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Summary

Background: Rupture oft the distal biceps tendon is a rare injury which leads to a considerable loss of supination and flexion strength. A deficit of 40% of flexion and more than 50% of supination strength is reported in the literature. Therefore, surgical reconstruction of the distal tendon is the method of choice. However, some patients opt for non-operative management and a small number of patients are not fit for surgery. The purpose of this retrospective study was to assess the results of non-operative treatment using objective muscle strength testing and evaluation of the subjective satisfaction.

Patients and method: Between 1999 and 2010, 206 patients had suffered from a distal biceps tendon rupture after trauma. Clinical examination, sonography and MRI confirmed the diagnosis. Most of these patients (85,4%, N - 176) underwent surgical intervention by refixation. 30 patients were treated non-operatively. All these patients were treated with a short-term cast-fixation followed by physiotherapy.

The screened patients underwent clinical assessment using a modified Mayo Clinic Performance Index. The supination and flexion strength was measured with an isometric strength test, taking muscle dominance into account. Visual Analogue Scale (VAS) was used for the evaluation of the subjective satisfaction.

Results: Of the 30 patients who were treated non-operatively 24 (80%) underwent follow-up examination. The mean time between trauma and follow-up was 80 months (18-138 months). A deficit of ROM was only found in one patient. The loss of supination strength was 26,6%, compared to the other arm. Loss of flexion strength was 16,1% -18,1% depending on whether the forearm was in pronation, neutral position or supination.

The overall subjective satisfaction for non-operative management was 8,9 for the VAS (10 max). The modified Mayo elbow performing score was 81,05 (90 max).

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Distal biceps tendon rupture – Is surgical reconstruction really always necessary?

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Introduction

Rupture of the distal biceps tendon is an uncommon injury, involving only 3 per cent of all biceps tendon injuries. Most often it consists of a clean avulsion of the tendon from the tuberosity of the radius. In some cases subtotal rupture occurs, with a remaining lacertus fibrosus. In contrast to injuries of proximal biceps tendons, distal tendon avulsion leads to a considerable loss of supination and flexion strength. A deficit more than 30% of flexion and more than 50% in supination is reported in the literature. Papers released in the 1980's referred to a significant loss of muscle strength after non-operative treatment [1,18]. Since then, surgical intervention is the recommended treatment, bearing in mind that this injury mostly affects middle-aged men who still have an active working and leisure life and therefore need normal strength and function. Therefore, over the last decade there wasn't much doubt about the need for operating, only the various surgical techniques were considered and discussed in literature [4,6,8,9,16,17,12,11,13–15,18,20,21,23,24].

Between 20 and 25 distal biceps tendon ruptures are treated per year in the Salzburg Trauma Centre. Although we recommend surgical intervention as the first choice, we observed that some of these patients were treated conservatively. A few of them refused the recommended operation due to working reasons. Some didn't agree to the intervention after being informed about the possible operative complications, including nerve lesions and ossification. A few patients were not fit for surgery. In all of these cases the patients got a short term cast fixation and then underwent physiotherapy for strengthening the remaining muscles. Most of them surprisingly showed a good functional outcome with a high subjective satisfaction rate. These results are in contrast to most of the papers released on this subject. As a consequence, we took a closer look at the patients who had not undergone surgical intervention and analysed the outcome retrospectively.

Patients and method

Between 1999 and 2010, 206 patients, who had suffered from a total or subtotal rupture of the distal

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Conclusion: In the literature, a significant loss of strength is reported in case of distal biceps tendon rupture. However the evidence for this is sparse. We evaluated more than 20 patients and we found that the loss of supination and flexion strength was not as severe as reported. A high patient satisfaction was found in this study as well. Taking further into consideration the loss of strength after surgical repair with the risk of nerve lesions, non-operative treatment seems to be an acceptable alternative option.

Keywords
Distal biceps tendon – rupture – conservative treatment – supination – strength

M. Pavelka et al.

Distale Bicepssehnenrupturen – Ist eine Operation wirklich immer notwendig?

Zusammenfassung

Hintergrund: Distale Bicepssehnenrisse sind eine seltene Verletzung, führen aber im Gegensatz zum proximalen Riss zu einem deutlichen Kraftverlust bei Beugung und Supination. Dieser Verlust wird in der Literatur mit bis zu 40% bei Beugung und über 50% bei Supination angegeben. Aus diesem Grund stellt die anatomische Refixierung die Behandlung der Wahl dar. Trotzdem muss in einigen Fällen eine konservative Behandlung erfolgen, da sich Patienten gegen eine Operation entscheiden oder internistische Gründe diese verbieten. Ziel unserer retrospektiven Studie war, das funktionelle Outcome von konservativ behandelten distalen Bicepssehnenausrissen zu untersuchen und gegebenenfalls neu zu bewerten.
Patienten und Methodik: Von 1999 bis 2010 wurden 206 Patienten mit Ausriss der distalen Bicepssehne behandelt. Die Diagnostik erfolgte in allen Fällen durch klinische Untersuchung und MRI. Der Großteil der Patienten (176; 85,4%) wurde nach präoperativer Abklärung und Aufklärung einer operativen Refixierung zugeführt.

biceps tendon after trauma, were treated in the Salzburg Trauma Centre. Clinical examination, sonography and MRI confirmed the diagnoses. 176 of these patients underwent surgical intervention by means of anatomical fixation of the tendon (85,4%).
Nevertheless, 30 of the patients were treated conservatively. There were different reasons for this decision: Twenty-five declined the operation and opted for conservative management. 5 patients were not fit for surgery.
In these 30 cases we treated the patients with short-term cast fixation lasting 1 to 2 weeks, which was then followed by physiotherapy. Between 2012 and 2014, all of the 30 patients were invited for retrospective follow-up examination. 24 of them agreed to the clinical assessment. After an interview with the patient clinical examination was performed. A modified Mayo Clinic Performance Index for the elbow was used to assess the functional outcome. This index includes the parameters Strength, Pain, Movement, Function and Instability. The score ranges from 0 to 100 points maximum. It was modified excluding instability as this plays no role in distal biceps ruptures. Therefore a maximum score was reached at 90 points.
Strength of supination and flexion was quantified by performing isometric strength tests. The flexion strength of the elbow was measured in supination, neutral position of the forearm and in pronation. The measurements were performed with the digital force gauge DS2 by IMADA. For testing the flexion of the elbow the patient was seated on a chair, with the testing device in front of him on the floor. The elbow was actively bent at 90 degrees, with the forearm subsequently in supination, neutral position and pronation. For supination strength testing the testing device was placed on a table on one side of the patient. After this, supination was tested with the elbow at 90 degrees. The testing was performed twice for each single measurement and the mean of both examinations was used.
As the results are influenced by whether or not the dominant arm is affected, we measured both arms, compared the strength in percent to the other arm and considered revision to the dominant arm. The difference in strength between the dominant and non-dominant arm is dependent on the specific muscles affected during movement [2]. We considered a difference of 3% as published by Müller et al [19] for elbow flexion and supination.
ROM of flexion and supination was also measured and compared to the other arm. The subjective overall satisfaction was evaluated by the Visual Analogue Scale (VAS).

Results

Twenty-four of the 30 patients (80%) underwent follow-up examination. The mean age was 51,6 years (25 – 77). There was almost no difference in age compared to the group that underwent surgery (ø 52,0 years; 25 - 79) The group consisted of 22 men and 2 women. Eight of them were office workers, 12 performed heavy manual labour and 4 were already retired. On MRI findings a complete rupture was found in 20 patients, a subtotal rupture was seen in 4 cases. The dominated arm was affected in 75% of these patients (N 18). Patients' data are listed in Table 1.
The mean time between trauma and follow-up was 80 months. The shortest follow-up time was 18 months and the longest interval was 138 months (11,5 years).