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CASE REPORT

Fibular tendon graft as an alternative for anterior cruciate ligament reconstruction of the knee: Case report

Anna Beatriz L. Silva[1], Anna Luísa L. Milani[1], Beatriz R. Teixeira[1], Izadora O. Leite[1], Giovana A. Paranhos[1], Layla M. Rios[1], Andrei M. V. Trindade[1,2], José Augusto Souza Neto[2], Phablio José Silva[2]

[1] Evangelical University of Goiás (UniEVANGÉLICA), Anápolis (GO), Brazil
[2] Clinical Staff Municipal Hospital Aparecida de Goiânia (HMAP), Aparecida de Goiânia (GO), Brazil

Abstract

Background: Anterior cruciate ligament (ACL) injury significantly compromises knee stability, especially during sports activities. Surgical reconstruction using tendon grafts is the standard treatment, with autografts (patellar, hamstring, quadriceps, and peroneus longus tendons) being the most commonly used. The patellar tendon is considered the gold standard, but its donor site morbidity has encouraged the search for alternatives such as the peroneus longus tendon. **Objective:** To report the use of the peroneus longus tendon as a graft in ACL reconstruction, highlighting its feasibility as an alternative to conventional techniques and the observed clinical outcomes. **Method:** The study involved a 35-year-old female patient with a complete right ACL tear following a sprain during physical activity. Reconstruction was initially indicated using hamstring tendons (semitendinosus and gracilis), but intraoperative evaluation revealed insufficient thickness and length. The ipsilateral peroneus longus tendon was then harvested as a complementary graft. **Results:** The patient showed favorable postoperative evolution, with proper healing and initiation of functional rehabilitation. Graft selection for ACL reconstruction depends on factors such as stability, muscle strength, complications, and functional goals. The peroneus longus tendon offers advantages such as suitable diameter, tensile strength, lower morbidity, and a safe harvesting technique, making it a promising option when conventional grafts are inadequate. Studies indicate lower revision rates when graft diameter is sufficient, reinforcing its applicability. **Conclusion:** The peroneus longus tendon proved to be an effective and safe alternative graft for ACL reconstruction, especially in cases where hamstring tendons are insufficient. It demonstrated good functional outcomes, strength, and low donor site morbidity.

Keywords: Graft; knee; anterior cruciate ligament.

Corresponding author: Anna Beatriz Lopes Silva

Email: anna280602@hotmail.com

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BACKGROUND

The anterior cruciate ligament (ACL) is one of the most important structures for maintaining knee stability, especially during athletic activities that involve quick changes of direction and abrupt landings[1-4]. Patients with untreated ACL injuries have a higher incidence of meniscal injuries and cartilage damage, which can progress to knee osteoarthritis[5].

The standard treatment for ACL rupture is ligament reconstruction, which involves replacing the damaged ligament with a tendon graft. The two main groups of grafts used are allografts (grafts taken from donors) and autografts (tissues taken from the patient themselves)[5-9]. Autografts can be harvested from various regions of the body.

The most commonly used by orthopedic surgeons are the flexor tendons (hamstring tendon, HT) and the patellar tendon (bone-patellar tendon-bone graft, BPTB)[2-9].

The BPTB graft is still considered the gold standard because it has biomechanical strength similar to the native ACL, allows for early, active, and safe rehabilitation, and has good long-term results. However, the BPTB is associated with morbidity at the donor site, including femoropatellar pain, loss of range of motion, and patellar fractures.

Therefore, some orthopedic surgeons have started using the long fibular tendon as a graft[10].

Thus, the objective of this work is to report the use of the fibular tendon as a graft in the reconstruction of the ACL of the knee, highlighting its viability as an alternative to conventional techniques and the clinical outcomes observed.

METHODS

The present report was reviewed and approved by the Research Ethics Committee – CAAE:89336625.1.0000.5076, in compliance with the ethical and legal principles established in Resolution 466/2012 and Circular Letter 166/2018.

The participant was selected non-randomly, being a 35-year-old woman, a smoker, weighing 79kg, 156cm tall, with a BMI of 32. Using the medications Losartan and Hydrochlorothiazide. Denies previous surgeries. Previous diagnosis of Systemic Arterial Hypertension (SAH).

Sought medical attention on 09/16/2024 with complaints of pain, instability, functional limitation, and a feeling of giving way in the right knee. Reported a right knee sprain while doing jumping jacks in the month prior to the consultation. Upon physical examination, Lachman sign 2+, anterior drawer sign 2+, and pivot shift sign + were evident, indicative of an anterior cruciate ligament injury in the right knee.

The three signs, Lachmann's sign, anterior drawer sign, and pivot shift sign, are tests used for the evaluation of the anterior cruciate ligament. The Lachman test is performed with the knee at 20-30º of flexion, showing anterior translation of the tibia relative to the femur. Grade 2+ indicates moderate displacement (5-10mm), suggesting partial or complete ACL injury. In the anterior drawer sign, with the knee at 90º flexion, anterior translation of the tibia is observed when forward force is applied, grade 2+ indicates moderate displacement (5-10mm), compatible with partial or complete ACL injury. The pivot shift test is a dynamic test that assesses rotational instability of the knee, associated with anterior cruciate ligament injury. It is considered positive when anterior subluxation of the tibia occurs with a sudden reduction during knee flexion, indicating ligament laxity.

In the imaging examination, magnetic resonance imaging (MRI) of the right knee, a complete rupture of the anterior cruciate ligament, the presence of posterior-lateral bone edema, and joint effusion with synovitis were identified.
Based on the clinical findings and complementary examination, surgical treatment for the reconstruction of the ACL of the injured knee was indicated. On January 30, 2025, the patient underwent right knee arthroscopy at the Municipal Hospital of Aparecida de Goiânia (HMAP). The removal of ipsilateral flexor tendon grafts (sartorius and gracilis) was performed, and their size and thickness were found to be inadequate for anterior cruciate ligament reconstruction. As an alternative, it was decided intraoperatively to remove the ipsilateral anterior fibular tendon to increase the thickness and size of the graft for ACL reconstruction.

RESULTS

The patient progressed satisfactorily in the immediate postoperative period, without clinical or surgical complications. At the postoperative follow-up on 02/14/2025, the patient showed good clinical progress, reporting gradual improvement in the function of the operated limb. The surgical wound was in an adequate healing process, with no signs of infection, dehiscence, or other local alterations.

At the time, I was undergoing physiotherapy sessions for postoperative recovery and functional rehabilitation, aimed at restoring the range of motion and muscle strengthening, according to the protocol established for rehabilitation after anterior cruciate ligament reconstruction.

The clinical response suggests a functional recovery within the expected range and reinforces the potential of the long fibular muscle tendon as a viable alternative graft for anterior cruciate ligament reconstruction.

DISCUSSION

The ACL is one of the most important stabilizing ligaments of the knee, responsible for promoting dynamic-static stability as well as coordination of the knee joint. Furthermore, its main function is related to the control of tibial mobility, preventing its anterior displacement in relation to the femur and limiting its excessive rotation. The ACL is frequently injured in activities that involve sudden changes of direction, jumps, or sudden deceleration, making it one of the most common injuries among athletes and physically active individuals. When a complete ACL rupture occurs, especially in patients who wish to return to sports activities, the indicated treatment is generally surgical reconstruction[1,5,6].

This surgical reconstruction procedure consists of replacing the injured ligament with a graft, which can be autologous (taken from the patient themselves) or allogeneic (from a donor[6,7,11,12]. Thus, the most commonly used autologous grafts include the flexor tendons (from the semitendinosus and gracilis muscles), patellar tendon, quadriceps tendon, and the long fibular tendon. The reconstruction of the ACL aims to restore knee stability, prevent associated injuries, and enable the safe return to the patient's routine[2,6,8].

The reconstruction of the ACL involves different types of grafts used, and the choice depends on various factors, including: knee stability, muscle strength, function, return to sport, patient satisfaction, complications, and costs[3,11,13,14]. Knee stability constitutes the main factor for the success of the reconstruction surgery, as it is the central objective of the procedure. Among the four grafts used, the most common in surgical practice are the flexor tendon grafts and the patellar tendon graft, but all available types have advantages and disadvantages that must be analyzed by the doctor to choose the most ideal graft[5,13,14]. The patellar tendon, being a bone-tendon-bone graft, offers excellent stability and rapid integration, making it highly recommended for athletes and patients with high physical demands. However, it can cause anterior knee pain and difficulty kneeling.

On the other hand, the flexor tendons provide less postoperative pain and a more comfortable recovery, although they exhibit slower integration and, in some cases, greater residual laxity. The quadriceps tendon graft is a versatile alternative, with good caliber and strength, especially useful in revisions. Finally, the fibular long tendon has been studied and used as a promising alternative for autologous graft in ACL reconstruction, especially in scenarios where conventional grafts are not available or in revision surgeries[3,4,6,8]. The origins, advantages, and disadvantages of autologous grafts are shown in Table 1.

Table 1. Origin, advantages and disadvantages of autologous grafts

Autologous graft type	Origin	Advantages	Disadvantages
Patellar Tendon	Anterior region of the knee, between the patella and the tibial tuberosity.	Rapid bone integration and preservation of strength and power.	Anterior knee pain, tendonitis, and increased donor site morbidity.
Hamstring Tendons	Originating from the semitendinosus and gracilis muscles, located in the inner and posterior thigh, inserting into the medial portion of the tibia.	Easy harvesting and less postoperative pain.	Decreased knee flexion and hip extension strength, impairing activities requiring sprints, and higher probability of re-rupture.
Quadriceps Tendon	Anterior region of the thigh and knee, above the patella. Connects the quadriceps muscles to the patella.	Useful for multi-ligament knee reconstructions, less anterior pain, and option to use or not a bone plug.	Technically more demanding, risk of patellar fracture, and potential quadriceps function deficit.
Peroneus Longus Tendon	Lateral region of the leg, posterior to the lateral malleolus.	Promising option, easy harvesting, low morbidity at the donor site, and provides a long and robust graft.	Limited knowledge about long-term outcomes of ACL reconstruction and possible consequences for foot/ankle function.

The use of the fibular tendon as a graft represents a favorable alternative for ligament reconstruction, such as the ACL. This tendon originates at the head and the proximal two-thirds of the lateral surface of the fibula, runs along the lateral surface of the leg, passes posteriorly to the lateral malleolus of the ankle (in its own groove), wraps around the calcaneus and the cuboid bone, crosses obliquely thru the sole of the foot, and inserts into the lateral surface of the base of the first metatarsal and the medial portion of the medial cuneiform bone. It is responsible for eversion and plantar flexion, in addition to contributing to the stabilization of the foot and ankle[1].

This type of graft has a good diameter and tensile strength, comparable to traditionally used grafts, and lower morbidity at the donor site, since the short fibular tendon remains intact, being the main responsible for eversion[10,13,15-20]. Furthermore, it allows for versatility in the surgical technique, with the possibility of partial or total removal of the tendon[5]. These characteristics favor good clinical outcomes, with satisfactory results in knee functionality, as demonstrated in studies[1].

During the reconstruction of the ACL in the described case, the initial graft with the flexor tendons presented insufficient thickness and length to ensure the necessary joint stability. Given this intraoperative finding, it was decided to supplement the reconstructive material with the tendon of the ipsilateral peroneus longus muscle, with the aim of increasing the diameter of the implanted structure. Studies show that the thickness of the graft is directly associated with the rupture rate and the need for surgical revision, with grafts having a diameter of less than 7 mm presenting significantly higher revision rates (13.6%) compared to those with a diameter greater than 8 mm (1.57%)[9]. In this context, the use of the long fibular muscle tendon proves to be a promising option, as its larger diameter contributes to better joint stability, less atrophy of the thigh muscles — indicating less muscle mass loss — in addition to presenting a safe removal technique, facilitated by its anatomical characteristics[8]. The following presents Figures 1 and 2 as illustrations of the long fibular tendon, highlighting its anatomical location and viability as an alternative graft in ACL reconstruction.

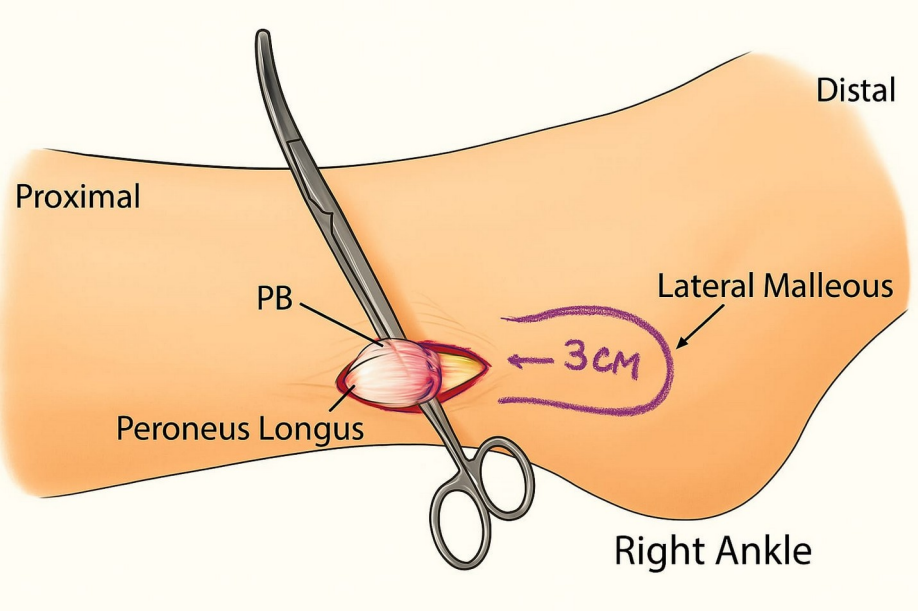

Figure 1. Long fibular tendon of the right ankle

Note: AI-generated image

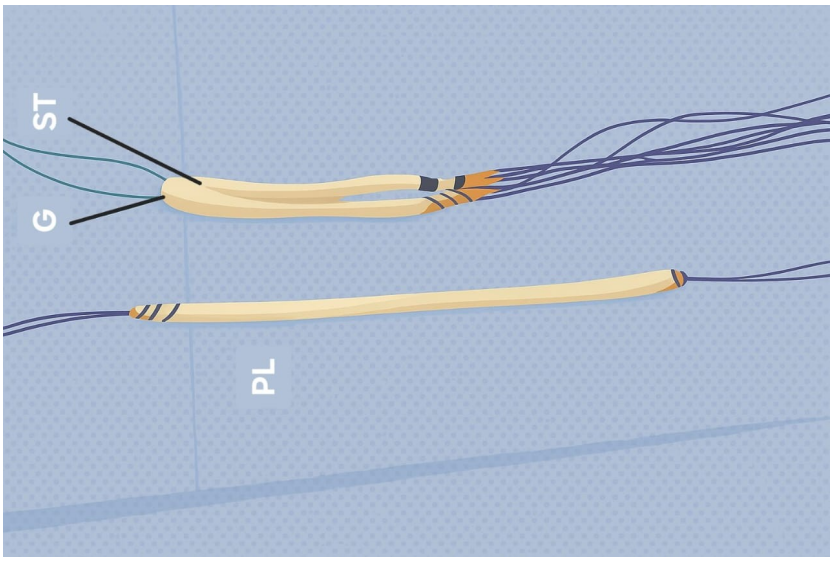

Figure 2. Hamstring grafts (gracilis [G] and semitendinosus [ST]) and peroneus longus (PL)

Note: AI-generated image

CONCLUSION

In conclusion, it should be noted that, among the options for autologous grafts, the first choice for the reconstruction of the anterior cruciate ligament in the patient's case was the ipsilateral flexors. This type of graft was chosen for its ease of removal and postoperative with less pain. But, due to insufficient thickness and lengths to ensure the necessary joint stability, the use of the long fibular tendon was chosen because it has a good diameter, contributing to better joint stability and less atrophy of the thigh muscles, tensile strength, and a safe removal technique. Therefore, the long fibular tendon proves to be effective and safe as an alternative graft in ACL reconstruction, especially in cases with limitations on the use of flexor tendons, with good functional outcome, resistance, and low morbidity at the donor site.

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REFERENCES

1 Oliveira DE, Ferretti M, Neto AG, Seijas R, Cohen M. Anterior cruciate and anterolateral ligament reconstruction using hamstring and peroneus longus tendons: surgical technique description. Arthrosc Tech. 2021 Jan 15;10(2):e397–e402. doi: 10.1016/j.eats.2020.10.030.

2 Arliani GG, Astur DC, Yamada RK, Cohen M. Lesão do ligamento cruzado anterior: tratamento e reabilitação. Perspectivas e tendências atuais. Rev Bras Ortop. 2012;47(2). doi: 10.1590/S0102-36162012000200008.

3 Yang Y, Wu J, Zhang M, Wang Y. All-Inside anterior cruciate ligament reconstruction: a review of advance and trends. Front Biosci (Landmark Ed). 2022;27(3). doi: 10.31083/j.fbl2703091.

4 Uwada FT, Oliveira AL, Silva RG, Almeida MR. Update on anterior cruciate ligament reconstruction using patellar tendon or quadriceps tendon graft: systematic review. J Med Residency Rev. 2023;2(1). doi: 10.37497/JMRReview.v2i1.27.

5 Oliveira DE, Santos JL, Mendes CO, Cohen M. Evaluation of the peroneus longus tendon as an autologous graft in knee surgery. Sci Rep. 2024 Nov 1;14(1):26341. doi: 10.1038/s41598-024-76779-y.

6 Macaulay AA, Perfetti DC, Levine WN. Anterior cruciate ligament graft choices. Sports Health. 2012 Jan;4(1):63–8. doi: 10.1177/1941738111409890.

7 Damasceno ML, Gobbi RG, Cohen M. A utilização de enxerto alógeno nas reconstruções ligamentares do joelho. Acta Ortop Bras. 2009;17(5). doi: 10.1590/S1413-78522009000500002.

8 Lara PHS, Mendes FF, Silva RPA, Ribeiro DMS. Novas técnicas de enxertia para reconstrução do LCA: artigo de atualização. Rev Bras Ortop. 2024;59(5). doi: 10.1055/s-0044-1779335.

9 Junior LFBP, Lima TB, Santos RM, Rocha S. The influence of different hamstrings assemblies on the final graft diameter in anterior cruciate ligament reconstruction. Rev Bras Ortop. 2024;59(3). doi: 10.1055/s-0044-1785518.

10 Rhatomy S, Widodo W, Asikin AI, Saputra BI. Single bundle ACL reconstruction with peroneus longus tendon graft: 2-years follow-up. J Clin Orthop Trauma. 2020 May;11(Suppl 3):S332–S336. doi: 10.1016/j.jcot.2019.09.004.

11 Wiradiputra AE, Febyan, Aryana GNW. Peroneus longus tendon graft for anterior cruciate ligament reconstruction: a case report and review of literature. Int J Surg Case Rep. 2021;83:106028. doi: 10.1016/j.ijscr.2021.106028.

12 Rhatomy S, Asikin AI, Wardani AE, Lumban-Gaol I. Peroneus longus autograft can be recommended as a superior graft to hamstring tendon in single-bundle ACL reconstruction. Knee Surg Sports Traumatol Arthrosc. 2019;27(11):3552–9.

13 He J, Wang C, Wang H, Li X, Luo X. Peroneus longus tendon autograft has functional outcomes comparable to hamstring tendon autograft for anterior cruciate ligament reconstruction: a systematic review and meta-analysis. Knee Surg Sports Traumatol Arthrosc. 2021;29(9):2869–79.

14 Melo AMT, Souza LS, Rocha T, Almeida V. Reconstruction of the anterior cruciate ligament: a literature review about the grafts used. Cienc Saude. 2023;27. doi: 10.5281/zenodo.7829268.

15 Abdelkader MA, Mostafa AG. Primary anterior cruciate ligament reconstruction using full-thickness peroneus longus tendon autograft. Egypt Orthop J. 2023 Nov;58(3):186–191. doi: 10.4103/eoj.eoj_23_23.
16 Ertogrul R, Ozcanli H, Eren OT, Karalezli N, Basbozkurt M. Is peroneus longus allograft a good alternative for anterior cruciate ligament reconstruction: a comparison study. Acta Chir Orthop Traumatol Cech. 2021;88(1):58–62.
17 Khamis AR, Elghobashy A, Shalaby H, Mahdy A. Anterior cruciate ligament reconstruction using peroneus longus tendon auto-graft: functional results. *Int J Res Orthop.* 2024;11(1):30–4.
18 Shetty SB, Kulkarni S, Laddha A, Gopinath M, Reddy A. Arthroscopic reconstruction of injured anterior cruciate ligament using peroneus longus graft with fixed loop endobutton: a prospective study. *J Orthop Case Rep.* 2024;14(10):225–9.
19 Angthong C, Chernchujit B, Apivatgaroon A, Katanyuta S, Angthong W. The anterior cruciate ligament reconstruction with the peroneus longus tendon: a biomechanical and clinical evaluation of the donor ankle morbidity. *J Med Assoc Thai.* 2015;98(6):555–60.
20 Wu S, Huang X, Liu X, Liu C, Yang L. Effectiveness comparison of anterior cruciate ligament reconstruction by long fibular muscle tendon and hamstring tendon. *Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi.* 2015;29(11):1358–63.