Anatomic measurements of the coracoid and its implication in the Latarjet procedure

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Abstract

Background: Latarjet procedure is frequently done to treat shoulder instability. It includes osteotomizing the coracoid distal to the insertion of the coracoclavicular ligament. Knowledge of the insertion of the trapezoid ligament is important to determine the level of the osteotomy.

Methods: Ten shoulders were dissected free of overlying soft tissue while preserving the ligament and muscle attachment on the coracoid. The distance between the tip of the coracoid to the coracoclavicular ligament and the pectoralis minor insertion width on the coracoid was measured.

Result: The average distance from the tip of the coracoid to the trapezoid insertion was 2.6 cm. The average pectoralis minor insertion width was 1.9 cm.

Conclusion: To preserve the insertion of the trapezoid ligament, the coracoid should be osteotomized less than 2.6 cm from the tip of the coracoid.

Keywords: Latarjet, unstable shoulder, coracoclavicular ligament, coracoid length

Introduction

The Latarjet procedure, which was described in 1954 [1], is frequently done to treat recurrent anterior dislocation of the shoulder. The indications for Latarjet include glenoid bone loss and / or big hill sachs defect. However, for many surgeons in Europe it is a primary procedure of choice to treat anterior instability, irrespective of the bone loss [2]. The procedure includes osteotomizing the coracoid at its base, mobilizing it along with the conjoint tendon and fixing it medially on the glenoid with the help of two screws [2]. This is done by first removing the coracoacromial ligament and the pectoralis minor tendon and then osteotomizing the coracoid at the base but sparing the coracoclavicular ligaments. However, the coracoclavicular ligaments are often not visible at the time of surgery. There is also, no consensus on the size of the coracoid that should be osteotomized. Thus the knowledge of the insertion of the trapezoid ligament on the coracoid is important to decide the level of the osteotomy. It is also desirable to have a big coracoid graft to ensure good bone availability for two screws [3]. According to some reports in the US and Europe, a graft size of 2.5-3 cm is usually available during the surgery [4]. Our surgical experience in the Indian population says that the available coracoid graft is smaller than the western counterpart.

The purpose of this study was to measure the distance between the tip of the coracoid and the distal insertion of the trapezoid ligament. This distance will define the safe zone of the coracoid, which is free of the coracoclavicular ligament at the time osteotomizing the coracoid, as the osteotomy should not violate the insertion of the trapezoid ligament.

Material and methods

Ten shoulders in embalmed cadavers were dissected free of skin, subcutaneous, overlying deltoid and pectoralis major muscle to expose the coracoid and its ligamentous attachment. These cadavers had no shoulder joint pathology or any scars on gross inspection. The coracoid along with conjoint tendon, pectoralis minor tendon, coracoclavicular ligament and trapezoid ligament was exposed (fig1). The tip of the coracoid was defined as the most distal bony projection of the coracoid. A digital caliper was used to measure the distance of the trapezoid ligament attachment on the coracoid from the tip of the coracoid and the width of the pectoralis minor attachment on coracoid.
The distance between the tip of the coracoid and the distal insertion of the trapezoid attachment was considered as the safety zone for the osteotomy of the coracoid process.

Results
The coracoid anatomy measurements were repeated twice to record the average value. The mean width of the pectoralis minor attachment on the coracoid was 1.6 cm (S.D. 1.1 cm) (fig 1). The average distance from the tip of coracoid to the distal attachment of the trapezoid ligament was 2.6 cm (S.D. 1.1 cm) (fig1). This distance was the safety zone, which was free of any trapezoid ligament attachment.

Discussion
The coracoid transfer procedure described by Michele Latarjet in 1954 used one screw to fix the coracoid in horizontal lying down position to the glenoid neck [1]. Bristow also described a procedure to treat recurrent dislocation wherein he used one screw to fix the coracoid in standing position [5]. However, Didier Patte modified the original Latarjet procedure to fix the coracoid in the lying down position with two screws and also explained the triple blocking effect of the grafted bone [6]. Gilles Walch further pioneered the procedure by fixing the coracoid with two malleolar screws, which are 4.5 mm in size. If two malleolar screws are used to fix the coracoid, we have to ensure there is at least 1 cm bone between the two screws. It is also desirable to leave 3 mm of bone on either side of the bone [3]. The length of the coracoid should be around 10+4.5+4.5+6 = 24 mm. When the coracoid is smaller than this size, the screws can be 3.5 mm [9].

The arthroscopic Latarjet technique described by Lafosse et al utilizes two malleolar screws, which are 3.5 mm screws for fixation of coracoid. Armitage et al also measured the coracoid on CT scans and found the mean length, width to be 16.8 and 15 mm respectively [10]. Our study was done to assess the safe zone, which is free of coracoclavicular ligament attachment, hence raw measurements of the width and height of coracoid were not considered significant.

The limitations of this paper are that we only studied 10 shoulders due to the limited availability of cadavers. The other limitation is that this study was done in embalmed cadavers, however the measurements were done in shoulders with intact ligaments, so there should not be a difference in accuracy as compared to fresh cadavers.

Conclusion
The recommended level of the osteotomy of the coracoid in classic Latarjet procedure should be less than 2.6 cm from the tip of the coracoid to preserve the attachment of the trapezoid ligament.

References