

Case Report

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DEGLOVING INJURY OF THE RECTUS FEMORIS MUSCLE: TWO CASES WITH RADIOLOGICAL FINDINGS

Ali Salbas¹  & Aslı Irmak Akdoğan¹ 

¹ İzmir Katip Çelebi University, Atatürk Training and Research Hospital, Department of Radiology, İzmir, Türkiye

A. S. 0000-0002-6157-6367

A. I. A. 0000-0002-6262-1799

Correspondence

Ali Salbas, dralisalbas@gmail.com

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Abstract

Rectus femoris muscle is one of the most commonly injured components of the quadriceps, especially in athletes. Due to its unique bipennate and unipennate structure, it is prone not only to classical myotendinous injuries but also to an uncommon pattern known as "intramuscular degloving injury". This injury refers to the dissociation between the superficial unipennate and inner bipennate components of the muscle. In this report, two male patients presented with anterior thigh pain and swelling following physical activity. Magnetic resonance imaging (MRI) revealed fluid collection between the muscle layers, haemorrhagic signal intensities on T1-weighted images, and central tendon retraction in both cases. Based on clinical and radiological findings, the diagnosis of intramuscular degloving injury of the rectus femoris was established. Both patients were conservatively managed and achieved symptomatic improvement. These cases highlight the significance of MRI in detecting this rare lesion and emphasise that such injuries may also affect non-athletic individuals.

Keywords

Rectus femoris • Muscle injuries • Magnetic resonance imaging • Thigh • Degloving injuries

INTRODUCTION

The rectus femoris muscle is one of the most frequently injured components of the quadriceps, particularly in athletes (1). Owing to its dual origin and long intramuscular tendon, it has a complex "muscle within a muscle" architecture. This structure predisposes it not only to classic myotendinous junction injuries but also to a rare pattern known as "intramuscular degloving injury" (2, 3). It involves dissociation between superficial unipennate and deep bipennate fibres and may show haemorrhagic content on T1-weighted magnetic resonance imaging (MRI) (2).

Clinically, it typically presents with acute thigh pain and swelling and may be misinterpreted as a conventional quadriceps strain. Therefore, MRI plays a key role in accurate diagnosis. However, despite its characteristic imaging features, this pattern has not yet been incorporated into current muscle injury classification systems, which may contribute to diagnostic uncertainty (2).

CASE REPORT

Case 1

A 28-year-old male with no systemic dis-

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ease presented with localised anterior thigh pain after sudden acceleration during a fast-paced run. As symptoms persisted, he sought medical attention. Physical examination revealed anterior thigh swelling and tenderness.

Magnetic resonance imaging showed fluid accumulation between the rectus femoris fibres at the proximal and mid-thigh levels. T1-weighted images demonstrated hyperintense areas suggestive of haemorrhagic content, retraction of the inner bipennate component and central aponeurosis, and diffuse peripheral oedema. Based on the clinical and radiological findings, an intramuscular degloving injury of the right rectus femoris was diagnosed. The patient was treated with nonsteroidal anti-inflammatory medication and activity modification. No follow-up imaging was performed; telephone follow-up at approximately one year confirmed complete symptom resolution without recurrence or functional limitation. Relevant MRI images are shown in Figure 1.

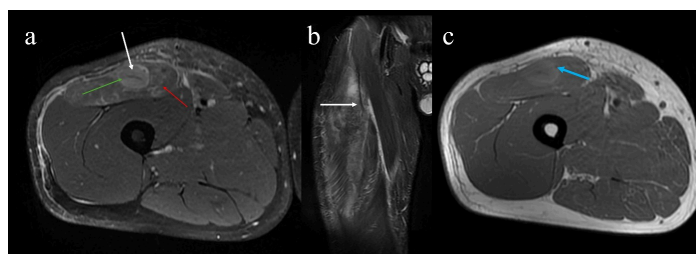


Figure 1. Axial a. and coronal b. fat-suppressed T2-weighted MR images of a 28-year-old male with anterior thigh pain show the inner bipennate myotendinous complex (green arrow) and the outer unipennate portion (red arrow) of the rectus femoris muscle. A minimal amount of fluid is observed between these two components. Both components demonstrate increased signal intensity consistent with intramuscular edema. The central aponeurosis (intramuscular septum) is visible in the center of the inner muscle (white arrow). Compared to the second case, the extent of edema and fluid accumulation is more limited. On the T1-weighted axial image without fat suppression c. hyperintense areas are seen between the inner and outer components, possibly indicating hemorrhagic fluid (blue arrow)

Case 2

A 19-year-old male with no known comorbidities presented with a 1-day history of localised anterior thigh pain and swelling following a recreational indoor football match. Examination revealed right thigh enlargement, tenderness, and a palpable mass.

Magnetic resonance imaging demonstrated extensive fluid accumulation and oedema between the muscle fibres throughout the rectus femoris muscle, predominantly in the proximal and mid portions. Retraction of the inner bipennate component was noted, along with hyperintense signal areas on T1-weighted sequences suggestive of haemorrhagic content. The patient was diagnosed with an intramuscular degloving injury of the rectus femoris muscle and treated with nonsteroidal anti-inflammatory therapy and activity restriction. At the 1-month follow-up, the patient reported near-complete resolution of symptoms. Telephone follow-up at

approximately 15 months confirmed sustained clinical improvement without recurrence. MRI images related to the case are shown in Figure 2. Informed written consent was obtained from both patients for the publication of this case report and accompanying images.

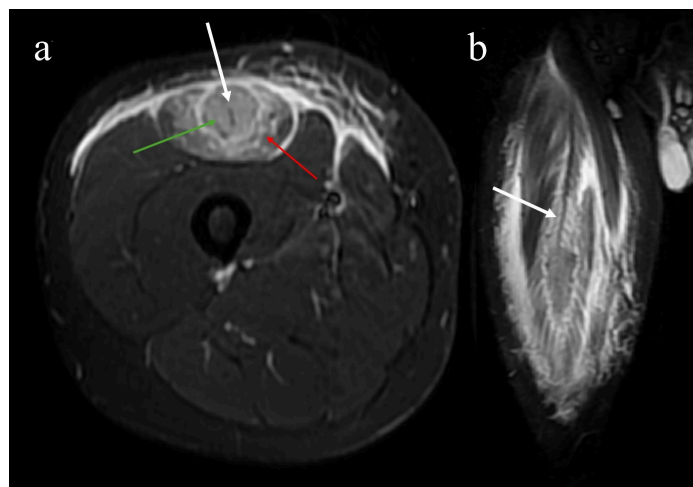


Figure 2. A 19-year-old male with intramuscular degloving injury of the rectus femoris muscle. a. Axial fat-suppressed T2-weighted MR image shows separation of the inner bipennate myotendinous complex (green arrow) from the outer unipennate muscle fibers (red arrow) by fluid encircling the bipennate portion. Intramuscular edema is present in both the inner and outer components, seen as increased signal intensity. The central aponeurosis (intramuscular septum) is observed in the center of the inner muscle (white arrow). b. Coronal fat-suppressed T2-weighted image demonstrates extensive intramuscular edema and fluid extending along the length of the rectus femoris. Prominent edema is also noted in the adjacent soft tissue planes.

DISCUSSION

The complex anatomy of the rectus femoris predisposes it to injury patterns that may not fit existing classification systems. Traditional muscle strain classifications may not adequately describe this lesion. The characteristic “muscle-within-a-muscle” architecture suggests that intramuscular degloving injury could be considered a distinct anatomical pattern. Because its clinical course and response to conservative care often resemble Grade II strains, it may be classified as a specific subtype, which could reduce diagnostic uncertainty while remaining consistent with established treatment protocols.

To clarify the relevant microanatomy, the indirect head of the rectus femoris originates from the superior acetabular ridge and continues distally as the central aponeurosis (central tendon). This structure serves as the attachment site for the inner bipennate component. In intramuscular degloving injuries, separation occurs between this inner bipennate component and the surrounding outer unipennate fibres, which originate from the direct tendon. This configuration has been described as a “muscle within a muscle” appearance (2, 4). The term degloving refers to partial or complete dissociation of the inner muscle belly from the outer muscle tissue, regardless of retraction.

Magnetic resonance imaging plays a central role in diagnosis by demonstrating dissociation between the superficial unipennate

and deep bipennate fibres. However, this injury pattern is not included in current muscle injury classification systems, which may contribute to diagnostic uncertainty. Conservative management is generally preferred and typically includes rest, activity modification, nonsteroidal anti-inflammatory drugs (NSAIDs), and progressive physiotherapy, with favourable outcomes and return to activity within 8–12 weeks in reported cases (5, 6). In our cases, central tendon retraction and haemorrhagic content did not require surgical intervention, and both patients improved with conservative treatment. Although these MRI findings are important for diagnosis, they may not independently indicate poor prognosis. Further data are needed to clarify the relationship between specific imaging features and clinical recovery across different age groups and athletic populations (5–7).

Our cases share similarities with previously reported cases. Kassarian et al. described eight young male soccer players (aged 15–22) with this injury pattern and reported a mean return-to-play time of 39 days, emphasising the characteristic MRI finding of fluid circumferentially separating the bipennate and unipennate portions (2). Although our patients were not elite athletes, similar MRI features, including dissociation, haemorrhagic content, and retraction, were observed. Mallick and Anshul reported a professional football player with comparable MRI findings and highlighted the potential for misdiagnosis as a typical strain, reinforcing the importance of MRI in recognising this entity (7). Consistent with this, our second case initially presented with nonspecific symptoms and was diagnosed following MRI.

Most existing reports focus on elite professional athletes (2, 7). However, our cases indicate that this pattern can also occur in recreational players and non-athletic individuals, suggesting that dissociation between the bipennate and unipennate fibres may develop even during less strenuous activity. Recognising this broader clinical spectrum is important because these injuries may otherwise be misclassified as simple strains.

Clinicians should maintain a high index of suspicion for this rare injury pattern in any patient presenting with anterior thigh pain after physical activity, regardless of athletic background. MRI should be considered particularly when symptoms are disproportionate or when response to initial conservative treatment is suboptimal. Further reports and systematic studies are needed to better define diagnostic criteria and management.

CONCLUSION

Intramuscular degloving injury of the rectus femoris is a rare condition that can occur in both athletes and non-athletic individuals. Awareness of this pattern may prevent misclassification as a simple strain. MRI is crucial for accurate diagnosis and supports appropriate conservative management.



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Conflict of Interest The authors have no conflict of interest to declare.

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