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## Functional outcome study of anatomical coraco-clavicular and acromio-clavicular ligament reconstruction for chronic unstable acromio-clavicular joint dislocations: A prospective mid-term follow up study

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### Abstract

The Acromioclavicular joint represents the link between the clavicle and scapula, which is responsible for synchronized dynamics of the shoulder girdle. Traumatic injuries to acromioclavicular joint (AC joint) are commonly sustained by contact-sports athletes in high impact collisions or falls. Rockwood classified these injuries into types I through VI. Type I to type III injuries are treated conservatively and type IV -VI injuries require surgical management. Injuries of grade III - V require reconstruction of AC and CC ligaments. We present a surgical technique involving harvesting of semitendinosus autograft from hamstrings and using it to anatomically reconstruct the conoid and trapezoid portions of the coraco-clavicular ligament and the superior acromio-clavicular ligament/capsule. This technique is beneficial because it provides both horizontal and vertical stability. The purpose of our study was to find out the functional outcome of the procedure performed in mid-term follow-up. In our study the result was good functional outcome at 5 year follow up and subsequent followups provided proper placement of clavicular and acromian tunnels at the time of surgery.

**Keywords:** acromioclavicular joint, coraco-clavicular ligaments, semitendinosus graft

### Introduction

The Acromioclavicular joint represents the link between the clavicle and scapula, which is responsible for synchronized dynamics of the shoulder girdle. Traumatic injuries to acromioclavicular joint (AC joint) and ligamentous structure can range in severity, as can the degree of subsequent joint instability. Injuries of this nature are commonly sustained by contact-sports athletes in high impact collisions or falls. Rockwood classified these injuries into types I through VI. Type I to type III injuries are treated conservatively and type IV -VI injuries require surgical management. Surgical treatment of AC joint dislocations has been performed since 1861 and over 100 different surgical techniques have been described for acute and chronic dislocations. Resection of distal end of clavicle (Mumford procedure) is indicated for symptomatic grade I or II unreduced dislocations in which the coraco-clavicular ligaments are intact. Injuries of grade III - V require reconstruction of AC and CC ligaments. The use of free tendon grafts in conjunction with suspensory devices has demonstrated reliable post operative outcomes and low rates of reoperation. We present a surgical technique involving harvesting of semitendinosus autograft from hamstrings and using it to anatomically reconstruct the conoid and trapezoid portions of the coraco-clavicular ligament and the superior acromio-clavicular ligament/capsule. This technique is beneficial because it provides both horizontal and vertical stability, resulting in overall shoulder stability and with no implants being used in it, no chance at implant backout, impingement and is hence cost effective also.

### Methods

We reviewed 22 cases of chronic AC joint dislocations in 18 males and 4 females. The mean age was 28 years that were treated with single bundle reconstruction.

The mean duration of follow-up was 6.1 years with a minimum follow up of 5 years post surgery and maximum follow up of 8 years post surgery.

### Anatomical considerations

The AC joint connects scapula to the thorax. The AC ligament provides horizontal stability and CC ligaments provides vertical stability. The distance from the AC joint from medial end of its capsule is 0.4 to 1.4 cm. The trapezoid began on an average at 2.0 -2.8cm and the conoid ligament began on an average 3.9-6.2 cm.

### Surgical technique

The procedure is performed under regional anaesthesia and spinal anaesthesia and patient is positioned in a beach chair position with a sandbag under the scapula. The patient arm is kept adducted. Superior approach is used.

The anterior fibres of deltoid muscle covering the coracoid are detached from the clavicle to reach to the coracoid. Then with only blunt finger dissection, the coracoid is swept across at the level of the elbow of the coracoid process carefully so as to preserve all the soft tissue attachments of coracoid and then with the help of a right angled hemostat, a passing suture is passed from underneath the coracoid at the level of its elbow from a window just posterior to the attachment of the coraco-acromian ligament laterally and the posterior most fibers of the pectoralis minor muscle medially. The AC joint is exposed and lateral cartilaginous portion of the clavicle excised using a small oscillating bone saw.

### Preparation of CCL footprint at clavicle

The CCL remnants are removed from the undersurface of clavicle. The CCL footprint is debrided by a bone nibbler.

### Harvesting graft

Semi-tendinosus hamstring graft is harvested from ipsilateral side and prepared.

### Creation of Clavicular and Acromion tunnels

Two tunnels are drilled in clavicle; they are 2.5 and 5 cm respectively from lateral end of clavicle (as per the thickness of graft) representing the conoid and trapezoid portions of the coracoclavicular ligament. One tunnel is drilled in acromion 2.5 cm from the AC joint, taking care not to damage the rotator cuff beneath the acromion process.

### Ligament reconstruction

Graft is passed from lateral drill hole of clavicle and passed underneath the coracoid from its medial side and turned back from its lateral side making figure of eight and passed through the medial drill hole of clavicle and tied over the superior surface of the clavicle while reducing the joint in vertical plane and then the remaining graft is passed through the hole in acromial drill hole and brought out through the anterior portion of acromion towards the clavicle and then tied with the sutures of the clavicular portion of the graft while reducing the joint in horizontal plane. Usually the clavicle is displaced superiorly and posteriorly and hence passing the graft in this manner and fixing it brings the clavicle inferiorly and anteriorly in line with the acromion and hence the AC joint is stabilized in both the vertical and horizontal planes.



Fig 1: X-ray showing AC joint disruption



Fig 2: AC and CC ligament reconstruction using semi-tendinosus graft



Fig 3: Post-op X-ray showing joint relocation

### Results

Reconstruction with semi-tendinosus graft in chronic AC joint dislocations provides good functional outcome at 5 year follow up and subsequent followups.

### Conclusion

Anatomical ligament reconstruction for the treatment of chronic AC joint dislocation resulted in successful long-term clinical and radiographic outcomes. It is important to ensure proper placement of clavicular and acromion tunnels at the time of surgery.

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