

Rupture of the short head of the biceps brachii muscle belly caused by a rock climbing accident

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Abstract

The case of a 42-year-old rock climber is presented who suffered a complete, isolated rupture of the short head of the biceps brachii muscle after falling onto his upper arm while indoor bouldering. This is the first description of this rare injury following a climbing accident as otherwise there are only four reported cases in military paratroopers and water skiers. Moreover, there is no definitive consensus when surgical intervention is necessary. We performed a direct end-to-end suture of the muscle belly through an open surgical approach. Postoperatively we performed a detailed follow up including clinical examinations as well as sonographic and magnetic resonance imaging to check the integrity of the suture.

After 6 months our patient had regained a full range of motion without functional complaints or pain. Concerning the sports specific outcome we only found a slight decrease in rock climbing abilities (UIAA grade: - 0.33). Thus we determined a 100% SANE Score for activities of daily life and rock climbing. In conclusion we suggest early surgery as a first line treatment of this severe, but rare injury.

Keywords: muscle injury, rock climbing, biceps muscle belly, surgical therapy

Rupture de la tête courte dans le galbe du biceps brachial, dûe à un accident de varappe

Résumé

Il s'agit d'un varappeur de 42 ans qui souffre d'une rupture complète et isolée de la tête courte du biceps du muscle brachial. Le varappeur est tombé sur son bras supérieur en faisant du bloc en salle. C'est la première description de cette lésion, rare en escalade, les autres cas étant dûs à des accidents concernant des militaires parachutistes ou des skieurs nautiques. En outre, on ne sait pas exactement si ou quand une intervention chirurgicale est nécessaire.

Nous sommes arrivés, par une approche chirurgicale, à faire une suture de bout en bout dans le galbe du muscle. Après l'opération, nous avons suivi et observé le grimpeur et nous l'avons examiné cliniquement en le soumettant à des examens de résonance sonographique et magnétique afin de se rendre compte de la solidité de la suture.

Six mois plus tard, notre patient retrouvé sa mobilité, sans douleurs ressenties, ni plaintes fonctionnelles. En ce qui concerne la varappe, on a remarqué que les performances avaient un peu diminué (de l'ordre de -0,33%). Nous avons donc conclu qu'il était à 100% prêt à reprendre des activités quotidiennes et à refaire de l'escalade.

Nous recommandons donc dans ce cas une intervention chirurgicale rapide afin d'agir directement sur cette lésion sévère mais rare.

Mots clés: blessure musculaire, escalade, biceps brachial, approche chirurgicale

Introduction

Injuries of the upper extremity, especially the fingers and the shoulder, are the most common injuries in rock climbers (Popp, 2015; Schöffl, Popp, Küpper, & Schöffl, 2015). Thus the understanding of most of those pathologies as well as the treatment algorithms have improved over the last couple of years.

The following report presents the first documented case of a rare complete rupture of the short head of the biceps muscle belly due to a rock climbing accident including a thorough follow up until return to sports. Up to date there are only four reported cases of this kind of injury from accidents of military paratroopers and a water skier. (Bain & Durrant, 2010; DiChristina, 1992; Moon, Kim, & Kong, 2010; Shah & Pruzansky, 2004). As approximately 85% of the function and power of the biceps brachii muscle are provided through the short head (Sturzenegger et al., 1986), an appropriate therapy is very important to prevent the patient from a severe loss of strength and function. Due to the very low incidence, there is so far no consensus about the treatment of this injury. In general, the majority of muscle injuries can be managed conservatively (e.g. rest, NSAID, physiotherapy, platelet-rich plasma) (Hotfiel et al., 2016; Järvinen, Järvinen, Kääriäinen, Kalimo, & Järvinen, 2005; Kelc, Trapecar, Gradisnik, Rupnik, & Vogrin, 2015). There are only a few indications for surgery according to Mueller-Wohlfahrt et al.: large intramuscular hematoma, tears of more than half of the muscle belly (Grade 3b-4) and the occurrence of a compartment syndrome (absolute emergency) (Mueller-Wohlfahrt et al., 2013). In order to reduce deformity and to hopefully enable our patient to regain full strength and functionality, the decision was made to perform surgery to restore anatomical integrity.

Case report

A 42 year old, otherwise healthy, male rock climber fell while warming up in a bouldering gym. After he slipped he hit his upper arm on a prominent corner of the climbing wall. Thereby he acquired a sudden, direct blow on the medial aspect of the right upper arm with the biceps muscle being fully tense. This led to immediate pain and swelling of the mid-portion of the upper right arm. 7 days after the trauma he showed up in our sportsmedicine department, after the consultation of 2 different orthopedic surgeons who had indicated an MRI but were not sure on the best choice of treatment. The clinical examination showed a depression in the medial, mid-portion of the upper right arm with hematoma and tenderness without an open wound (Fig. 1). Furthermore there was a lack of strength especially for supination and flexion in the elbow joint. The already existing MRI images depicted a complete, isolated rupture of the short head of the biceps brachii muscle but no fracture (Fig. 2). In order to reduce deformity and to enable our patient to regain full strength and functionality, 10 days after trauma we performed an open surgical approach and restored anatomical integrity through direct end-to-end U-sutures (Vicryl 2.0) and adapting sutures (Polydioxanon 3.0) (Fig. 3). Postoperatively, the patient's upper arm was immobilized in a Gilchrist sling for 6 weeks. Passive physiotherapy with gradual progression was allowed 3 weeks after surgery and after 8 weeks our patient was able to begin with intensified rehabilitation program for muscle growth and mobilisation of the adjoining joints. 12 weeks after surgery there was an absence of pain under rest and weight bearing. Furthermore a sonographic control depicted the integrity of the muscle belly repair. Thus the stepwise restart of sports specific exertion was permitted. 24 weeks postoperatively within the framework of the final examination we performed an MRI, which showed a successful anatomical reconstruction of the medial biceps muscle belly. Still, in the area of the former rupture, a high percentage of fibrous scar tissue was found. This is, however, consistent with the healing process and time elapsed after surgery.

The clinical investigation showed a full range of motion without functional complaints or pain. Concerning the sports specific outcome we only found a slight decrease in rock climbing abilities (UIAA grade: - 0.33; UIAA grade (Schöffl et al. 2011) (red point): pre-injury VIII , 6 months post-surgery VII+). Moreover, we determined a 100% SANE Score (Single Assessment Numerical Evaluation) for activities of daily life and rock climbing. Because of these promising results, we suggest early surgery as a first line treatment of this severe, but rare injury.



Figure 1. Right upper arm with the gap resulting from the rupture of the biceps short head muscle belly.

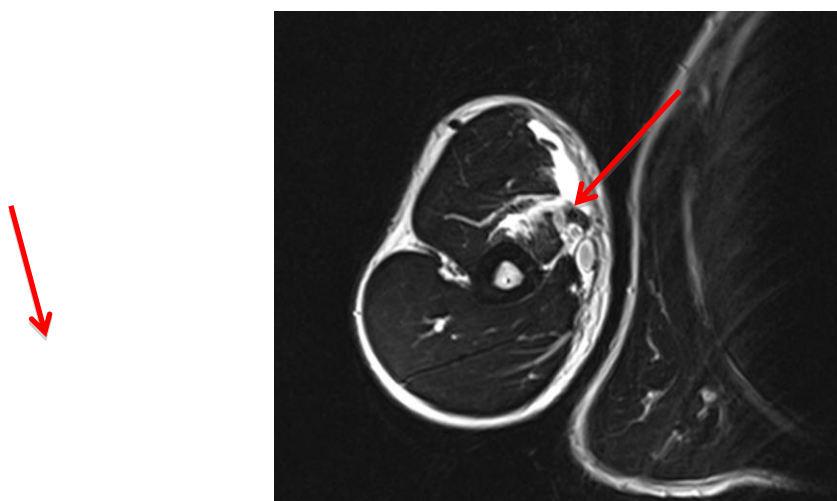


Figure 2. MRI images of the complete isolated rupture of the muscle belly of the short head of the biceps brachii.



Figure 3. Intraoperative situs before (left) and after the surgical reconstruction (right) of the muscle belly of the short head of the biceps brachii muscle.

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