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Technical Note

Reconstruction of the distal biceps tendon using semitendinosus grafting: Description of the technique☆

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ARTICLE INFO

Article history:
Received 30 January 2017
Accepted 17 April 2017
Available online 2 August 2018

Keywords:
Elbow/injuries
Rupture
Reconstructive surgical procedures
Treatment outcome

ABSTRACT

Distal ruptures of the biceps are rare when compared to proximal ruptures, with a different epidemiology and mechanism of trauma. There is no exact pathophysiology, though the hypovascular distal insertion and the mechanical impact during movement should be considered important factors. The surgical treatment of chronic cases presents worse prognosis due to muscle shortening with tendon retraction, making anatomical repair of the injury difficult, requiring the use of grafts for its reconstruction. This is a prospective study involving four patients with chronic distal biceps injury. The tendons were reconstructed with an autologous graft from the semitendinosus tendon from the ipsilateral knee and secured to the radial tuberositywith the help of two anchors. The surgical technique proved to be a simple and viable procedure for the reconstruction of chronic ruptures of the distal biceps.

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Reconstrução do tendão distal do bíceps com enxerto de semitendíneo: descrição da técnica

Palavras-chave:
Cotovelo/lesões
Ruptura
Procedimentos cirúrgicos reconstrutivos
Resultado de tratamento

RESUMO

As rupturas distais do bíceps são raras quando comparadas com as rupturas proximais, têm epidemiologia e mecanismo de trauma diferentes. Não apresentam uma fisiopatologia exata; entretanto, a zona hipovascular na inserção distal e o impacto mecânico durante o movimento devem ser considerados fatores importantes. O tratamento cirúrgico dos casos crônicos apresenta pior prognóstico pelo encurtamento muscular com retração do tendão, dificulta a reparação anatômica da lesão, deve ser considerado o uso de enxertos para sua reconstrução. Este é um estudo prospectivo, envolve quatro pacientes com lesão crônica do

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https://doi.org/10.1016/j.rboe.2018.07.008

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bíceps distal. Os tendões foram reconstruídos com enxerto autólogo do tendão semitendíneo do joelho ipsilateral e fixado na tuberosidade do rádio com auxilio de duas âncoras. A técnica cirúrgica mostrou-se um procedimento simples e viável para reconstrução das rupturas crônicas do bíceps distal.

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Introduction

The biceps brachii is the main supinator muscle of the forearm; its secondary function is elbow flexion.[1]

When compared with proximal insertion ruptures, distal ruptures of the biceps are rare (5% of cases) and present a different epidemiology and trauma mechanism.[2]

These injuries are observed mainly in men between the 4th and 6th decades of life, during eccentric contraction of the biceps, and preferentially affect the dominant side of the limbs.[1]

To date, the exact pathophysiology is unknown, though the hypovascular area at the distal insertion and the mechanical impact during movement should be considered important factors. Degenerative tendinopathy and some endocrine diseases have also been associated with the onset of this pathology.[3] The main risk factors are the use of anabolic steroids, weight lifting, and smoking.[4]

The clinical condition is characterized by acute pain, edema, and local ecchymosis, associated with an audible click during injury. Moreover, there is the presence of a gap on palpation proximal to the cubital fossa and loss of strength in supination of the forearm and elbow flexion.

The treatment of choice is surgical, except in elderly patients and/or in those with low functional demand. Cases with over four weeks of evolution are considered chronic.[5] These cases present a worse prognosis due to muscle shortening, with tendon retraction, muscular atrophy, and associated fibrosis, hindering an anatomical repair of the injury. Therefore, in chronic injuries with tendon retraction of the biceps, the use of grafts for reconstruction should be considered.

The literature describes numerous repair techniques for acute injuries, as well as graft techniques for chronic injuries; the graft options include the calcaneus, palmaris longus, tensor fasciae latae, and semitendinosus tendons.[6–8]

This study is aimed at presenting a reconstructive surgical technique with autologous semitendinosus tendon graft for the treatment of chronic distal biceps tendon injuries.

Material and methods

This study included four patients who underwent reconstruction of the distal biceps tendon using a semitendinosus graft. All patients were male athletes (jiu-jitsu fighter, wrestler, soccer goalkeeper, and a fitness center goer), with a mean age of 37.75 years (range: 32–46). The mean follow-up was 15 months (range: 11–28) and took place between 2014 and 2015.

These athletes suffered indirect injuries in the dominant arm during sports activity. The jiu-jitsu fighter was injured during an eccentric contraction to defend himself against a blow applied by his opponent (arm clinch). The wrestler was injured during a fall in a defensive movement. The fitness center patient was in an eccentric movement during a biceps curl. Finally, the soccer goalkeeper was injured during a movement defending his goal.

On average, the athletes were operated 8.25 months after the injury (range: 4–13).

On physical examination, they presented elbow flexion loss of strength and particularly at supination. The Rulland and Hook tests were positive for all athletes. In all patients, magnetic resonance imaging (MRI) was used to assess the degree of the injury and to support the diagnosis.

All complications and risks of treatment options were explained to the athletes, as well as the need for autologous tissue for grafting if a primary reinsertion of the bicipital tendon was not possible.

Surgical procedure

Surgeries were performed under general anesthesia associated with locoregional brachial plexus block; the patients were positioned in supine decubitus, and tourniquets were not used.

The technique used involved two small anterior longitudinal incisions, one proximal to recover the proximal stump and another distal for reconstruction.

At the distal orifice, a longitudinal incision of approximately 3 cm was made, 2.5 cm distal to the elbow pit, guided by fluoroscopy for initial location of the radial tuberosity. The Henry approach was used to expose the radial tuberosity in supination, with delicate soft tissue spacing, thus avoiding neurological and vascular injury. The tuberosity was scarified to allow bleeding and to potentiate graft insertion.

A second, small incision of around 3 cm was made more or less 4 cm proximal to the cubital fold to isolate the retracted tendon stump, which is normally surrounded by fibrotic tissue. A blunt digital dissection was done to release the biceps muscle belly from the deep fascia and brachialis muscle. Special care was taken in the identification of the lateral cutaneous nerve of the forearm (a branch of the musculocutaneous nerve) that passes between the biceps and the brachialis.

The criterion used for the definition of tendon reconstruction was the inability of excursion of the remnant of the tendon to reach the tuberosity of the radius even after the release of the lacertus fibrosus. The tendon path (tunnel) was

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