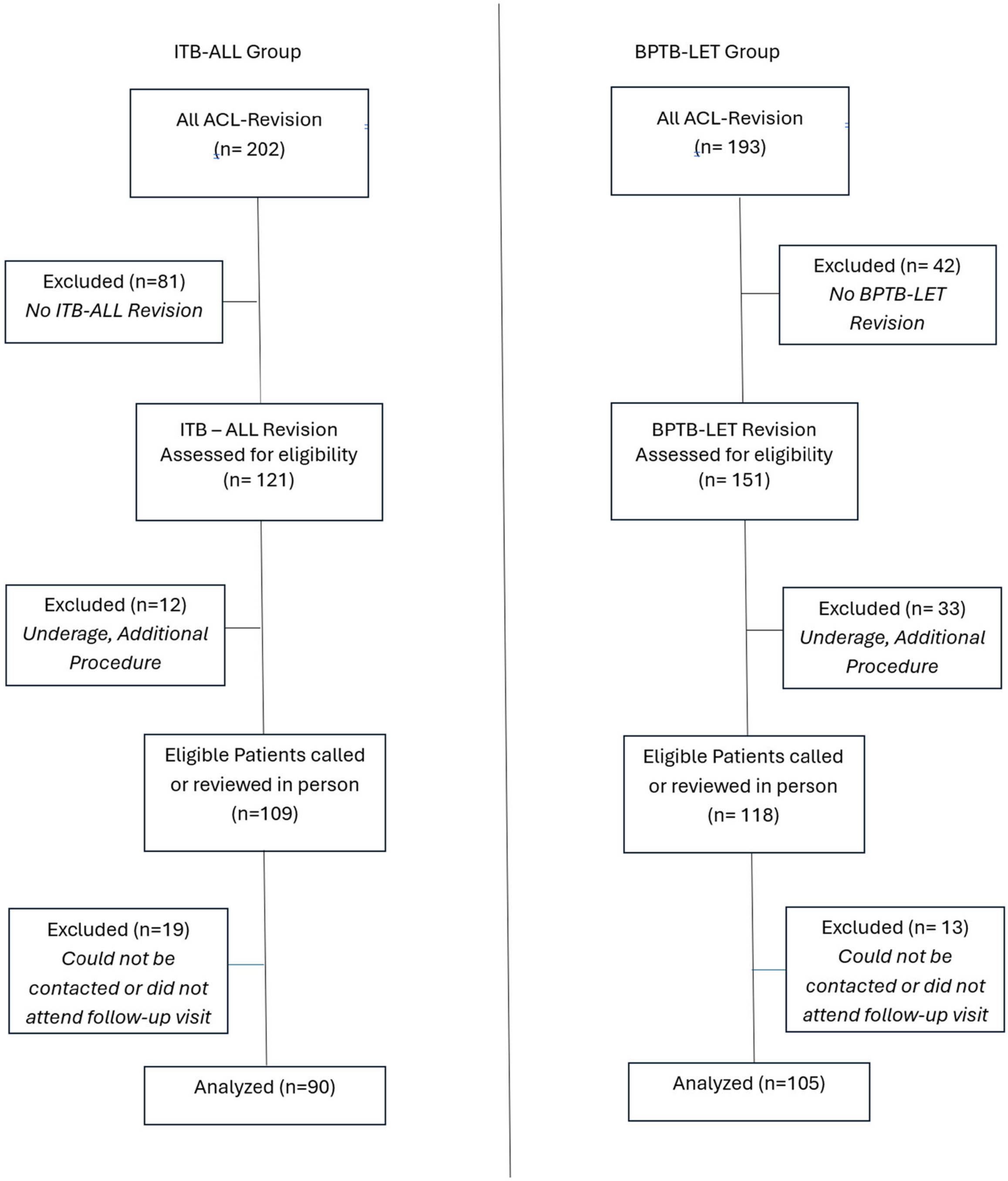

FIGURE 3 Flowchart illustrating population selection. ACL, anterior cruciate ligament; BPTB-LET, bone–patellar tendon–bone with lateral extra-articular tenodesis; ITB, iliotibial band.

Recent biomechanical data further support the rationale for ITB-based reconstructions. Özbek et al. [30] compared ITB autograft with BPTB grafts, with and without a LET, using robotic cadaveric testing. They found that ITB and BPTB reconstructions both restored anterior and rotational stability. However, adding an LET to the BPTB could result in overconstraint at 15° of flexion during pivot-shift manoeuvres.

The ITB-AG construct offers several advantages. Using a single continuous graft allows simultaneous intra- and extra-articular reconstruction from a single harvest site [6, 31, 34], providing both anterior and anterolateral stabilization [2, 3, 7, 29]. In this study, 98.9% of patients in the ITB-AG group demonstrated a negative pivot shift compared with 66.7% in the BPTB-LET group ($p < 0.00001$). However, assessment of rotatory laxity in awake patients may be examiner-dependent, and results should be interpreted cautiously, particularly given that evaluations were performed by two different examiners. This finding may

TABLE 1 Patient characteristics and surgical data.

	BPTB-LET (n = 105)	ITB-AG (n = 90)	p value
Age at revision, years, mean ± SD [95% CI]	29.9 ± 7.1	28.6 ± 7.3	0.0750
	[22.8–37.0]	[21.3–35.9]	
Sex, n (%)			0.5768
Male	83 (79)	74 (82)	
Female	22 (21)	16 (18)	
History of meniscectomy, n (%)	13 (12)	9 (10)	0.6552
Medial meniscus	10	8	
Lateral meniscus	3	1	
Time to revision after retear, months, mean ± SD [95% CI]	6.1 ± 6.5	6.2 ± 14.0	0.6455
	[0–12.6]	[0–20.2]	
Preoperative pivot shift, n (%)			0.0522
Negative	0	0	
Grade I	18	11	
Grade II	77	77	
Grade III	10	2	
Graft diameter, mm, mean ± SD [95% CI]	9.3 ± 0.5	8.8 ± 0.7	0.0001*
	[8.7–9.7]	[8.1–9.5]	
Meniscus tear at revision surgery, n (%)	36 (34)	54 (60)	0.0001*
Medial	19 (54)	37 (68)	
Lateral	16 (44)	8 (15)	
Both	1 (2)	9 (17)	
Meniscal treatment at revision surgery, n (%)			0.0027*
Repair	17	43	
Partial meniscectomy	19	11	

Note: Baseline characteristics and intraoperative findings of patients undergoing revision ACL reconstruction using BPTB-LET or ITB-AG.

Abbreviations: ACL, anterior cruciate ligament; BPTB-LET, bone–patellar tendon–bone with lateral extra-articular tenodesis; CI, confidence interval; ITB-AG, iliotibial band autograft augmented with allograft; SD, standard deviation.

*Indicates that the corresponding result is statistically significant (p value < 0.05).

reflect the so-called horseshoe effect, in which the ITB and ACL form a continuous capsulo-osseous loop around the knee, functioning in a synergic way to resist anterolateral translation [9]. Moreover, the higher rate of meniscal preservation in the ITB-AG group may have contributed to the lower incidence of post-operative positive pivot-shift findings [16, 18, 28]. Also, the ITB-AG technique eliminates the risk of femoral tunnel convergence inherent to double-tunnel for R-ACLR and LET constructs, and this feature is particularly useful in revision cases. In addition, it can provide a satisfactory graft diameter through allograft reinforcement and only two interference screws are needed for complete fixation. However, this technique requires a long lateral incision and the need for an allograft, which increases cost and may not always be available. Conversely, the BPTB-LET technique benefits from bone-to-bone healing and robust tunnel integration but may have a higher risk of tunnel convergence, may require additional fixation devices, especially if a non-press fit technique is used, and carries a greater risk of anterior knee pain and quadriceps weakness [13, 26, 32].

Complications specific to ITB harvest, such as lateral thigh haematoma or vastus lateralis herniation [23], were not observed in the current series. These issues, historically reported in up to 11% of cases, have become rare due to improved closure techniques [19, 25, 35]. Using the intermuscular septum sectioning technique enables posterior fascia advancement [24]. Hardware-related complications requiring reoperation were also minimal, with only one case of femoral screw

TABLE 2 Functional outcomes at final follow-up.

	BPTB-LET (*n* = 105)	ITB-AG (*n* = 90)	*p* value
Follow-up, months, mean ± SD [95% CI]	37.9 [29.1–46.7]	34.1 [27.5–40.7]	0.0005*
Retear, *n* (%)	6 (5.7)	4 (4.4)	0.7551
Complications, *n* (%)	5 (4.7)	5 (5.5)	1.000
IKDC, mean ± SD [95% CI]	88.3 ± 10.1 [78.2–98.4]	90.7 ± 10.8 [89.9–100]	0.0026*
Patients achieving IKDC PASS, *n* (%)	96/99 (97)	80/86 (93)	0.3073
Lysholm, mean ± SD [95% CI]	90.8 ± 9.0 [81.8–99.8]	94.6 ± 10.8 [83.8–100]	<0.00001*
Pivot-shift grade, *n* (%)			<0.00001*
Negative	70 (67)	89 (99)	
Grade I	32 (30)	1 (1)	
Grade II	3 (3)	0	
Grade III	0	0	
Side-to-side laxity, mm (KT-1000)	1.4 ± 1.2 [0.2–2.6]	0.7 ± 1.7 [0–2.4]	0.1164

Note: Clinical and functional outcomes at final follow-up comparing BPTB-LET to ITB-AG techniques for revision ACL reconstruction. Patients with graft retear were excluded from analysis.

Abbreviations: ACL, anterior cruciate ligament; BPTB-LET, bone–patellar tendon–bone with lateral extra-articular tenodesis; CI, confidence interval; IKDC, International Knee Documentation Committee; ITB-AG, iliotibial band autograft augmented with allograft; PASS, Patient Acceptable Symptom State; SD, standard deviation.

*Indicates that the corresponding result is statistically significant (p value < 0.05).

removal (1%) in the ITB-AG group. These results echo recent reports that modern bioresorbable fixation devices significantly reduce hardware morbidity [25]. Furthermore, a very low rate of joint stiffness was observed in both groups. One patient in the BPTB-LET group required arthrolysis, whereas no patient required manipulation under anaesthesia or arthrolysis following ITB-AG revision surgery.

The current study has several limitations and comparisons must be done with caution. First, the study compared patients treated in two centres across different countries, introducing potential variability in surgical environment and rehabilitation protocols. Second, although demographic and baseline characteristics were comparable, minor differences in follow-up duration, graft diameter, and intraoperative meniscal management could have influenced outcomes. Posterior tibial slope was not systematically measured or used as an exclusion criterion in this series. However, in the authors' clinical practice, slope-correcting osteotomy is only rarely indicated and is generally not performed at the time of first revision ACLR, which likely limited the impact of excessive posterior tibial slope on the present results. In addition, detailed characterization of associated meniscal and chondral lesions (including tear pattern, size and cartilage lesion grade) was not consistently available, and this lack of details may have influenced postoperative PROMs. Third, the absence of preoperative IKDC and Lysholm data precluded the calculation of improvement beyond the minimal clinically important difference. Data regarding postoperative participation in athletic activities were not systematically collected and therefore were not analysed in the present study. Nevertheless, the Lysholm score provides information on activities of daily living, and the IKDC subjective score includes items related to sports activity and functional limitations during athletic participation. Despite these limitations, the present results support the ITB-AG as a reliable and reproducible option for revision ACLR, leading to similar rates of graft survival and functional recovery as the traditional BPTB-LET while avoiding its donor-site morbidity. The technique may be particularly valuable in cases in which previous autograft harvest limits available graft sources or when minimizing anterior knee pain is a priority.

CONCLUSIONS

This multicenter comparative study demonstrated that the ITB-AG technique achieved graft survival comparable to the standard BPTB-LET procedure at midterm follow-up, with similarly low complication rates. Patient-reported outcomes were statistically higher in the ITB-AG group, although the magnitude of these differences may be of limited clinical relevance. In addition, a higher proportion of patients in the ITB-AG group demonstrated a negative pivot-shift test. Overall, ITB-AG represents a viable alternative for revision ACLR.

AUTHOR CONTRIBUTIONS

Victor Mas: Data acquisition; manuscript writing. **André Giardino**: Data acquisition. **Thomas Ripoll**:

Conceptualization; manuscript editing. **Alessandro Carrozzo**: Manuscript writing. **Régis Pailhe**: Manuscript editing. **Louis Courtot**: Conceptualization; manuscript editing. **Camilo Helito**: Conceptualization; surgical procedures; manuscript editing. **Etienne Cavaignac**: Conceptualization; surgical procedures; manuscript editing.

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CONFLICT OF INTEREST STATEMENT

Etienne Cavaignac is a consultant for Arthrex, Amplitude and Biobank. The remaining authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The authors have nothing to report.

ETHICS STATEMENT

The number corresponding to the ethical statement of the study is 28296263 (Health Data Hub Register).

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