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Case report

Surgical treatment of rectus femoris injury in soccer playing athletes: report of two cases☆

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ABSTRACT

Muscle injury is the most common injury during sport practice. It represents 31% of all lesions in soccer, 16% in track and field, 10.4% in rugby, 17.7% in basketball, and between 22% and 46% in American football. The cicatrization with the formation of fibrotic tissue can compromise the muscle function, resulting in a challenging problem for orthopedics. Although conservative treatment presents adequate functional results in the majority of the athletes who have muscle injury, the consequences of treatment failure can be dramatic, possibly compromising the return to sport practice.

The biarticular muscles with prevalence of type II muscle fibers, which are submitted to excentric contraction, present higher lesion risk. The quadriceps femoris is one example. The femoris rectus is the quadriceps femoris muscle most frequently involved in stretching injuries. The rupture occurs in the acceleration phase of running, jump, ball kicking, or in contraction against resistance. Although the conservative treatment shows good results, it is common that the patient has lower muscle strength, difficulty in return to sports, and a permanent and visible gap. Surgical treatment can be an option for a more efficient return to sports.

Tratamento cirúrgico da lesão do reto femoral em jogadores de futebol: um relato de dois casos

Palavras-chave:
Músculo esquelético/lesões
Músculo quadríceps/lesões
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Traumatismos em atletas

RESUMO

As lesões musculares são uma das mais comuns ocorridas por traumas nos esportes. Elas constituem 31% de todas as lesões no futebol, 16% no atletismo, 10.4% no rugby, 17.7% no basquete e de 22% a 46% no futebol americano. Representam um problema desafiador na traumatologia, já que os músculos lesados se curam vagarosamente e com eventual recuperação incompleta da função. Embora o tratamento conservador resulte em bons

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resultados funcionais na maioria dos atletas com lesão muscular, as consequências da falha do tratamento podem ser dramáticas, possivelmente atrasando o retorno ao esporte.

Os músculos mais frequentemente envolvidos são os bi-articulares ou aqueles com maior complexidade estrutural (por exemplo, adutor longo), que são submetidos a contração excêntrica e contêm principalmente fibras de contração rápida (tipo 2). Um representante desse grupo é o quadríceps femoral, que constitui-se pelos músculos reto femoral, vasto medial, vasto intermédio e vasto lateral. O reto femoral é o músculo do quadríceps mais envolvido nas lesões por estiramento. É mais lesado nas fases de aceleração do "tiro", salto de explosão, chute da bola ou quando há uma contração contra resistência. Mesmo que o tratamento conservador apresente bons resultados, é comum que o paciente tenha diminuição da força muscular, dificuldade de retorno ao esporte e *gap* permanente e visível. O tratamento cirúrgico pode ser uma opção para um retorno mais eficiente ao esporte.

Introduction

Muscle injuries are the most common lesion during sports activities, representing 31% of all lesions in soccer, 10.4% in rugby, 17.7% in basketball practice and can range from 22% to 46% in American football.[1,2] Depending the muscle injury type, fibrotic tissue resulting from muscle cicatrization can compromise muscle function, which is a challenging problem for orthopedics.[3] Although conservative treatment produces adequate functional results in the majority of the athletes, the consequences of treatment failure or the non-treatment of muscle injuries can inhibit return to sports.[1]

Muscle injury can be classified by O'Donoghue[4] in three grades according to size and functional loss: grade 1 for irrelevant tissue lesions, grade 2 for tissue lesions associated with strength reduction in the muscle-tendon complex, and grade 3 for complete rupture of the muscle-tendon complex and complete functional loss.

Biarticular muscles with type II muscle fibers and subjected to eccentric contraction have a higher risk for new injuries.[1,2,5,6] Quadriceps femoris is an example of this muscle type. The femoris rectus is the quadriceps femoris muscle that is most frequently involved in stretch lesions.[6] Rupture occurs during the acceleration phase of running, jumping, kicking a ball, or during contraction against resistance. Although conservative treatments may lead to acceptable results, it is common for patients to display lower muscle strength, delayed return to physical activity, and a permanent visible and palpable gap. Surgical treatment can be an option for a more efficient return to sports.

Case presentation

This study report two cases of surgical treatment for complete rupture of the rectus femoris in soccer players.

Case 1

Patient 1 was a 50 year old male amateur soccer player with a 38 year history of playing the sport. The patient used to play soccer three times a week and had used anabolic steroids five years before lesion (oxandrolone 60–80 mg for 10 days). The patient experienced an indirect trauma during soccer practice when he kicked a ball. He developed pain, edema, a palpable gap, and a knee extension gap (Fig. 1A).

Case 2

Patient 2 was a 28 year old male professional soccer player during eight years. The patient used to practice four times per week and plays one or two times a week. He denied any use of anabolic steroids. This patient experienced an indirect trauma during soccer training when he kicked a ball (eccentric contraction of the muscle). He developed the following symptoms: pain, edema, a palpable gap, a knee extension gap, and decreased muscle strength (Fig. 1B).

Investigations

Both patients were examined by X-ray, ultrasound, and MRI to confirm the presence of an intrasubstance lesion of the rectus femoris. The lesions were classified as grade III in both cases. Both patients developed large contusions with the presence of a hematoma (Fig. 2).

Treatment

Both subjects were immediately treated with analgesia and cryotherapy. The patients were treated surgically due to the grade III injury with a significant gap, the presence of a hematoma, and their limited improvement with time. In case 1, the surgical procedure was performed 22 days following injury. The surgery was conducted using a 10 cm longitudinal anterior incision in the thigh. A gap was identified in the lesion, and the muscle was rounded. The muscle was surrounded by a hematoma, and there was scar tissue at the proximal and distal edges of the lesion. We released the muscle adhesions to the fascia, and the muscle ends were mobile. The lesion was repaired by attaching the muscle edges and "mouth to mouth" sutures with FiberWire® (Arthrex, Naples, FL, USA) wire using anchored continuous suturing. The surgical repair of the professional soccer player (patient 2) was performed 7 days following the injury. The surgical approach

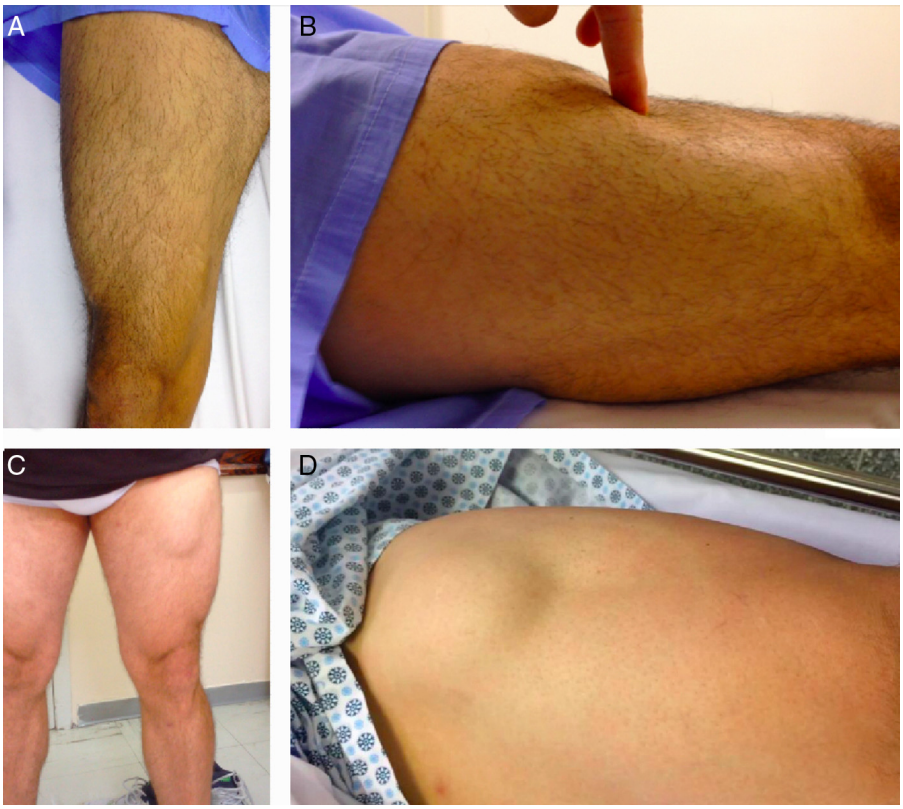

Fig. 1 – Physical examination of patients 1 (A, B) and 2 (C, D). Front view (A, C) and lateral view (B, D) from the tight where we can see the femoral muscular gap and pseudo tumor lesion.

involved an approximately 7 cm longitudinal and anterior incision in the thigh. The dissection was performed preserving the fascia. A gap and local hematoma were identified. The lesion was repaired by connecting the muscle edges and "mouth to mouth" sutures with Vicryl® n°02 wire using anchored continuous suturing. Both patients had their leg immobilized with a knee extension splint for 6 weeks (Fig. 3).

Outcome and follow-up

Both patients underwent immobilization with non weight-bearing and extension of the knee for three weeks. After this period, the patients started physiotherapy to improve range of motion of the knee; and passive and active movement was allowed after six weeks. The patients were medicated with analgesics, and cryotherapy was performed. Patient evaluations revealed no pain and progressive recovery of muscular strength after three months. Patient one returned to normal sports activities 5 months after surgery, and patient two returned to playing after 4 months.

Discussion

The majority of the quadriceps lesions can be managed with rehabilitation and drugs in cases with extensive injuries and in older and less active populations.[7] However, in recreational and competitive athletes, resuming activities quickly and muscle contraction are important. Thus, surgical procedures should be considered in these cases. The literature regarding this type of injury is limited, and there is no structured treatment protocol. There are other muscle group injuries that were treated using a surgical approach with satisfactory outcomes reported in the literature. Pectoralis major muscle[8] and the gastrocnemius muscle are surgically treated in most cases.[9]

The rectus femoris is the most superficial and anterior muscle of the quadriceps complex (anterior compartment of the thigh). This biarticular muscle originates in the anterior iliac spine and the hip joint capsule and is important for hip flexion and knee extension.[7]

The injury mechanism of this muscle usually involves eccentric explosive contraction.[7,10] Thus, it is the most commonly injured muscle.[10,11] The injury mechanism was indirect in this case report. The amateur soccer player was injured as he kicked a ball, and the professional soccer player was injured as he performed an intense short run. The trauma mechanisms for both cases are similar to previous results presented in the literature.[7,10,12]

Avulsion injuries originating at the direct head of the rectus femoris in the anterior inferior iliac spine are well documented in the tendon junction of the rectus femoris in the quadriceps tendon.[8,10] However, myotendineal transition lesions are less common.[10] This type of lesion was identified by Temple et al. Injuries presented as pseudo tumors in seven cases.[10] In the present study, patients had similar lesion. Treatment results of these cases are similar to the results observed by Straw et al.[10] The author believes that after surgical repair, muscular strength can return to the baseline before injury.

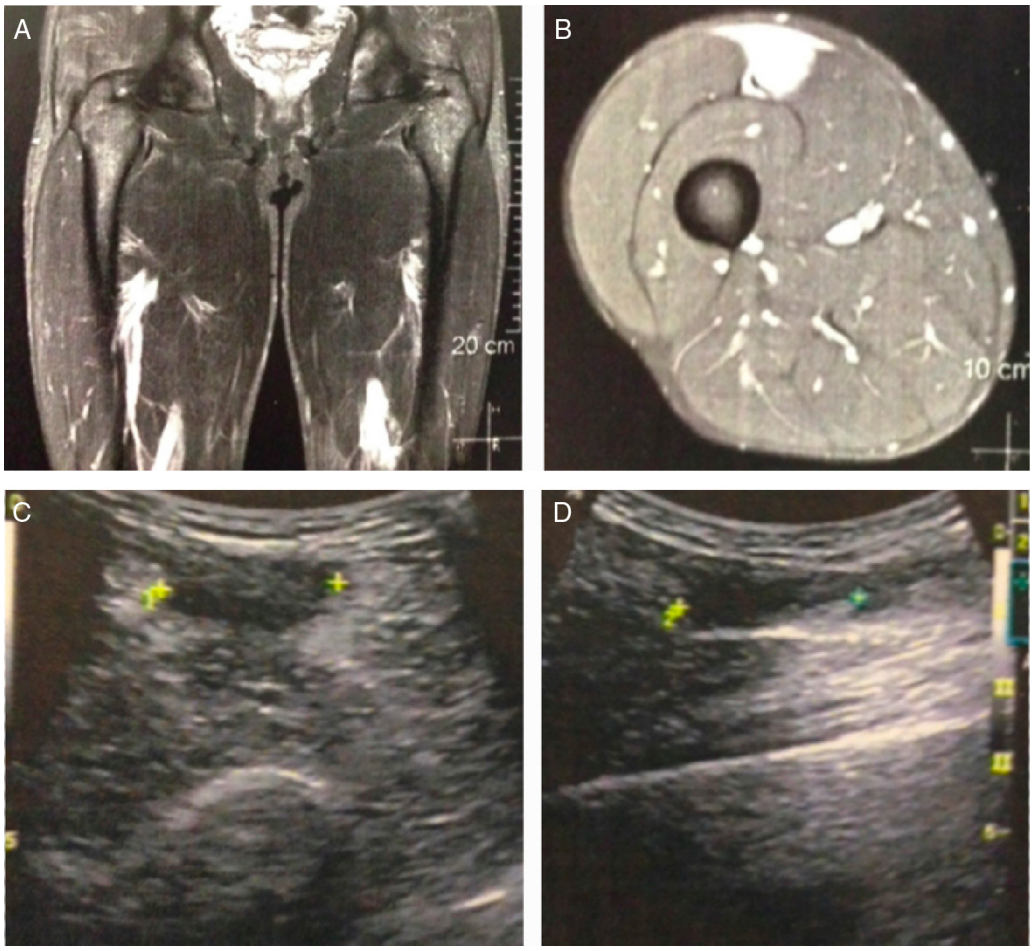

Fig. 2 – (A, B) MRI coronal and axial views showing hipersignal in the anatomical site of the rectus femoris muscle, respectively; (C, D) US images showing hypoechoic signal, sugesting presence of hematoma.

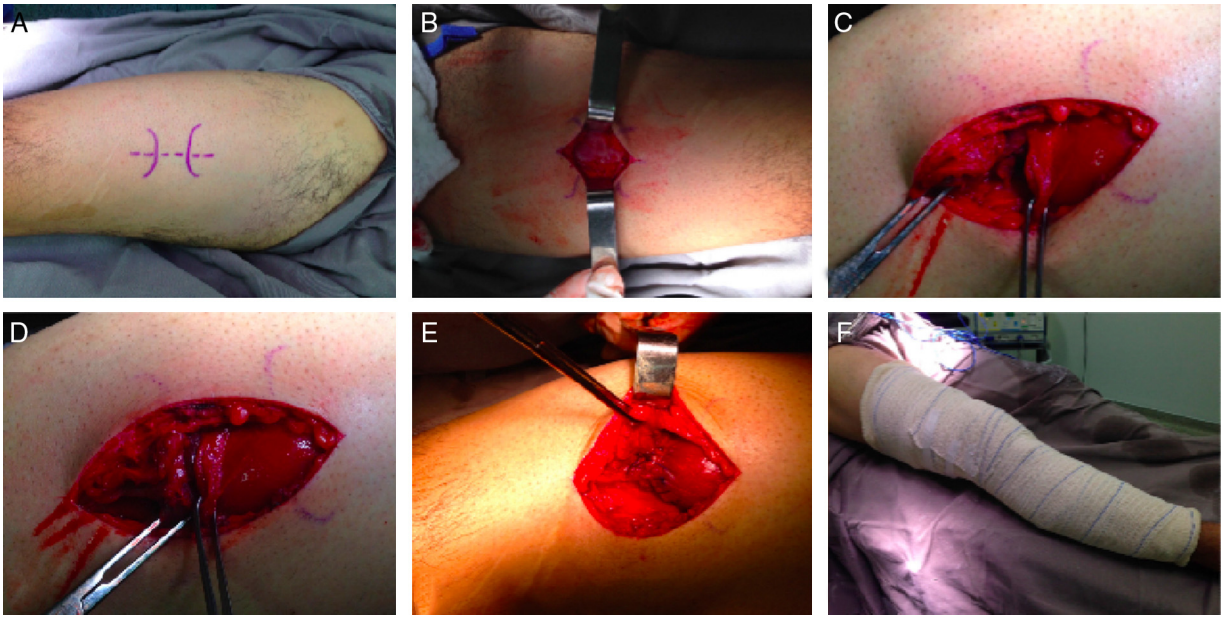

Fig. 3 – Intraoperatory images. (A) Femoral injury extremities identification and approach programation in the anterior femoral skin; (B) dorsal fascia intergrity of the rectus femoris muscle; (C) muscular injury identification; (D) re-approach of muscular edges; (E) suture "mouth to mouth"; (F) imobilization in extension.

The treatment of patients reported in the present study in the acute phase (one week) was not different from the protocol recommended by the literature, with immobilization, cryotherapy and analgesia. The patient of case 1 was submitted to surgical treatment after 22 days of injury. The other patient underwent surgical procedure 7 days after lesion.

Compared with the literature, which reports an average of three months, we had an earlier surgical intervention, which may have influenced the efficiency of the treatment and accelerated the beginning of the rehabilitation protocol, since the patient of the case 2, treated seven days After injury, returned 1 month before the case 1 patient, treated 22 days after injury.

The rehab protocol was the same for both cases. They stayed immobilized for three weeks. After that the priority was gain of motion with passive mobilization. After six weeks they were submitted to active mobilization and in five months, returned to sport practice. It was therefore a more early rehabilitation protocol than that recommended by the literature in the non-surgical treatment,[6] which may decrease the athlete's time outside the training and competitions.

Patients returned to sports practice after the third month but their rehabilitation program continued for six months after surgery. Taylor reported results that were similar to our findings. Surgery and a progressive and early postoperative physical therapy program allow patients to participate in sports without any restrictions.[7]

In this study, we demonstrated that patients with grade III muscular lesions of the rectus femoris muscle and a gap with a hematoma that fail to recover after a short physical therapy treatment period can be treated by surgical repair and postoperative physical therapy.

Conflicts of interest

The authors declare no conflicts of interest.

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