PRONATOR TERES RUPTURE IN A RECREATIONAL TENNIS PLAYER

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ABSTRACT

A pronator teres lesion is a relatively uncommon sports injury often associated with a stroke and/or hit traumatic mechanism, and only reported in cricket and golf contexts. Herein we present an unusual case of pronator teres rupture in an amateur tennis player with a forehand stroke mechanism, including the diagnostic process and the approach. The patient presented to our facilities complaining of right anterior forearm tightness and pain. The clinical presentation was confirmed by magnetic resonance imaging (MRI). Conservative treatment was chosen and consisted of a relative rest followed by rehabilitative treatment until the patient returned to his previous activity four weeks post-injury. Pronator teres strains are the possible causes of forearm pain and tightness and can be related to tennis-specific actions.

Keywords: magnetic resonance imaging, forearm, pronator teres muscle, strain, muscle injury

INTRODUCTION

Pronator teres strains are a relatively unusual injury, often associated with a stroke and/or hit traumatic mechanism(Chen et al., 2001). The injury occurs when the muscle fibres cannot withstand the eccentric forces following a violent strike to the ball or, worse, the ground while holding the sporting club or racket. This injury has been previously reported only in cricket and golf players (Ficke, 2015; Niebulski & Richardson, 2015). The classical presentation of pronator teres strain includes mechanical pain exacerbated by active pronation and wrist flexion with ulnar deviation.

The pronator teres is one of the so-called medial epicondyle muscles that comprise the flexor wad of the forearm. This muscle consists of 2 heads which originate proximally from the medial epicondyle and attach distally to the shaft of the radius on its lateral surface, although anatomical variations may be present (Olewnik et al., 2018). The oblique orientation of its fibres enables its primary rotatory role as the main pronator of the forearm.

Based on electromyography (EMG) studies, the pronator teres assists not only with forearm pronation but with elbow flexion(Farber et al., 2009). Pronator teres forms the flexor-pronator mass along with flexor carpi radialis (FCR), palmaris longus (PL), flexor digitorum superficialis (FDS), and flexor carpi ulnaris (FCU), which all together provide functional stabilisation against valgus stress during active motion.

The role of pronator teres has been highlighted among others as the primary dynamic stabiliser and the most likely musculotendinous unit to be injured in medial epicondylitis(Park & Ahmad, 2004; Udall et al., 2009). Diagnosis is usually made using magnetic resonance imaging (MRI) in reported cases of the injury (Ficke, 2015; Niebulski & Richardson, 2015). Herein we present an unusual case of pronator teres rupture

in an amateur tennis player with a forehand stroke mechanism. This case includes background information on the anatomy and pathophysiology of pronator teres strains, description of the assessment process and the subsequent intervention programme that led to a successful return to participation.

CASE REPORT

A right-handed, 52-year-old amateur male tennis player presented to our facilities complaining of right anterior forearm tightness and pain. The patient described a specific mechanism of injury in his right elbow while playing tennis 48 hours earlier. The patient, a medical doctor, was playing recreational tennis twice a week and had no previous symptoms or significant medical history related to the elbow. Initial symptoms started during a second set of a match, immediately after a clean forehand shot. A sudden, sharp pain was felt in the upper third of the forearm, followed by progressive swelling at the pain site. An increasing forearm weakness forced him to stop playing. The physical assessment during consultation 6 days following the injury episode revealed an anteromedial forearm bruise, 2-3 centimetres below muscle insertion. Mild tenderness to palpation was elicited over the middle third of the anteromedial forearm, specifically over the course of the cubital aspect of pronator teres.

The pronator teres revealed significant weakness and an attempted "grip-and-pull" manoeuvre caused immediate discomfort. Resisted forearm pronation accentuated the perceived referred pain suggesting contractile tissue involvement. Elbow assessment for tender areas showed no tenderness at the medial epicondyle.

The range of motion (ROM) evaluation revealed a full extension and 130° of flexion, probably due to swelling from the acute state. Pronosupination movements were unrestricted, but the discomfort was reproduced by active pronation. The Tinel sign for median nerve was negative and there was no sign of medial elbow instability. The rest of the neurological and vascular examination was unremarkable.

An MRI study performed 3 days after the patient's initial presentation showed a fairly well-defined area of high intensity signal on the axial and coronal proton density weighted MR images with fat saturation, all suggesting a grade 2 injury of the pronator teres muscle with a representation of a focal partial tear adjacent to the myotendinous junction (Figure 1).

An increased signal affected the surrounding tissue representing an associated oedema. No other anatomically related structures, such as ulnar collateral ligament, median nerve or distal biceps, were involved. X-ray images were not obtained.The medical staff initially diagnosed the patient with pronator teres strain based on the symptoms and weakness with resisted forearm pronation and elbow flexion. The expected outcomes include complete healing of the muscle tear, with the corresponding scar tissue formation along the affected site. The patient was then treated with instrumental myofascial release, stretching, active release techniques, and post activity icing for the following two weeks.

The patient was recommended to avoid elbow strenuous activities for 3 weeks. Manual therapy for elbow ROM and forearm strengthening of the related flexor wad was initiated at 7 days and continued for 3 weeks. At the latest evaluation, at 3 weeks, his elbow and forearm were clinically normal with complete range of movements and no evidence of any strength deficit. He was able to perform his upper body strength and conditioning workouts with the same intensity as pre-injury, so the patient was released back to his previous activity. He was allowed to gradually return to playing tennis, starting with low intensity backhand and forehand strokes. Once he was able to hit the ball normally without any symptoms, he progressively assumed forehand strokes. Four weeks after his initial presentation, he resumed participating at his previous level, reporting to be symptom-free with no sense of weakness or loss of control.

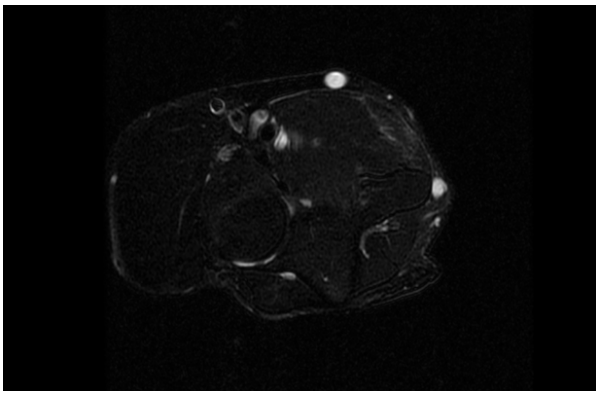

Figure 1a

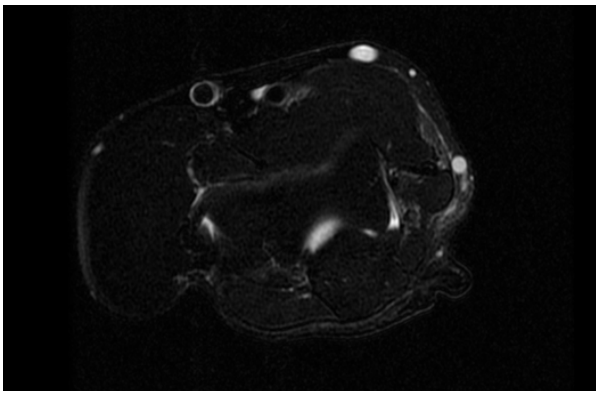

Figure 1b

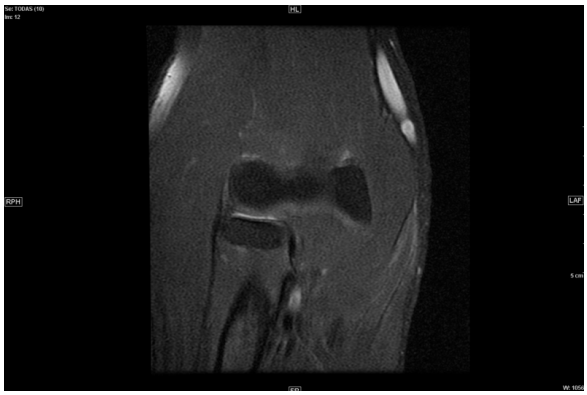

Figure 1c

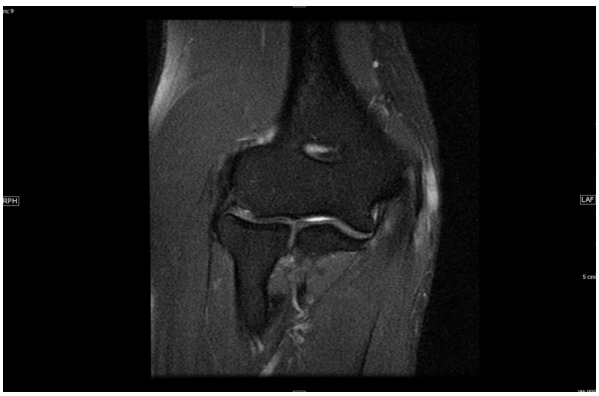

Figure 1d

Figure 1. (a, b) axial and (c, d) coronal proton density weighted MR images with fat saturation shown within. MR grade 2 injury of the pronator teres muscle with a focal partial tear (fibre disruption) represented by a fairly well-defined area of signal hyperintensity adjacent to the myotendinous junction.

Note: associated subcutaneous oedema.

DISCUSSION AND CONCLUSION

This case report describes the diagnostic process and approach to a patient suffering from a mild pronator teres strain. To the best of our knowledge, no previous pronator teres muscle strain following a forehand stroke has been described in recreational tennis in the past.

Isolated injuries to the pronator teres are not very common. Generally, these injuries have been the result of an abrupt pronosupination mechanism in stick/racquet sports(Fu et al., 2018; Orchard et al., 2016). Following these injuries, there is generally a positive outcome.

However, targeted treatment can be altered if diagnostic imaging is not used to confirm the affected structures. This case report describes the diagnostic process and approach to a patient suffering from a mild pronator teres strain.

Racquet size and weight, head weight, string tension or strike zone are considered factors influencing the impact stress at the elbow in a tennis context. Among those, technical aspects have shown to play a critical role with regard to physical demands imposed on this region. Poor forehand stroke mechanics have been highlighted as a cause of medial elbow stress, with a late ball strike, and with the racquet head behind the elbow at contact, being a significant contributor to medial epicondylitis (Ilfeld, 1992). All of this can be eventually exacerbated with an open-stance technique, which relies on rapid angular acceleration to the disadvantageous strike point. On the other hand, recreational tennis players may change their forehand shot more often than professionals and have been shown to require the pronator teres more than high-level tennis players(Reid et al., 2013), potentially leading to an increased risk of injury to this muscle.

This patient resumed his participation in competition for three weeks prior to his return to amateur tournaments. This timeline corresponds with previously reported data (Ficke, 2015; Niebulski & Richardson, 2015). While in this case the patient returned to play in a reasonable time frame, it is important to consider that the delayed diagnosis had the potential to keep the patient from returning to activity.

A differential diagnosis of medial elbow pain in tennis players includes ulnar collateral ligament sprain, ulnar neuritis, valgus extension overload with osteophyte formation and posteromedial impingement, medial epicondyle avulsion, and medial epicondyle tendinopathy(Kane et al., 2014; O'Holleran & Altchek, 2006).

Our above-described experience may enlarge this list with isolated pronator teres muscle strain.
In our case of a pronator teres strain, conservative management yielded good clinical outcomes. A follow-up MRI at 8 weeks post-injury demonstrated scarring of the muscle with resolution of the oedema and fluid collection.

Due to the existing gap in the literature, the approach to this rare entity should be individualised. Patient characteristics, such as level of activity and age should be considered, as should the degree of fibres involvement. MRI has shown to be a convenient method for localising the site and the extent of injury when a pronator teres strain is suspected. More high-quality evidence and well-designed studies are desirable to determine the optimal approach to these injuries.

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PUKNUĆE PRONATOR TERESA KOD REKREATIVNOG TENISERA

Povreda pronator teresa je relativno rijetka sportska povreda koja se često povezuje sa traumatičnim mehanizmom zamaha i/ili udarca, a zabilježena je samo u kontekstu kriketa i golfa. Ovdje prikazujemo neobičan slučaj puknuća pronator teresa kod tenisera - amatera, a sa mehanizmom forhend udarca uz dijagnostički proces i pristup. Pacijent je došao u našu ustanovu žaleći se na napetost i bol u desnoj prednjoj podlaktici. Klinička slika je potvrđena magnetnom rezonancom (MRI). Odabrano je konzervativno liječenje koje je obuhvatalo relativni odmor, a zatim rehabilitacijski tretman sve dok se pacijent nije vratio svojoj prethodnoj aktivnosti četiri sedmice nakon povrede. Naprezanje pronator teresa je mogući uzrok boli i napetosti podlaktice i može biti povezano sa aktivnostima koje su svojstvene tenisu.

Ključne riječi: magnetna rezonanca, podlaktica, pronator teres mišić, naprezanje, povreda mišića

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