Surgical treatment of shoulder instability using transsubscapularis transfer of the long biceps tendon

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Abstract

Objective: To describe the long bicep tendon transfer technique for the treatment of anterior shoulder instability.

Method: The long tendon of the biceps brachii was detached from the supraglenoid tubercle and transferred to the anterior edge of the glenoid cavity using subscapularis tenotomy, reproducing the sling effect and increasing the anterior bone block.

Results: The technique is easy to perform and minimises the risks of coracoid process transfer.

Conclusion: Transfer of the long tendon of the biceps brachii is an option for the treatment of glenohumeral instability.

Keywords: Joint instability/pathology, Joint instability/surgery, Shoulder joint/pathology, Shoulder joint/surgery, Cadaver

Introduction

Glenohumeral instability is a very prevalent occurrence in orthopaedic practice. The condition affects young people in their productive years and has direct impacts on the careers of professional athletes or the work capacity of workers. Several surgical techniques are used to treat shoulder instability. Arthroscopic labral reconstruction is the most widely used technique, but it has a high recurrence rate in patients with anterior glenoid bone loss greater than 25%. In these cases, coracoid process transfer becomes the best option. However, this technique is not free of complications. One of the advantages of coracoid process transfer is tensioning of the subscapularis tendon through the conjoint tendon. This sling effect contributes to the stability of the humeral head during abduction and external rotation movements by tensioning the subscapularis tendon and causing it to act as an anterior block. Furthermore, the position of the bone block on the anterior edge of the glenoid cavity increases bone contact during anterior translation of the humeral head, ensuring greater bone contact and preventing dislocation.

Transfer of the long head of the biceps brachii tendon through the subscapularis tendon and its tenodesis on the anterior edge of the glenoid cavity next to the labral repair reproduces the sling effect of the subscapularis tendon and allows anterior contact by means of soft tissue thickening (augmentation).

Materials and methods

This study was approved by the Research Ethics Committee of our university, under the care of the Department of Anatomy. The cadaver was placed in lateral decubitus, with the upper limb abducted to 30°. The posterior acromion angle was identified. A posterior portal was marked by having inspected the joint, the anterior portal was marked by inserting a Jelco n° 14 needle (outside-in) into the rotator cuff. The starting point of the tenotomy coincided with the inferior edge of the glenoid cavity.

Tenotomy of the long biceps tendon was performed through the anterior portal, from its insertion in the supra-glenoid tubercle. The tendon was then removed from the bicipital groove in the humeral head through the anterolateral portal and transferred to the intra-articular environment via the access cable.

Having inspected the joint, the anterior portal was marked by inserting a Jelco n° 14 needle (outside-in) into the rotator cuff. The starting point of the tenotomy coincided with the inferior edge of the glenoid cavity.
In coracoid process transfer surgery (Latarjet), the conjoint tendon is transferred along with the graft. The tendon is responsible for subscapular tensioning and formation of the anterior myotendinous block. In the event of avulsion or non-consolidation of the graft, flexion strength compromise can be expected.

We believe that this procedure may be a viable option for patients with anterior glenohumeral instability, Bankart lesion, and mild to moderate bone loss and with an intact rotator cuff.

Given this information, we suggest the transfer of the long tendon of the biceps brachii to the anterior edge of the glenoid cavity, through the subscapularis tendon, thus reproducing the sling effect, creating an anterior barrier and increasing the labral surface through augmentation with the tendon.

Results
The shoulder was positioned in abduction and external rotation, the scapula was stabilised, and a steady and progressive force was applied to the distal humerus, in the anterior-posterior direction, to reproduce the force that would lead to dislocation. Before the intervention, 50 kgf could be applied without the occurrence of dislocation. We then reproduced a Bankart lesion in the anteroinferior glenoid labrum and middle and inferior glenohumeral ligament lesions. The shoulder was then subjected to the same dislocation force. Joint congruence loss occurred after the application of 12 kgf.

We performed surgery for labral lesion repair, transsubscapularis transfer of the bicipital tendon with augmentation of the anterior labrum, and, finally, capsular and subscapularis tendon-re-tensioning. After the procedure, the shoulder was again subjected to dislocation force, with loss of congruence occurring at a force of 21 kgf.

Discussion
The biceps brachii muscle is a flexor and supinator of the forearm. Proximally, the short head of the biceps brachii is attached to the coracoid process of the scapula. The long head of the tendon passes within the capsular ligament in the humeral head of the bicipital groove and is inserted into the scapula in the supraglenoid tubercle. The long tendon of the biceps brachii is a joint stabiliser, acting as a depressor of the humerus during abduction on the scapula plane.

Several disorders of both a traumatic or degenerative nature may affect the tendon and cause pain. Tenotomy is an appropriate treatment and does not cause clinical consequences, such as instability, chondral lesions, or humeral head ascension. The long tendon of the biceps brachii is considered a vestigial structure, as it functions as a secondary stabiliser in bipedal primates; its absence does not affect shoulder function.

The short tendon of the biceps brachii has its proximal anchor point in the coracoid process. Short tendon lesions have clinical repercussions. This tendon is responsible for ⅔ of the elbow flexion strength; therefore, its rupture leads to a loss of strength.

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