

## Clinical case

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## Teres major rupture: case report in a jiu-jitsu athlete

*Rotura del músculo redondo mayor: informe de un caso en un atleta de jiu-jitsu*

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**ABSTRACT.** The rupture of the teres major muscle is a well-known condition in sports activities like baseball, hockey, and tennis. There is no real consensus in the literature regarding treatment, with approaches varying between functional and surgical methods. While functional treatment appears to be a viable option, there is a lack of evidence indicating significant improvement in medial rotation strength after aforementioned treatment. We report a 30-year-old male with pain below the right armpit for the past 10 days, attributed to jiu-jitsu training which revealed a complete tear of the musculotendinous junction of the teres major and a partial insertional tear (approximately 75% of thickness) of the supraspinatus and infraspinatus tendons, along with atrophy in the musculotendinous transition of the pectoralis major. The patient was treated with analgesic medication, accompanied by physiotherapeutic treatment included electrothermophototherapy, laser/LED therapy, manual therapy, and a structured exercise regimen over 14 weeks, gradually reintroducing sport-specific training.

**Keywords:** magnetic resonance imaging, sports, shoulder injuries.

**RESUMEN.** La rotura del músculo redondo mayor es una afección muy conocida en actividades deportivas como el béisbol, el hockey y el tenis. No existe un consenso real en la literatura sobre el tratamiento, y los enfoques varían entre métodos funcionales y quirúrgicos. Si bien el tratamiento funcional parece ser una opción viable, falta evidencia que indique una mejora significativa en la fuerza de rotación medial después de dicho tratamiento. Presentamos a un hombre de 30 años con dolor debajo de la axila derecha durante los últimos 10 días, atribuido al entrenamiento de jiu-jitsu, que reveló un desgarramiento completo de la unión musculotendinosa del redondo mayor y un desgarramiento de inserción parcial (aproximadamente el 75% de espesor) de los tendones supraespinoso e infraespinoso, junto con atrofia en la transición musculotendinosa del pectoral mayor. El paciente fue tratado con medicación analgésica, acompañada de tratamiento fisioterapéutico que incluyó electrotermofototerapia, terapia con láser/LED, terapia manual y un régimen de ejercicio estructurado durante 14 semanas, reintroduciendo gradualmente el entrenamiento deportivo específico.

**Palabras clave:** imágenes por resonancia magnética, deportes, lesiones de hombro.

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## Introduction

The teres major muscle originates from the posterior and inferior aspect of the lateral border of the inferior angle of the scapula. Its insertion occurs on the medial lip of the intertubercular groove, serving to adduct and medially rotate the arm.<sup>1</sup> Innervation is provided by the lower subscapular nerve, originating from C5 and C6 roots. This muscle plays a crucial role in arm adduction, internal rotation, and retroversion in relation to the chest, forming a functional unit with the latissimus dorsi muscle.<sup>2</sup>

Both the teres major and latissimus dorsi muscles play a significant role in the acceleration and follow-through phases of throwing, contributing to force generation and shoulder joint stability during the throwing process. Reported cases of injuries in throwers may occur more frequently during slow-speed throws and also during upper limb traction in water skiing, as described by Fitzpatrick et al.<sup>1</sup> Although rare, ruptures of the teres major muscle can pose notable challenges to an athlete's performance.<sup>3</sup> There is a growing incidence of teres major and latissimus dorsi muscle ruptures in professional baseball throwers.<sup>3</sup>

Differential diagnoses can be demonstrated through magnetic resonance imaging (MRI) findings, complemented by clinical history. Myotendinous strains or tears result from forced muscle stretching during contraction, also known as eccentric contraction.<sup>1</sup> Muscle contusions present a more focal area of signal increase between muscle fibers, similar to a strain, accompanied by muscle size enlargement.<sup>1</sup> However, there is no clear disruption of muscle fibers.<sup>1</sup> Signal increase within muscle fibers can also be observed in cases of acute denervation, distinguished from muscle strains by the absence of perifascial edema and involvement of a nerve territory, along with increased fluid-sensitive signal and/or enhancement in the peripheral nerve.<sup>1</sup>

The aim of this article is to report a rare case of a complete rupture of the teres major musculotendinous junction in a jiu-jitsu athlete and to contribute to the literature by highlighting key aspects of diagnosis, treatment, and rehabilitation. This case emphasizes the importance of an expanded MRI field of view with oblique, coronal and sagittal sequences for accurate imaging assessment. Additionally, it provides a detailed 14-week conservative rehabilitation protocol, demonstrating a successful non-surgical approach for return to sport. The discussion also explores the role of biomechanical imbalances due to prior injuries in predisposing athletes to teres major rupture, offering insights into injury prevention and management strategies.

## Clinical case

A 30-year-old male with pain below the right armpit for the past 10 days. He reported asthma since childhood, treated with budesonide. Neither additional medical conditions nor previous surgeries were notified. Besides the practice of

jiu-jitsu, the patient also engages in weightlifting. jiu-jitsu athlete mentioned that the pain started after training.

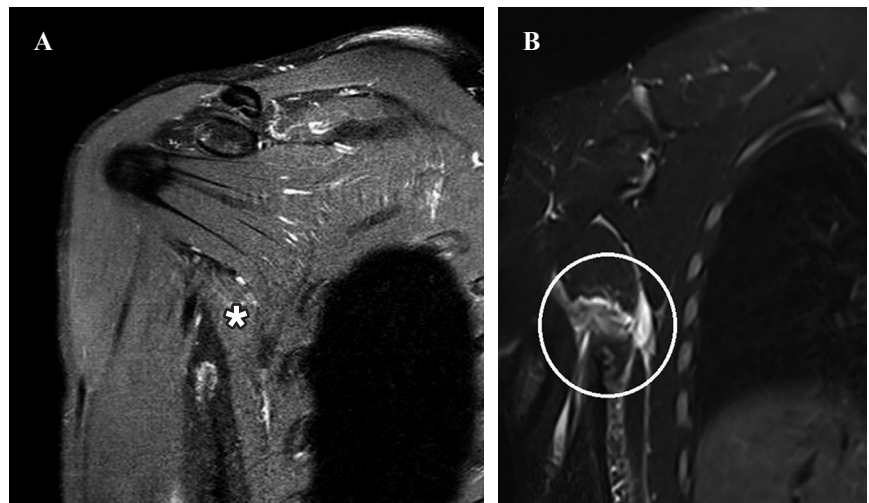
On physical examination, he showed a limited right shoulder range of motion without signs of instability, palpation tenderness, and swelling in the axillary region. He exhibited reduced strength for internal rotation, adduction, and extension movements, reporting pain rated 7/10 during these motions, clinical maneuvers namely Hawkins-Kennedy test, Neer test, drop arm test were positive whereas Speed test was negative.

Two years prior, a right shoulder MRI revealed tendinopathy with partial supraspinatus and infraspinatus tears, and four years ago, a complete tear of the left pectoralis major tendon. A recent MRI (protocol: coronal T1 and DP FAT SAT, sagittal T2 and DP FAT SAT and axial DP FAT SAT of the shoulder and coronal T1, T2 and T2 STIR, axial T1 and DP FAT SAT and sagittal DP FAT SAT of the chest) detected a complete rupture of the musculotendinous junction of the teres major and latissimus dorsi with a 4.0 cm retraction, along with a partial insertional tear (about 75% of thickness) of the supraspinatus and infraspinatus tendons, and atrophy in the musculotendinous transition of the pectoralis major-all injuries on the right side, as well as mild liposubstitution of the teres major muscle on the right (*Figures 1 to 3*).

As a medication, only oral analgesic medication was used, but physiotherapeutic treatment included electrothermophototherapy laser therapy/LED therapy (photobiomodulation), fascial manual therapy, shoulder joint mobilization for two weeks, followed by three weeks of electrothermophototherapy (as needed), mobility exercises, periscapular muscle activation, isometric rotator cuff and latissimus dorsi exercises controlling pain-free range. In the following four weeks, periscapular muscle strengthening, isotonic exercises with elastic resistance for rotator cuff and latissimus dorsi muscles, and initiation of open and closed kinetic chain sensorimotor training began. In the last five weeks of physiotherapeutic treatment, concentric and eccentric isotonic exercises intensified, along with open and closed kinetic chain sensorimotor training, and the initiation of sport-specific training, in this case, Jiu-Jitsu. The total treatment duration was 14 weeks.

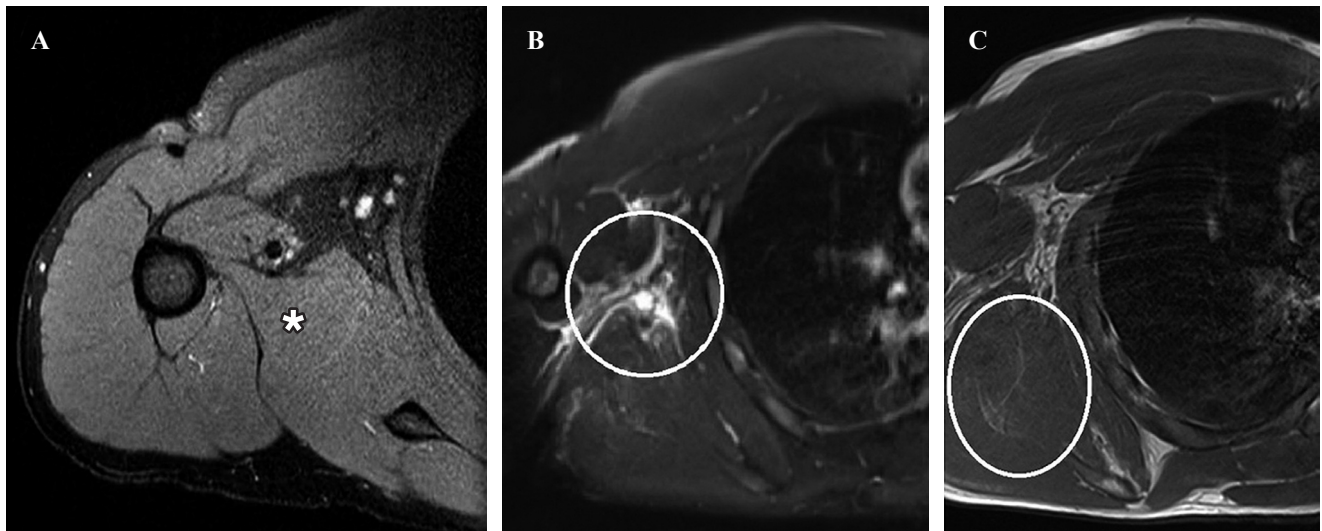
## Discussion

Pathologically, teres major injuries result from various traumas, including traction trauma with the upper limb extended during the eccentric phase of muscle contraction, opposing sudden traction. This injury mechanism often manifests in cases such as the one described above, due to immobilization positions in jiu-jitsu. In summary, athletes have a higher association with this type of injury, as seen in baseball and water skiing. Teres major rupture has also been reported in hockey, tennis, golf, cricket, combat sports, and football goalkeepers.<sup>2</sup>

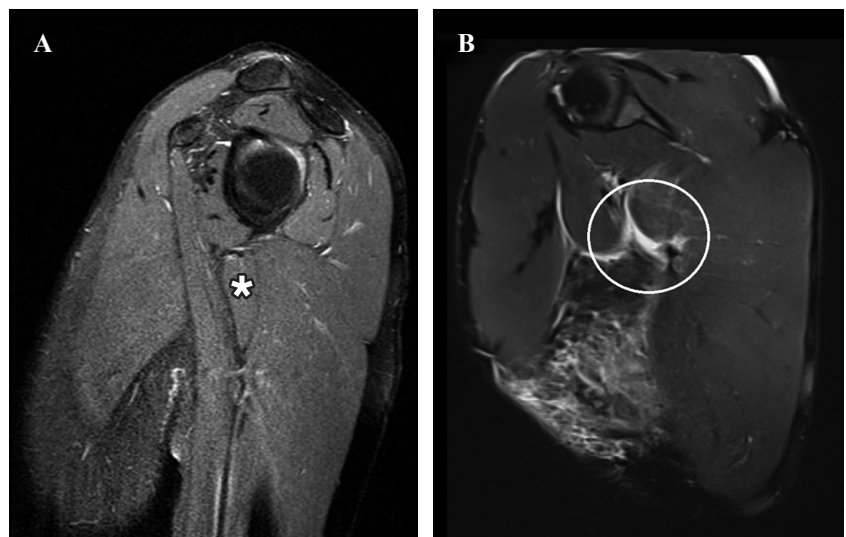


**Figure 1:**

Coronal MRI in the PD SPIR sequence (A) demonstrating the normal anatomy of the teres major muscle (white asterisk) and in the T2 STIR sequence (B) demonstrating the rupture of the myotendinous junction of the teres major (white circle).



**Figure 2:** MRI in the axial section in the PD SPIR sequence (A) demonstrating the normal anatomy of the teres major muscle (white asterisk), in the T2 DP FAT SAT sequence (B) demonstrating the rupture of the myotendinous junction of the teres major (white circle) and on T1 sequence (C) demonstrating slight liposubstitution of the teres major muscle.



**Figure 3:**

MRI in the sagittal section in the PD SPIR sequence (A) demonstrating the normal anatomy of the teres major muscle (white asterisk), in the T2 DP FAT SAT sequence (B) demonstrating the rupture of the myotendinous junction of the teres major (white circle).

Clinically, patients complain of intense pain with a tearing sensation in the axillary region corresponding to functional disability.<sup>2</sup> On clinical examination, edema is detected on the lateral border of the scapula, eventually corresponding to a hematoma and muscle traction, which can lead to reduced mobility in all axes.<sup>1,4</sup>

Regarding imaging exams, in suspected teres major muscle injuries, the field of view in shoulder MRI should be expanded to visualize the teres major muscle in its entirety. Ideally, obtaining specific oblique coronal and oblique sagittal images of the teres major muscle in parallel and perpendicular to the normal course of muscle fibers and tendons provides a more detailed view of the muscular belly, tendon insertion, and musculotendinous junction.<sup>1</sup> Treatment options range from conservative approaches, including physiotherapy and strengthening exercises, as conducted in the reported patient, to surgical interventions. The choice of the ideal treatment depends on various factors, including the extent of injuries, the patient's age, and their aspiration to return to sports. There are various treatment forms, including functional ones using rotator cuff strengthening exercises.<sup>4</sup>

Four studies stand out in evaluating teres major rupture. In a study by Erickson et al., 20 sports participants (16 baseball throwers, 10 professional athletes, one kitesurfer, one rugby player, one weightlifter, and one water skier) with an average age of  $26 \pm 9.3$  years were analyzed. Four patients were treated conservatively, and 16 underwent surgery, with five patients with complete rupture attempting unsuccessful conservative treatment, requiring surgical intervention for resolution and return to sports. The treatment time was  $8.7 \pm 3.3$  months.<sup>3</sup>

Fitzpatrick et al. reported a 53-year-old man who experienced a water-skiing accident, showing mild MRI stretching at the insertion of the teres major tendon, partial myotendinous rupture of the upper (cranial) muscle fibers with complete myotendinous rupture of the lower (caudal) fibers, conservatively treated with physiotherapy. Physiotherapy included shoulder range of motion, rotator cuff, and periscapular muscle mobility, strength, proprioception exercises, as well as ultrasound therapy and massage three times a week for six weeks. Fourteen weeks after the injury, the patient was pain-free and back to all normal activities and swimming without appreciable limitations.<sup>1</sup>

Cousin et al. reported a 39-year-old firefighter injured during water skiing. MRI showed an isolated avulsion of the teres major muscle, without involvement of the latissimus dorsi and the teres minor. With conservative treatment using physiotherapy, the patient attended for six weeks describing residual pain in the posterior face of the proximal humerus. Clinical examination revealed a normal range of motion. He was able to intensify rehabilitation, and at six months, he no longer complained of muscle weakness or pain.<sup>2</sup> Takase reported a 21-year-old man with sudden right shoulder posterior region pain after hitting a tennis ball above the

head. MRI showed a complete rupture of the teres major muscle belly.<sup>4</sup> For two weeks, the patient was treated with sling immobilization, followed by shoulder range of motion exercises. At seven weeks, rotator cuff strengthening exercises began, and at four months, the patient was allowed to gradually return to tennis. Six months after the injury, the patient was pain-free.

Most teres major injuries occur at the musculotendinous junction, with standard MRI classification criteria used for assessment. While most reported cases describe partial ruptures, the present case involved a complete rupture of the musculotendinous junction of the teres major, along with a partial insertional tear (about 75% of its thickness) of the supraspinatus and infraspinatus tendons and atrophy at the musculotendinous transition of the pectoralis major. The patient's history suggests a biomechanical imbalance, as a previous left pectoralis major rupture resulted in decreased strength of the internal shoulder rotators and scapula abductors on that side, leading to compensatory eccentric function of the right external rotator muscles, particularly the supraspinatus and infraspinatus. Over time, excessive activation of the teres minor muscle may have contributed to increased tension and susceptibility to injury of its antagonist, the teres major, ultimately leading to rupture. Notably, this is the first reported case of a teres major rupture in a jiu-jitsu athlete.

Additionally, the injury to the teres major can lead to the development of scapular dyskinesis, an abnormal scapular movement often observed in shoulder injuries.<sup>5</sup> Dyskinesis occurs when there is an imbalance in the muscles that control the scapula, leading to improper movement during arm motions.<sup>6</sup> In the case of the patient described, the injury to the teres major may have caused overloading of the periscapular muscles, such as the serratus anterior and rhomboids, which attempt to compensate for the loss of function of the teres major. This can result in abnormal scapular mechanics, with excessive elevation or internal rotation, further compromising shoulder function. Clinical assessment of scapular dyskinesis can be performed through specific tests, such as the scapular repositioning test and evaluating the function of the serratus anterior, both essential for identifying muscular compensations that affect scapular stability.<sup>7</sup> Treatment for this condition should involve exercises focused on stabilizing and strengthening the periscapular muscles, aiming to restore normal scapular mechanics and improve shoulder function, especially in athletes where precise scapular control is critical for performance.<sup>7</sup>

A crucial aspect of diagnosing these injuries is the imaging approach, particularly MRI with an expanded field of view. Since standard shoulder MRI protocols may not fully visualize the teres major, oblique coronal and sagittal sequences aligned with muscle fibers should be obtained. However, in this case, these sequences were not performed due to the medical request being limited to chest and shoulder imaging. This highlights the potential

for misdiagnosis or underestimation of injury severity if imaging is not adequately tailored. Recognizing subtle findings such as mild liposubstitution and atrophy in chronic or recurrent cases can be essential for treatment planning, and future studies should explore correlations between early MRI findings and treatment outcomes. Therapeutically, this case reinforces the efficacy of conservative management, as the patient successfully returned to sport following a structured 14-week rehabilitation program. This progressive protocol emphasized pain control, mobility exercises, gradual strengthening of the periscapular and rotator cuff muscles, and eventual sport-specific training. The integration of isometric, isotonic, and sensorimotor exercises appears to have been key in restoring function while minimizing re-injury risk. While surgical intervention is sometimes necessary, particularly for elite athletes, this case suggests that conservative treatment should be the first-line approach for non-throwing athletes or those with sufficient compensatory muscle function. However, despite documented success with both conservative and surgical management in various sports such as baseball players, tennis players, fighters, and other elite athletes, there remains no established treatment algorithm to guide the decision between these approaches. Further studies are needed to define optimal treatment strategies based on injury severity, sport type, and functional demands.

## Conclusion

This case presents a challenging scenario due to the rare complete rupture of the musculotendinous junction of the teres major, further complicated by an almost complete tear of the rotator cuff, including significant involvement of the supraspinatus and infraspinatus tendons. The presence of both injuries made it difficult to determine whether conservative or surgical management would be the most appropriate approach. MRI proved invaluable in confirming the diagnosis, particularly with the need for an expanded field of view to fully assess the teres major muscle and the rotator cuff tendons. The decision for conservative treatment was made based on the patient's clinical status, including the physical examination findings, which showed reduced strength in internal rotation, adduction, and extension, but no instability. A structured rehabilitation program aimed at restoring shoulder function, focusing on strengthening the periscapular muscles and rotator cuff, ultimately allowed the patient to return to sport. This case highlights the need for a careful, individualized approach, weighing both the extent of muscle injuries and the patient's athletic goals. The

absence of clear treatment algorithms for combined teres major and rotator cuff injuries underscores the importance of further research into optimizing treatment strategies and defining the role of conservative management in such complex cases.

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## Ethical responsibilities

**Human beings and animals' protection:** disclosure the authors state that the procedures were followed according to the declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

**Data confidentiality:** the authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data. Rights to privacy and informed consent: The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

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