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EDITORIAL

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Rectus femoris tendon: An emerging option in ACL reconstruction

Abstract

Over the past decades, the search for the 'ideal' graft in anterior cruciate ligament (ACL) reconstruction has remained one of orthopaedic surgery's most enduring pursuits. Each generation of surgeons has witnessed new grafts and techniques emerge – only for most to find their rightful place somewhere between innovation and pragmatism. The sheer number of available options – bone–patellar tendon–bone, hamstring autografts, quadriceps tendon, peroneus longus and the many forms of allografts – is itself a reminder that no single graft is perfect. Each carries its own strengths and limitations, underscoring that no option fully satisfies the balance between biomechanical performance, donor-site morbidity, graft survival and functional recovery. This ongoing search for improvement keeps the door open for exploring new alternatives. In this context, a new and unexpected contender has quietly entered the scene.

KEYWORDS

anterior cruciate ligament, ligament reconstruction, rectus femoris graft, rectus femoris tendon

A NEWCOMER WITH FAMILIAR ROOTS

The rectus femoris tendon (RF) is not a stranger – it belongs to the same very well-known quadriceps complex – but its isolated use represents a different way of thinking. Rather than harvesting the full or partial thickness of the quadriceps tendon, this approach selectively retrieves the most superficial portion, allowing an isolated long graft that can be used in different configurations. It preserves the underlying quadriceps structure without requiring a bone block, offering a consistent soft-tissue graft with predictable dimensions and, so far, very low expected morbidity [2, 7]. This limited disruption of the extensor mechanism, since the superficial harvest leaves no significant defect to repair, may also reduce postoperative muscle inhibition and support a more balanced recovery [7].

In an era where minimising donor-site morbidity and maximising versatility are central goals, these attributes make the RF tendon an appealing option for surgeons looking to expand their graft portfolio.

FROM LABORATORY EVIDENCE TO CLINICAL APPLICATION

Early biomechanical work has shown that when folded to replicate clinical preparation, the RF tendon achieves a similar ultimate stress to the patellar tendon, suggesting comparable intrinsic tissue strength despite lower load-to-failure [5].

Also, a recent anatomical study has now clarified what early clinical reports had only suggested: the rectus femoris tendon can be harvested safely through a well-defined superficial layer that includes a consistent and identifiable safe zone for dissection [4].

The graft's total length allows preparation for ACL reconstruction with diameters ranging from approximately 8.8 mm (double-strand) to 11.4 mm (quadruple-strand), making it suitable for both primary and revision procedures, not only for the ACL but also for the posterior cruciate ligament, which typically requires a more robust graft. In addition, its consistent dimensions permit combined reconstruction of the ACL and peripheral reinforcements, such as the anterolateral ligament or the anterior oblique ligament, using a single harvest (Figure 1). These findings provide the anatomical validation that complements previous biomechanical and clinical data, confirming the rectus femoris tendon as a reproducible and anatomically reliable graft source [4].

Abbreviations: ACL, anterior cruciate ligament; ALL, anterolateral ligament; RF, rectus femoris tendon.

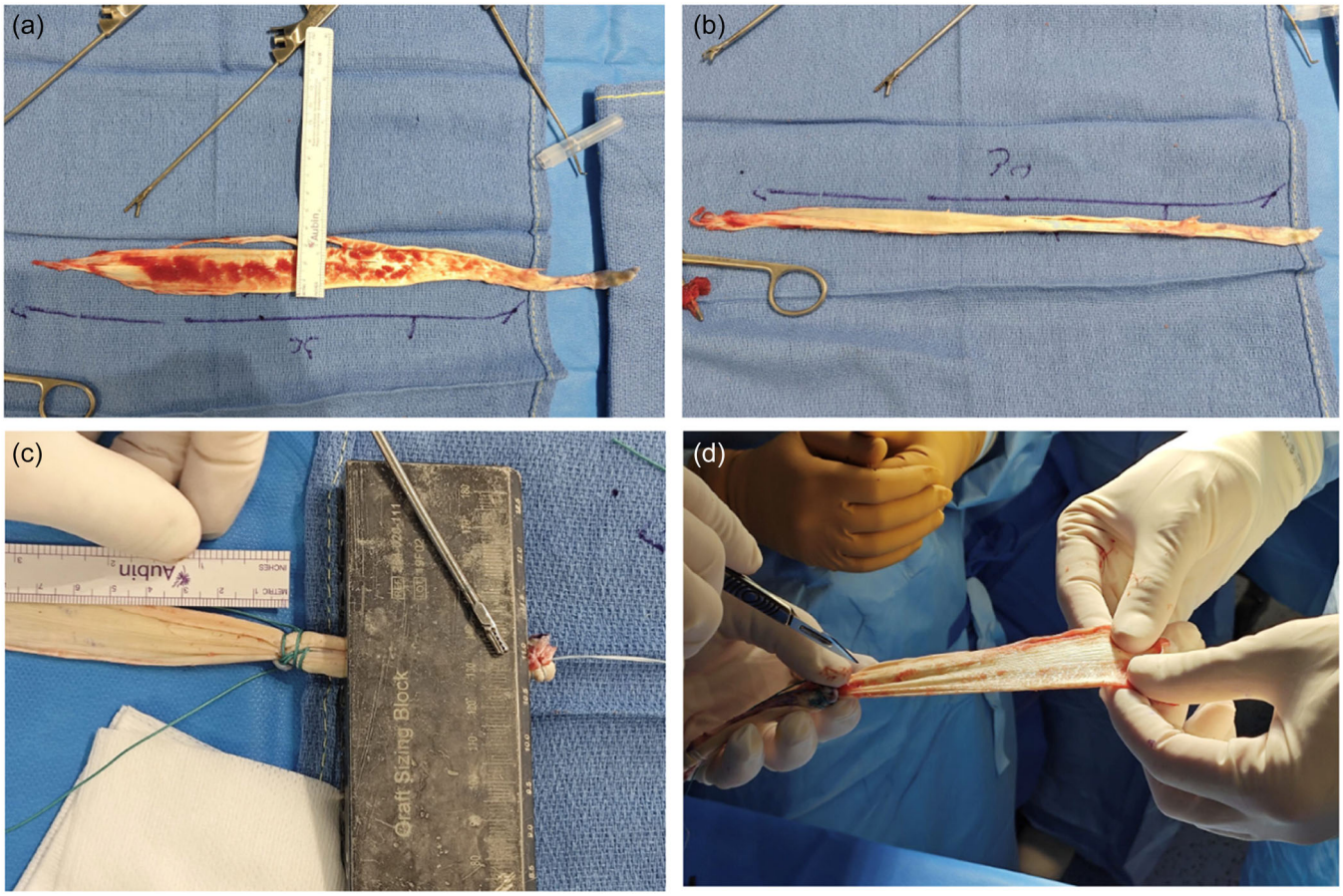

FIGURE 1 Preparation of the rectus femoris tendon graft for combined anterior cruciate ligament (ACL) and anterolateral ligament (ALL) reconstruction using a single harvest. (a and b) Tendon cleaning and measurement after harvest. (c) Measurement of the folded graft for ACL reconstruction. (d) Final preparation showing the double-folded ACL graft and the remaining strand used for anterolateral ligament reconstruction.

Clinically, the RF graft stands out for its versatility. With an average length of around 30 cm and an adaptable configuration, the graft allows surgeons to tailor it to patient anatomy and perform combined procedures, without the need for additional donor sites [1, 2, 6, 8]. Initial clinical reports have been encouraging. Recent series have demonstrated that the RF can be safely used in revision ACL reconstruction, with satisfactory short-term outcomes and low donor-site morbidity [2]. Comparative data have also shown similar patient-reported results to those obtained with hamstring grafts, supporting its feasibility as an alternative when conventional autografts are unavailable or previously used [3].

Recent evidence has also begun to address one of the key concerns regarding quadriceps harvest and early strength recovery. A comparative isokinetic study found no significant differences in quadriceps performance six months after ACL reconstruction using rectus femoris versus hamstring tendon autografts, suggesting that superficial harvest of the rectus femoris does not impair early extensor recovery or alter neuromuscular activation patterns [7].

While these early results are promising, long-term evidence is still limited. Larger prospective studies with adequate follow-up are required to confirm the durability of these outcomes and to establish more precise indications for its use.

THE PROMISE AND THE CHALLENGE

Like any innovation that captures surgical attention, the rectus femoris graft must prove more than feasibility. Its early results are encouraging and the technique appears both safe and reproducible. Yet the real test lies beyond technical success – whether these characteristics can translate into consistent long-term performance, lower failure rates and improved return-to-sport outcomes.

As exploration of alternative soft-tissue grafts continues, the rectus femoris tendon stands out as an anatomically consistent and surgically reproducible option – an elegant reminder that innovation often begins with a closer look at what we already know.

A PERSONALISED FUTURE

The future of ligament reconstruction is moving toward patient-specific graft selection. The rectus femoris tendon may not represent a revolution, but it introduces a meaningful new option within that personalised framework. Its intrinsic strength, adaptable geometry and soft-tissue composition make it a valuable addition to the surgeon's repertoire. Its characteristics combine the ease of handling of a long soft tissue graft like the hamstrings, with histology and strength similar to the quadriceps tendon and biomechanical characteristics of the patellar tendon. One could say it's the ideal scenario if it proves effective in the near future.

Progress in ACL surgery rarely comes from abandoning tradition—it comes from expanding choice. Perhaps the question is not whether the rectus femoris graft will replace established options, but whether it challenges us to reconsider what truly defines the 'ideal' graft. The rectus femoris graft illustrates this evolution: a familiar structure reimagined to meet the demands of modern knee surgery. For now, this 'new kid on the block' deserves both enthusiasm and scrutiny – the kind of balanced curiosity that transforms potential into evidence.

ETHICS STATEMENT

Not applicable.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

Tomas Pineda[1,2]
Etienne Cavaignac[3]
Thomas Neri[4]
Sergio Canuto[5]
Camilo Helito[6,7]
Matthieu Ollivier[8]

[1]*Universidad Andrés Bello, Hospital del Trabajador, Facultad de Medicina, Santiago, Chile*
[2]*Universidad Finis Terrae, Hospital el Carmen, Facultad de Medicina, Santiago, Chile*
[3]*Clinique Universitaire du Sport, Centre Hospitalier Universitaire de Toulouse (CHU), Toulouse, France*
[4]*Service de Chirurgie Orthopédique et Traumatologique, Hospices Civils de Lyon, Centre Hospitalier Lyon Sud, Lyon, France*
[5]*Ortoclínica hospital de Ortopedia, Maceió, Brazil*
[6]*Hospital Sírio Libanês, São Paulo, São Paulo, Brazil*
[7]*Grupo de Joelho, Instituto de Ortopedia e Traumatologia, Hospital das Clínicas HCFMUSP, Faculdade de Medicina da Universidade de São Paulo, São Paulo, Brazil*
[8]*APHM, CNRS, ISM, Inst Movement Sci, Sainte-Marguerite Hospital, Aix Marseille University, Marseille, France*

Correspondence
Tomas Pineda, Hospital del Trabajador, Orthopaedic Surgery Department, Ramón Carnicer 185, Santiago 7501239, Chile.
Email: tpinedarojas@gmail.com

ORCID

Tomas Pineda https://orcid.org/0000-0002-9537-0658
Matthieu Ollivier https://orcid.org/0000-0002-6910-0873

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