BS Structured Summary

Article: Peroneus Longus as Autologous Graft in Knee Surgery

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Structured Summary: Peroneus Longus as Autologous Graft in Knee Surgery

Original Article: Evaluation of the peroneus longus tendon as an autologous graft in knee surgery

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INTRODUCTION / BACKGROUND

Anterior cruciate ligament (ACL) injury is the most common knee ligament injury in patients who practice sports activity, with an incidence of 78 cases per 100,000 people per year. Untreated injuries are associated with a higher incidence of meniscal tears and articular cartilage damage, which may progress to knee osteoarthritis. In addition to isolated ACL injuries, other ligament injuries may occur simultaneously (multiligament), requiring reconstruction techniques tailored to each patient.

Over recent decades, knee ligament reconstruction has evolved to use various graft types. Autografts, allografts, and synthetic grafts represent options with varying levels of clinical success. The most popular autografts among knee surgeons remain hamstring tendon (HT) and bone-patellar tendon-bone (BTB). Each carries advantages and disadvantages: BTB facilitates bone integration through bone plugs but may cause patellofemoral pain, patellar fracture, and donor-site pain; HT has lower donor-site morbidity but its final diameter is unpredictable, and harvesting may decrease flexion strength — affecting athletes whose sport relies on knee flexion.

Against this backdrop, the peroneus longus (PL) tendon has gained ground as a robust alternative. Despite its stabilizing function for foot and ankle, prior studies show its harvest does not compromise gait in short- and medium-term follow-up. PL can be harvested in two ways: in its entirety (full PL) or only its anterior half (AHPL), according to surgical technique and graft caliber required. In the literature, PL and AHPL have been used in ACL, PCL, medial patellofemoral ligament (MPFL) reconstructions, and even coracoclavicular shoulder reconstructions.

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This study by the Brazilian group led by Pedro Baches Jorge (Santa Casa de São Paulo) — published in Scientific Reports from Nature Portfolio in November 2024 — has special character: it brings to high-impact international literature a pioneering prospective cohort directly comparing full PL versus AHPL use in different knee ligament reconstructions, simultaneously evaluating outcomes in the operated knee and donor ankle. The central hypothesis is that PL constitutes an excellent graft option, safe and without significant secondary damage in the donor area.

OBJECTIVE

To determine whether the use of peroneus longus tendon (in its entirety — PL — or only its anterior half — AHPL) as an autologous graft in knee ligament reconstruction is safe and does not cause significant secondary damage to the donor area, simultaneously evaluating functional outcomes of the knee (IKDC, Tegner-Lysholm) and ankle (AOFAS, FADI) at follow-up up to 24 months.

METHODS

Prospective study conducted between April 2019 and September 2022, after ethics committee approval at Santa Casa de São Paulo (protocol 34826120.5.0000.5479), following the Declaration of Helsinki. Patients undergoing any type of knee ligament reconstruction using PL or AHPL as graft were consecutively enrolled. Exclusion criterion: prior ankle instability or injury. Of 155 initially selected patients, 2 were excluded for prior ankle instability and 6 lost to follow-up before 6 months, resulting in 147 analyzed patients.

Patients were distributed into three follow-up groups (overlapping): Group A — 6 months (147 participants); Group B — 12 months (102 participants); and Group C — 24 months (63 participants). Knee functional assessments: Tegner-Lysholm score and IKDC (International Knee Documentation Committee) guidelines. Ankle functional assessments: AOFAS (American Orthopedic Foot and Ankle Score) and FADI (Foot and Ankle Disability Index).

Standardized graft-harvesting technique: incision at the posterior fibular edge, approximately 2-3 cm proximal to the most distal point of the lateral malleolus. After subcutaneous dissection, peroneus longus and peroneus brevis tendons are identified and joined with non-absorbable sutures. At this point, two options are possible depending on technique: (a) PL can be fully incised and removed using a tenotome; (b) alternatively, an "L"-shaped incision in the PL tendon separates the anterior half from the remainder, and only the AHPL is removed with the tenotome. After harvest, remaining tissue is sutured in layers.

Grafts were used in different reconstructions: isolated ACL (predominant — 85.71%), ACL + MCL, posterolateral corner, ACL + posterolateral corner, medial patellofemoral ligament, and quadriceps repair. Statistical analysis: SPSS V26; Friedman test for intra-group comparisons at the three timepoints; Mann-Whitney test for comparisons between graft types at each timepoint and for delta variations (D1=12-6 months, D2=24-6 months, D3=24-12 months). Significance at $p<0.05$.

MAIN RESULTS

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Population and profile: 147 patients included, mean age 27.33±7.44 years, mean height 173.41±8.15 cm, mean weight 76.49±13.34 kg. Most practiced soccer as their main sport (76.87%), followed by handball (9.52%), basketball (6.12%) and others. Isolated ACL reconstruction was the most frequent indication (85.71%; 126 patients), followed by multiligament combinations. Graft distribution: full PL in 75 patients (51.02%) and AHPL in 72 patients (48.98%) — nearly balanced division enabling direct comparison.

Donor-site complications: 15 patients (10.20%) presented swelling and hematoma in the first postoperative week; 3 patients (2.04%) had superficial infection; no patient presented neurological deficit. Four patients (3.92%) had failed stability treatment at 12 months — all in the ACL group. Complications were low-morbidity and did not affect rehabilitation or final outcome.

Central finding — ankle outcomes (AOFAS and FADI): both scores were excellent from 6 postoperative months and remained excellent through 24 months, with favorable progression. At 24 months: PL → AOFAS 99.92±0.07 and FADI 99.92±0.07; AHPL → AOFAS 100.00±0.00 and FADI 100.00±0.00. There was therefore no clinical functional decrement in the donor ankle in either protocol, despite small statistical differences modestly favoring AHPL in deltas D1 (FADI: 0.89 PL vs 0.16 AHPL; p=0.005), D2 (FADI: 0.97 vs 0.53; p=0.038) and D3 (AOFAS: 0.08 vs 0.36; p=0.046).

Knee outcomes — IKDC and Tegner-Lysholm: excellent progression in both groups. At 24 months: PL → IKDC 99.02±0.02 and Lysholm 98.69±1.08; AHPL → IKDC 99.31±0.54 and Lysholm 98.88±0.95. Differences between groups across the three timepoints were statistically significant in the overall pattern (p=0.001). For Tegner-Lysholm, no significant difference between graft types at any time or in deltas. For IKDC, differences emerged in D1 (PL +8.15 vs AHPL +1.64; p=0.008) and D2 (PL +9.76 vs AHPL +15.51; p=0.038), reflecting distinct recovery kinetics between grafts.

Clinical synthesis: both graft types (full PL and AHPL) demonstrated excellent knee functional results, with progressive IKDC and Tegner-Lysholm improvement, and maintenance of excellent donor-ankle function (AOFAS and FADI near maximum score). Small observed differences modestly favored AHPL in some ankle parameters but without clinically relevant repercussion. Complications were low-morbidity. The choice between full PL and AHPL can be made by the surgeon according to technical need (diameter/length required by reconstruction).

AUTHORS' CONCLUSION

The use of peroneus longus tendon as a graft in knee surgeries proved adequate for achieving good knee functional results. Regarding the donor site, there was no decrease in FADI and AOFAS scores regardless of whether the graft was removed in its entirety (PL) or only as its anterior half (AHPL). Further follow-up is required to assess whether these excellent scores are maintained in medium and long term.

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💬 BS DISCUSSION

This paper deserves special attention on our BS Papers radar for three reasons. First, the senior author is Pedro Baches Jorge (Santa Casa de São Paulo), a Brazilian reference in knee surgery — and the publication came out in Scientific Reports from Nature Portfolio in November 2024, a high-impact international showcase for Brazilian production. Second, it is a prospective cohort with 147 patients, directly comparing full PL versus AHPL — a comparison rare in world literature, since most prior studies use only one of the two variants. Third, and perhaps most important: the paper systematically answers a question many of us already ask in daily practice — "if I harvest the peroneus longus, will the patient pay a price at the ankle?". The 24-month answer from this study is: no clinically relevant ankle price is paid, with FADI/AOFAS practically at 100 in both groups.

For the BS surgeon, the most useful technical point is the standardized harvest protocol clearly described: 2-3 cm incision proximal to the lateral malleolus apex, identification of peroneus longus and brevis tendons, tenodesis between them with non-absorbable suture (critical step to preserve eversion function), and then decision to harvest the entire PL with a tenotome, or the anterior half via an "L"-shaped tendon incision. This is a technical detail worth taking to BS surgical labs — replicating the technique step by step increases safety and reproducibility. The low complication rate (10.2% hematoma in the first week and 2% superficial infection, with no neurological deficit) and absence of ankle instability are data that bring confidence when adopting the procedure.

Another valuable point of the study is the demonstrated versatility of applications: isolated ACL (85.71%), ACL + MCL, isolated or ACL-combined posterolateral corner, MPFL reconstruction, and even quadriceps repair. This versatility positions the peroneus longus as the knee surgeon's "wildcard graft" — especially in multiligament situations where we need additional graft beyond hamstring, or when the flexor proves of insufficient diameter. Importantly, the Santa Casa group has previously published other PL-involving techniques, including the combined ACL + ALL reconstruction with semitendinosus + gracilis + PL (Escudeiro de Oliveira et al., Arthrosc Tech 2021), and the ACL + AOL reconstruction using anterior half of PL (Jorge et al., Arthrosc Tech 2023). This 2024 paper consolidates and validates a consistent line of research by the Brazilian group.

Statistical data comparing full PL vs AHPL deserve careful reading. Although the abstract highlights statistically significant differences (p=0.001) between groups, the observed clinical differences are small and may not have practical impact. For example, in FADI at 6 months, AHPL averaged 99.47 and PL 98.95 — a statistically significant difference (p=0.015), but practically imperceptible to the patient in daily function. In delta analysis (variations between timepoints), AHPL had more favorable FADI increments, suggesting that harvesting only the anterior half may marginally better preserve ankle function. For the BS surgeon, the practical recommendation is: when technique allows (i.e., when required diameter can be achieved with AHPL combined with another graft), prefer AHPL; when needing a long, robust isolated graft (e.g., for isolated posterolateral corner reconstruction or combined ACL + ALL with PL only), harvesting full PL does not impose relevant clinical penalty.

Limitations are honest and well-assumed by the authors. Maximum 24-month follow-up does not allow assessment of late joint degeneration at the ankle, theoretically possible with stabilizer removal. Patient number (n=147) is reasonable for a prospective analysis but small per subgroup (e.g., only 3 patients in MPFL-R or isolated corner-R), limiting specific conclusions for these indications. The authors also correctly cite other studies showing preservation of eversion strength and first-ray plantarflexion after PL harvest (Rhatomy 2019, Shao 2020) — but note longer follow-up is needed. For BS Papers, this is an essential paper: it marks BS's entry into tracking high-visibility international Brazilian production and strengthens the narrative that peroneus longus is a safe, versatile, low-morbidity option — particularly relevant for the Brazilian reality, where tissue-bank allograft access is limited and cost is a decisive factor in surgical planning.

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