



## Case study

## Calf injuries in professional football: Treat the patient or the scan? – A case study



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## ABSTRACT

**Objective:** To describe a case of a professional football player with significant imaging findings despite a rather innocuous clinical presentation with gradual onset of calf pain and who was able to continue training and playing with minor medical intervention. To discuss some of the limitations of existing muscle injury grading systems and their potential to cover the full range of injury presentations for calf injuries.

**Design:** Case report.

**Setting:** A professional football player was assessed by physical examination, clinical testing and imaging (MRI) after a gradual onset of a calf injury. After returning to training and competition, a follow-up of his symptoms was performed with regular ultrasound imaging assessments.

**Participant:** A professional football player (35 years, 1.90 m, 88 kg) male, African, striker, playing in the Professional Arabian Gulf League.

**Conclusion:** The discordance between the clinical presentation and the imaging findings resulted in a challenging situation regarding the decision of whether to allow the player to train and compete. In addition, existing muscle injury grading systems do not seem to cover the full range of injuries seen in clinical practice.

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## 1. Introduction

Calf injuries constitute a challenging situation for players and medical staff in professional football. Ekstrand, Häggglund, and Walden (2011), in a study comprising of 51 football teams, reported that calf injuries comprised 13% of all muscle injuries in football.

Several muscles from the leg's posterior and postero-medial compartment can be affected when a calf injury is reported. Among these structures the medial gastrocnemius tear (also called "tennis leg") appears to be the most common injury, and refers to an injury of the musculotendinous (myotendinous) junction of the medial gastrocnemius muscle. The latter injury, although reported in football, is more typically seen in middle aged athletes practicing racquet sports (Campbell, 2009; Gilbert, Bullis, & Griffiths, 1996).

The soleus, the plantaris or the flexor hallucis longus muscles have also been described in the aetiology of calf injuries, albeit with a smaller incidence than the gastrocnemius tears (Campbell, 2009).

Medial gastrocnemius tears normally present as a sudden onset of pain involving an eccentric contraction during athletic performance (Garret, 1996). This sudden onset of pain and subsequent

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functional impairment is typical of the higher grade injuries. From the moment of injury, the athlete normally presents severe incapacity and athletic activity is immediately suspended (Campbell, 2009). Conversely, injuries with gradual onset, such as those related to the soleus, are usually less severe injuries and cause little functional impairment (Dixon, 2009).

Calf injuries are diagnosed with a combination of clinical testing and imaging. Loss of plantar flexion power due to pain in heel raise activities and loss of pain free dorsiflexion range of motion along with pain during walking are some of the most common symptoms and signs. Imaging can be performed using ultrasonography and magnetic resonance imaging (Bianchi, Martinoli, Abdelwahab, Derchi, & Damiani, 1998; Helms, Fritz, & Garvin, 1995; Kwak, Lee, & Han, 2006; Menz & Lucas, 1991). Given the accessibility to ultrasound on or near the playing field, this is often the initial imaging modality. However, the accuracy of ultrasound in the first 24–48 h of muscle injury is variable (Balius, Rius, & Combalá, 2015). As such, many of these injuries, even if diagnosed by ultrasound, are then evaluated with MRI to better define the exact site and extent of the injury as well as to determine any associated injuries. However, although generally reliable, incidental findings on MRI have been observed in asymptomatic patients (Saxena, Luhadiya, Ewen, & Goumas, 2011).

The vast majority of calf injuries are treated non-operatively, and the rehabilitation period usually lasts a few weeks, depending on injury severity (Blue & Matthews, 1997; Hamilton, Klostermeier, Lim, & Moulton, 1997). However in some cases full return to sports may not occur for 3–4 months, especially in high-grade gastrocnemius injuries (Blue, 1997; Kwak et al., 2006).

Muscle injury grading also constitutes a challenging and controversial issue in sports medicine, with novel classification systems being proposed recently, based on a combination of clinical signs and symptoms, injury mechanism and imaging (Mueller-Wohlfahrt et al., 2013; Pollock, James, Lee, & Chakraverty, 2014), or using imaging analysis in isolation (Chan, Del Buono, Best, & Maffulli, 2012), in an attempt to complement the most common but probably also most incomplete injury grading system existent to date (O'Donoghue, 1962). However, despite the positive contribution of these proposed systems, muscle injuries constitute a complex subject in sports medicine considering the fact that the type of muscle, anatomical location of the injury within the muscle, injury mechanism and probably the individual biomechanics of the athlete may be relevant in determining prognosis and availability to train and play. For this reason, finding a broad grading system that covers all types of muscle injuries may be a challenging task, as already referred to by Tol, Hamilton, and Best (2013) in an editorial to the Munich consensus statement (Mueller-Wohlfahrt et al., 2013), and recently by Hamilton et al. (2015).

Currently limited research is available regarding calf injuries in professional football. Understanding the importance of the injury mechanism alongside with the clinical signs and symptoms of the player, the exact location of the injury and the imaging features may be fundamental in the decision making process regarding players' availability to train and compete. The process of determining whether a player is apt to train and compete is challenging and often confusing, particularly when there is a discordance between the imaging findings and the clinical signs and symptoms. One common such situation arises when the imaging findings seem more severe than the clinical findings.

The main aim of this case report is to complement the existent information on calf injuries in football, and to show how anatomical variation in the injury location and gradual onset of symptoms despite the presence of significant imaging findings may allow the athlete to maintain his availability for training and competition. As a secondary aim, this study revisits the existing grading systems on

muscle injuries and their applicability to the broad spectrum of these types of injuries.

## 2. Methods

### 2.1. Participant

A professional football player (35 years, 1.90 m, 88 Kg) male, African, striker, playing in the Professional Arabian Gulf League is the subject of this study. The player has a past history of right knee ACL surgery, and no other known injuries. Average season competition for the past 3 years was 40 games per season and more than 95% training availability throughout the same period.

Informed consent was obtained from the player and the club he represented.

### 2.2. Clinical information

The player referred himself to the medical department of the club with minor complaints arising in the region of the proximal tendon of the medial head of the left gastrocnemius muscle. No history of trauma during training or sudden pain episodes were reported, and symptoms presented with a gradual onset with the accumulation of training and game time.

On clinical examination, range of motion of standing ankle dorsiflexion lunge with knee flexion and knee straight was symmetric compared with the contralateral side with minimum discomfort at the end range in the mentioned area on the affected side. Resistive tests like single leg heel raises with knee straight and bent and repetitive hopping were symmetric in power and repetitions to fatigue, also with minor complaints arising from the left proximal medial gastrocnemius head. The medial head of the left gastrocnemius head was tender on palpation proximally, with no further areas of pain.

### 2.3. Injury imaging and grading

After seven days of persistent minor complaints, and after 90 minutes of competition, the clinical features changed with the player presenting a visible swelling in his left calf, which, despite the absence of other changes in his clinical presentation, motivated the imaging exploration of the injury. A non-contrast MRI was obtained on a 1.5T machine using standard FSE T1-weighted, T2-weighted (with and without fat suppression), and fat-suppressed proton density weighted and STIR sequences (Fig. 1).

For the purpose of this study two radiology specialists were consulted for imaging analysis. The consultants identified a large  $5 \times 4 \times 1.6$  cm complex fluid collection most consistent with haemorrhage between the superficial fascia and the mid and lower thirds of the medial margin of the medial gastrocnemius muscle, with no actual fibre disruption. This collection was cranial to the classic location of the distal myotendinous/myofascial injuries of the medial head of the gastrocnemius and was causing mass effect on the underlying muscle belly. Also, both specialists identified old myofascial scarring proximally in the medial gastrocnemius muscle which may have predisposed to shearing stress along the myofascial muscle surface, potentially leading to the present injury presentation. No signs of acute muscle belly injury were noted by either of the consultants. On both radiologists' opinions another possible cause of the bleeding observed on the MRI could have been direct trauma in that region causing a disruption in a perforating vessel and consequent bleeding between fascial planes. However, considering the fact that the player had no history of direct trauma, and that the onset of symptoms was gradual, this seemed to be a less plausible cause.

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