

Isolated Tear of the Vastus Lateralis Tendon: A Rare Case Managed Conservatively

Stavros Lykos¹, Konstantinos Tsivelekas¹, Dimitrios Pallis¹, Margarita-Michaela Ampadiotaki¹,
Stamatios A Papadakis¹

Learning Point of the Article:

This case highlights the rarity and diagnostic challenges of isolated vastus lateralis tendon ruptures, emphasizing the effectiveness of tailored non-surgical rehabilitation plans in achieving full functional recovery and guiding clinicians in providing optimal, individualized care.

Abstract

Introduction: Isolated ruptures of the vastus lateralis (VL) tendon are exceptionally rare, with few reported cases in the orthopedic literature. This case report sheds light on non-surgical management for partial VL tendon ruptures, providing insight into an alternative treatment pathway that avoids surgical intervention.

Case Report: A 27-year-old Caucasian male experienced a partial, isolated rupture of the VL tendon after a minor fall. The injury was confirmed through magnetic resonance imaging at the lateral patellar insertion. The patient displayed no knee instability and was treated conservatively with platelet-poor plasma injections, a hinged knee brace, and targeted physiotherapy.

Conclusion: This case illustrates that conservative treatment can be effective for patients with isolated partial VL tendon ruptures, particularly when knee stability is maintained. The patient achieved full activity recovery within 6 months, highlighting the potential of non-surgical options to provide successful outcomes in similar cases. This report enriches our understanding of tendon injury management and emphasizes the clinical viability of conservative strategies, potentially influencing treatment decisions for similar orthopedic injuries.

Keywords: Vastus lateralis rupture, conservative management, orthopedic rehabilitation.

Introduction

Quadriceps tendon ruptures at the patella's superior pole are relatively rare but significant injuries that often necessitate surgical intervention for knee extension restoration. These ruptures, with an incidence of 1.4/100,000, typically result from eccentric loading and forced knee extension [1]. Increased risk factors include age over 40, obesity, and systemic conditions such as diabetes, chronic renal failure, rheumatoid arthritis, and systemic lupus erythematosus, along with the use of steroids or fluoroquinolones. Isolated ruptures of the vastus medialis (VM),

vastus intermedius (VI), or vastus lateralis (VL) muscles are exceedingly rare, with only a handful of cases documented in the literature [2-4]. This article presents a unique case of isolated VL tendon rupture, underscoring the anatomical and functional significance of the VL in knee stability and patella tracking, facilitated by its integration into the quadriceps tendon and attachment to the lateral patella aspect. Magnetic resonance imaging (MRI) is the preferred diagnostic modality for these types of injuries. Particularly, to our knowledge after reviewing the literature, isolated rupture of the VL tendon has been reported only in three cases [2,5,6].

Author's Photo Gallery



Dr. Stavros Lykos



Dr. Konstantinos Tsivelekas



Dr. Dimitrios Pallis



Dr. Margarita-Michaela
Ampadiotaki



Dr. Stamatios A Papadakis

Access this article online

Website:
www.jocr.co.in

DOI:
<https://doi.org/10.13107/jocr.2024.v14.i08.4686>

¹B' Department of Orthopaedics, KAT General Hospital of Attica, Athens, Greece.

Address of Correspondence:

Dr. Stavros Lykos,

^{B'} Department of Orthopaedics, KAT General Hospital of Attica, Athens, Greece.

E-mail: lykosstavros@gmail.com

Submitted: 09/05/2024; Review: 23/05/2024; Accepted: June 2024; Published: August 2024

DOI: <https://doi.org/10.13107/jocr.2024.v14.i08.4686>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License <https://creativecommons.org/licenses/by-nc-sa/4.0/>, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms

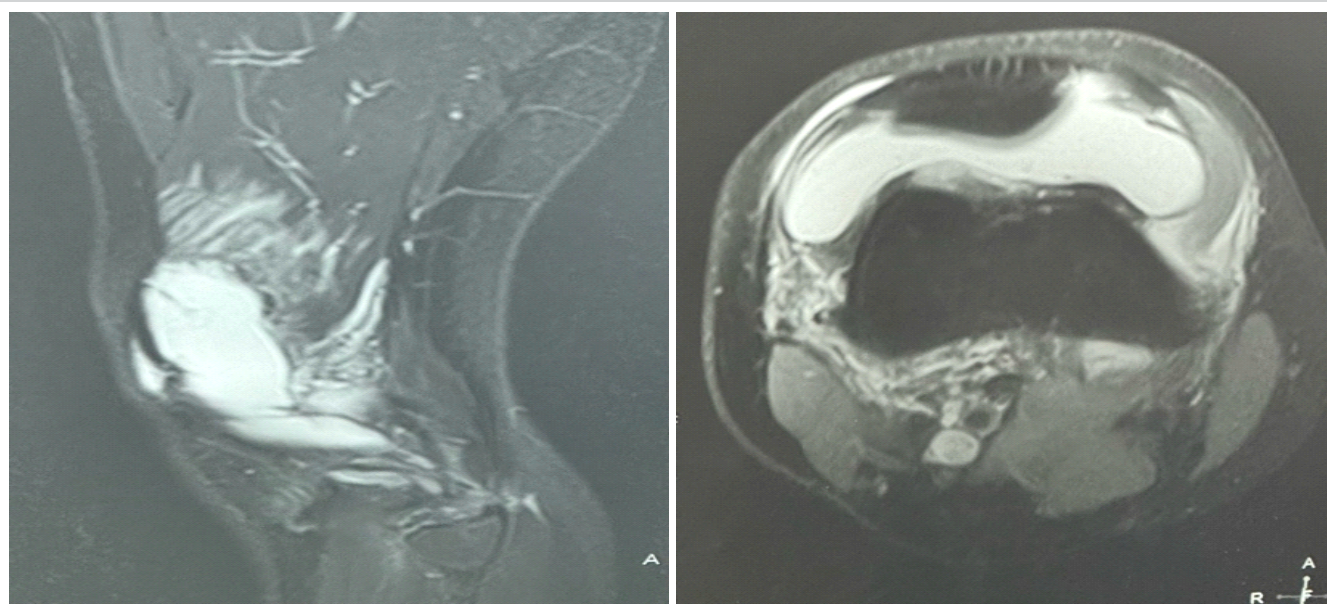


Figure 1: Fat saturated sagittal and axial view showing the partial rupture of vastus lateralis.

Anatomically, distal fibers of the VL connected with those from rectus femoris (RF), VL, and VM are attached to the superior pole of the patella forming the common quadriceps tendon [1]. Besides that, VL assists with proper patella tracking and stability, since several fibers are attached to the lateral aspect of the patella forming the lateral patellar retinaculum [7]. The purpose of this article is to provide a detailed account of an isolated VL tendon rupture managed conservatively, illustrating the potential for successful outcomes without surgical intervention, thereby expanding the understanding and approach to treating such rare injuries.

Case Report

A 27-year-old non-smoking male presented with mild knee pain following a fall from standing height a month prior. Despite being able to bear weight, he reported pain after walking long distances and during squatting exercises. Clinical examination revealed mild swelling on the knee's medial side and lateral tenderness with no palpable defects in the quadriceps tendon. Diagnostic tests, including anterior drawer, McMurray, and Lachman tests, were negative, with no patellar instability, and both active and passive ranges of motion were normal. Laboratory tests were within normal limits.

Radiological assessments including anteroposterior and lateral knee X-rays revealed no osseous pathology, with an Insall–Salvati ratio of 1.01. A Merchant view X-ray was employed to assess lateral patellar tilt. The lateral patellofemoral

angle, congruence angle, and sulcus angle were measured at 13°, –4°, and 138°, respectively. Trochlea was assessed as Type A according to Dejour's classification [8]. Ultrasound imaging identified a hypoechoic gap in the VL tendon's distal aspect. Subsequent MRI confirmed this finding, identifying a partial rupture of the VL tendon at its lateral patellar insertion, whereas the adjacent fibers remained intact (Fig. 1).

Treatment and rehabilitation

Given the patient's late presentation after the initial injury, along with a normal range of motion (ROM) and no signs of patellar instability, a conservative treatment approach was chosen. This included a platelet-poor plasma (PPP) injection to aid the healing of the VL rupture and a suggestion for physical therapy, incorporating augmented blood flow restriction therapy (BFRT). A hinged knee brace was initially applied for 4 weeks to facilitate healing while allowing partial weight-bearing. The brace settings were adjusted weekly to increase knee flexion progressively: 0–30° during the first 2 weeks, 30–60° in the 3rd week, and 60–90° in the 4th week. After this period, the brace was adjusted to allow unrestricted movement and full weight-bearing. The brace was completely removed at the end of the 8th week, setting the stage for an intensive physiotherapy regimen aimed at restoring full ROM, strength, and proprioception. After 6 months of regular follow-up, the patient had fully recovered, demonstrating complete knee function restoration and a gradually return to pre-injury activity levels.

Discussion

Ruptures of the quadriceps tendon, although infrequent, are well-documented injuries. These typically involve the tendon's osseous attachment on the superior pole of the patella, manifesting as full-thickness tears accompanied by impairment of the extensor apparatus. Surgical reconstruction is predominantly undertaken to restore knee extension. [1] However, partial tears, particularly isolated ruptures of the VM, VL, or VI tendons, are exceedingly rare [9]. Partial tears are most commonly reported in the VI tendon, whereas complete tears usually involve the VL, VM, and RF tendons [2,5,6,10]. Isolated ruptures of the VL tendon are notably scarce and to our knowledge with only three documented cases in the literature, in addition to two cases concerning mid-substance VL tears.

Diagnosing partial tears or isolated ruptures present challenges both clinically and radiologically, due to the overlay of the intact RF and potentially intact extensor apparatus [11]. At present, MRI is the primary imaging modality, offering detailed insights for identifying rupture patterns and guiding treatment [2]. Ultrasound can provide valuable information for complete tears; therefore, real-time dynamic scanning is often the initial diagnostic approach in several instances [12]. Nevertheless, the diagnostic utility of ultrasound may be compromised for partial tears due to their potential oversight.

Traditionally, quadriceps tendon ruptures are managed surgically, with various techniques described, including suture repair, bony suture tunnels, suture anchors on the patella, and the Scuderi and Codivilla techniques for augmentation in the repair of chronic tears [6,13]. Conversely, the management of partial or isolated tears lacks consensus due to the rarity of such cases. Previously, three cases of VL tendon rupture were managed surgically, with two cases involving high-demand weightlifters treated with the suture anchor technique. Phadnis et al. and Johnson et al. reported two cases of high-demand weightlifters treated with the suture anchor technique [2,6]. Notably, Phadnis et al. initially performed a conservative treatment given the extensor apparatus and ROM integrity, which turned into surgery 1 year later due to 20–30% power loss on weightlifting [6]. Moreover, Frank et al. mentioned a suture anchor repair of a complete rupture of the VL tendon in 49-year-

old patients suffering an indirect mechanism of injury [5]. Miles et al. reported two cases of young athletes who were treated surgically for mid-substance VL tears [10]. In our case, conservative treatment was decided due to extensor apparatus integrity and lack of patellar instability and augmented with PPP and BFRT. Previously, EliceGUI et al. described the PPP and BFRT conservative therapy for the management of midsubstance isolated VM rupture achieving full recovery [4].

Conclusion

Isolated ruptures of the VL tendon are notably rare, presenting a significant challenge in determining the most effective management strategy. This study highlights the potential of conservative treatment strategies to yield valuable outcomes, facilitating full recovery, and a return to pre-injury levels of activity. Furthermore, in scenarios where surgical intervention becomes indispensable, reconstruction has demonstrated markedly enhanced results, particularly for individuals with high-demand physical activities, including athletes. The documentation of this exceedingly uncommon case of a partial VL tendon rupture aims to enhance understanding and awareness of the diagnostic intricacies and the efficacy of conservative treatment approaches in managing such rare injuries. This case contributes important insights to the existing body of knowledge, underscoring the significance of tailored treatment strategies to achieve optimal patient outcomes.

Clinical Message

This case report demonstrates the potential of conservative management in treating partial, isolated ruptures of the VL tendon, a rare and often challenging injury. Highlighting a successful outcome without surgical intervention, this report suggests that similar injuries can be effectively managed with a conservative approach, especially when surgical risks are considered or when surgery is not feasible. This case encourages clinicians to consider conservative strategies, such as PPP injections and controlled physiotherapy, in similar clinical scenarios, potentially broadening treatment options in orthopedic practice.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Pope JD, Plexousakis MP. Quadriceps tendon rupture. In: StatPearls. Treasure Island, FL, USA: StatPearls Publishing; 2018.
2. Johnson P, Digiovanni R, Nguyen T. Isolated vastus lateralis rupture and repair using suture anchor technique. *Case Rep Orthop* 2020;2020:9617303.
3. Pallis D, Tsivelekas K, Nikolakakos P, Ampadiotaki MM, Kokkinis C, Papadakis SA. Complete disruption of vastus intermedius tendon and partial rupture of vastus medialis tendon. *J Surg Case Rep* 2023;2023:rjad351.
4. Elicegui S, Stovak M, Dobrich J, Hodges JJ, Sekhon V, Dolan C. Traumatic mid-substance isolated vastus medialis rupture in a young athlete: A case report. *JBJS Case Connect* 2023;13
5. Frank JM, Riedel MD, McCormick FM, Nho SJ. Isolated vastus lateralis tendon avulsion. *Am J Orthop (Belle Mead NJ)* 2013;42:464-5.
6. Phadnis J, Trikha PS, Wood DG. Isolated avulsion of the vastus lateralis tendon insertion in a weightlifter: A case report. *Cases J* 2009;2:7905.
7. Waligora AC, Johanson NA, Hirsch BE. Clinical anatomy of the quadriceps femoris and extensor apparatus of the knee. *Clin Orthop Relat Res* 2009;467:3297-306.
8. Kazley JM, Banerjee S. Classifications in brief: The Dejour classification of Trochlear dysplasia. *Clin Orthop Relat Res* 2019;477:2380-6.
9. Falkowski AL, Jacobson JA, Hirschmann MT, Kalia V. MR imaging of the quadriceps femoris tendon: Distal tear characterization and clinical significance of rupture types. *Eur Radiol* 2021;31:7674-83.
10. Miles RN, Schroeder JD, Creech JA, Hulsopple C, Higgins DL. Midsubstance vastus lateralis tear in the young athlete: Case report and a review of the literature. *Clin J Sport Med* 2023;33:280-2.
11. Thompson SM, Bird J, Somashekar N, Dick E, Spicer D. Investigation and treatment for isolated vastus intermedius rupture. *Injury Extra* 2008;39:232-4.
12. Foley R, Fessell D, Yablon C, Nadig J, Brandon C, Jacobson J. Sonography of traumatic quadriceps tendon tears with surgical correlation. *J Ultrasound Med* 2015;34:805-10.
13. Bushnell BD, Whitener GB, Rubright JH, Creighton RA, Logel KJ, Wood ML. The use of suture anchors to repair the ruptured quadriceps tendon. *J Orthop Trauma* 2007;21:407-13.

Conflict of Interest: Nil

Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

How to Cite this Article

Lykos S, Tsivelekas K, Pallis D, Ampadiotaki M, Papadakis SA. Isolated Tear of the Vastus Lateralis Tendon: A Rare Case Managed Conservatively. *Journal of Orthopaedic Case Reports* 2024 August;14(8): 164-167.

