



International Journal of Orthopaedics Sciences

ISSN: 2395-1958

IJOS 2018; 4(3): 305-307

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www.orthopaper.com

Received: 25-05-2018

Accepted: 26-06-2018

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Study of outcome of management of chronic acromioclavicular joint dislocation with palmaris longus autograft and tension band wiring

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DOI: <https://doi.org/10.22271/ortho.2018.v4.i3f.55>

Abstract

Introduction: The management of chronic Rockwood type III, IV, V and VI Acromioclavicular joint (ACJ) dislocation remains controversial. Good-to-excellent results can be obtained with nonsurgical management, however, surgical management of ACJ dislocation restores joint anatomy, thus avoiding obvious deformity and gives overall better outcome.

Methods: In this prospective study ten patients (7 men, 3 women), with Rockwood type III (ACJ) dislocation, underwent coracoclavicular (CC) ligament reconstructive surgery using a palmaris longus tendon graft and tension band wiring across AC joint. All patients were evaluated clinically preoperative and at subsequent follow-ups using Visual Analogue Scale and Constant Murley Shoulder Score, and radiologically comparing Coracoclavicular distance (CCD) of injured to the normal side on preoperative radiograph, on the second day postoperative and at final follow-up. The mean follow-up was 12 months (range: 10-18 months).

Results: At the final follow-up, the Visual Analogue Scale (mean 0.8) revealed a good to excellent clinical outcome. The mean Constant-Murley score was 93.4 (range 74–96). The difference in the CCD of injured side compared to the contralateral side was <5mm for 9 patients and between 5-10 mm for 1 patients at final follow up.

Conclusion: This study concludes that Acromioclavicular joint reduction with tension band wiring and reconstruction of the coracoclavicular ligament using palmaris longus tendon autograft provides good functional outcome with satisfactory clinical and radiological results for Chronic AC joint injuries. However larger group case series is required to further evaluate this procedures outcome.

Keywords: Chronic AC joint dislocation, palmaris Longus Autograft, tension band wiring, constant Murley score

Introduction

Acromioclavicular joint (ACJ) injuries account for about 12% of all shoulder injuries in clinical practice and nearly 50% in athletes participating in contact sports [1]. There is a general consensus regarding conservative treatment for types I and II acute AC joint dislocations, and surgical treatment for types IV, V and VI AC joint dislocations [2]. The management of acute as well as chronic Rockwood type III ACJ dislocation remains controversial. Some authors obtained good-to-excellent results with nonsurgical management; however, others have reported that Surgical management for type III ACJ dislocation restores joint anatomy, thus avoiding residual deformity, pain and other symptoms at final follow-up evaluations. Many methods have been propagated for treatment of Chronic AC joint disruption which include reconstruction of Coracoclavicular (CC) and Acromioclavicular ligaments (AC) ligaments with various soft tissue grafts like palmaris longus, semitendinosus, fibre wires and others [8]. We present here the results of our technique of reconstruction of chronic AC joint disruption with Palmaris longus graft and augmenting the repair with Tension band wiring across ACJ.

Method and Material

This study was conducted at Dhiraj Hospital, Waghodia, Vadodara. 10 consecutive patients of chronic AC joint injuries were included in this study after obtaining proper consent. Patients were evaluated preoperatively by thorough clinical examination and appropriate radiographs.

Surgical Technique

Patient positioning & Anesthesia: Preoperatively all patients were checked for the presence of Palmaris longus tendon by making a pinch of thumb with little finger & some flexion of wrist which made the tendon prominent. After induction with General anaesthesia, patients were placed in supine position with sand bag under ipsilateral scapula. Palmaris longus tendon autograft from the ipsilateral side was harvested. The Graft was stitched on both ends with Ethibond No. 2 with goal diameter of 4-6mm & goal length of 5-6cm.

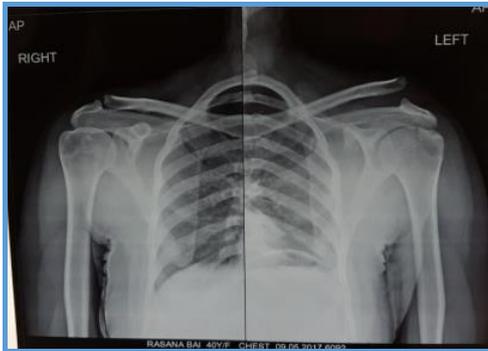
Surgical Approach and procedure

The incision for AC joint was placed horizontally centered approximately 2-3cm lateral to the AC joint & curvilinear toward the coracoid process, approximately 6-8cm long, taking care to protect the supraclavicular nerves. The deltotrapezial fascia was incised transversely. The deltoid was dissected off the anterosuperior surface of clavicle subperiosteally, allowing visualization of the coracoid process and the acromioclavicular joint. Care was taken not to damage the CC ligament when dissecting the area between the clavicle and the coracoid. The medial and lateral borders of the coracoids process were defined and dissected subperiosteally for graft passage. Full thickness flaps

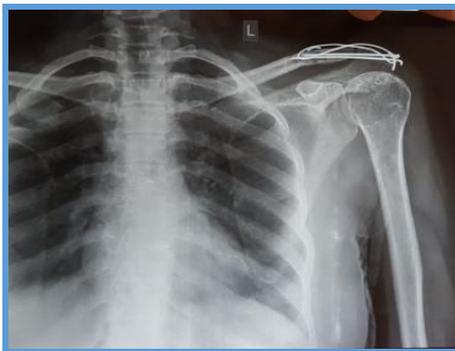
including periosteum, are made from midline of the clavicle both anteriorly and posteriorly achieved adequate visualization of the bone.

Using a 4.5mm drill bit, two holes are drilled on lateral end of clavicle with adequate bone bridge in between at a place which resembled the anatomic position of the trapezoid and conoid parts of the coracoclavicular ligaments.

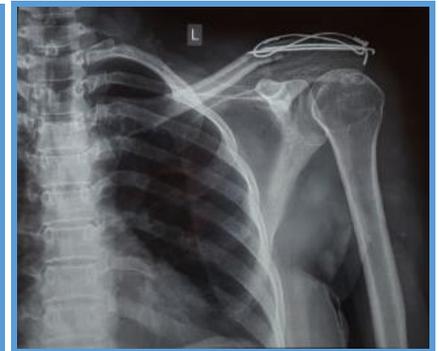
Through the a subcoracoid passage, the prepared Palmaris longus autograft was passed with help of curved hemostat. With help of straight needle with eye, the graft ends were passed through the pre drilled holes in clavicle and brought out on the superior surface. The torn disc in the AC- joint was removed. The ACJ was reduced & fixed with 2 k-wire lateral to medial passing from the acromian process to the clavicle holding the AC joint in reduced position under IITV guidance. The graft ends were now sutured with each other over superior surface of clavicle with Ethibond No 2. Another drill hole was made from anteroposterior direction 3cm medial to the lateral end of clavicle and one end of SS wire loop was passed from this hole. Further going in figure of 8 manner the SS wire loop was tightened underneath the bend ends of K-wire laterally to complete the tension band construct. Final reduction and fixation was checked with IITV and compared with contralateral side.



1: Pre Operative



2: Immediate Post Operative



3: Twelve Month Follow Up

Post-operative rehabilitation

Patients were placed in shoulder arm pouch for a duration of 3 weeks. Gentle passive range of motion of the elbow & wrist was encouraged during this time. At 3 weeks, patients were referred to physical therapist for pendulum exercises & passive shoulder motion, whilst active assisted motion exercises commenced after 4th week post op. Strengthening exercises were delayed until 2 months. All patients were evaluated preoperative, on the second day postoperative, at 1 month, 3 months, 6 months and at final follow-up.

Results

All patients were available for follow up and were evaluated clinically (using Visual Analogue Scale & Constant Murley Score) and radiologically (AP and Stress views) comparing the injured with the contralateral side. The mean duration of follow up was 12 months (range, 10-18) and the mean patient age was 33.1 years (range 19-46 years).

Clinical outcome

At the final follow-up the Visual Analogue Scale (mean 0.8) revealed a good to excellent clinical outcome. The mean Constant-Murley score [3] was 93.4 (range 74-96). One patient (10%) suffered superficial infection and was treated with appropriate antibiotic. There were no cases of implant loosening or graft failure.

Radiological outcome

The pre-operative, the immediate postoperative and final follow up x-rays obtained were evaluated. A significant difference was found in the Coraco Clavicular Distance (CCD) between pre-operative and post-operative radiographs obtained on second day after surgery (mean 9.3 post op versus mean 18.7 mm pre op). The CCD difference of the injured side compared to the contralateral side was divided into three groups: <5 mm, 5-10 mm and >10 mm. There were 9 patients (90%) with a distance <5 mm and 1 patients with a distance of 5-10 mm (10%). At time of final follow-up, the CCD had significantly increased to 14.7 mm in one patient, compared to his immediate post-operative value of 9.2 mm and to the CCDistance of the contralateral uninjured shoulder of 9.1 mm. However this radiological variation did not affect the patient's overall functional outcome (Constant Murley score 91 at final followup).

Discussion

AC joint is a diarthrodial joint, with stability maintained by the trapezoid and conoid parts of CC ligament in addition to the capsule, deltoid & trapezius. AC joint injuries are commonly seen in young patient especially those who participated in contact sports. Suspicion of AC joint injury should prompt the clinician to obtain standard AP, axillary and scapular Y and Zanca views which are AP radiograph

with 10–15 degrees cephalad tilt removing the superimposing structures and allows complete visualization of the clavicle and its corresponding articulations [2]. Many operative techniques have been used for treatment of AC joint dislocation which can be divided into 2 groups focusing on the ligament healing or on the ligament reconstruction. The first techniques like tension band wiring try to maintain the clavicle-coracoid relationship in a reduced position in order to allow primary healing of the CC & AC ligaments, which are mainly indicated for acute dislocations. The second group techniques focuses on CC & AC ligament reconstruction and is used for chronic dislocation [4, 5]. There is also a debate of Early versus Late AC Joint surgical treatment. Whilst one group of surgeons have reported good-to-excellent results with nonsurgical management; the other group have reported that early surgical management for ACJ dislocation restores joint anatomy and improves the function more efficiently. Rolf *et al.* found that patients with type III injuries who undergo early AC ligament reconstruction have significantly improved outcomes when compared with those who underwent a trial of therapy followed by surgical treatment greater than 3 months from the index injury [10].

There is still no gold standard treatment for ACJ type III dislocation. Stabilization of the AC joint is achieved by the joint capsule and the CC ligaments. A healthy AC joint has been shown to accommodate 4–6 mm of translation in the anterior, posterior, and superior planes under a 70 N load. Furthermore, the AC joint undergoes rotary motion of 5° to 8° during scapula-thoracic motion and around 45° during shoulder abduction [7]. Lim *et al.* showed that the clavicle rises in full overhead elevation up to 35 degrees and rotates along its long axis by 45 degrees. This explains why techniques using only a rigid AC joint fixation with only Kirschner wires, Steinman pins or CC screws have failed to achieve optimal results due to their backing out and fallen out of favor in clinical practice due to their high failure and complication rates, as the clavicle and the AC joint are highly flexible [5, 7, 11].

On the other hand, Anatomic reconstruction of the CC ligaments causing only semi-rigid fixation techniques such as tendon grafts with implantation allows for the natural movement of the clavicle, but these fixations have shown failure such as button breakage, graft ruptures and coracoid fractures on long term follow up in some studies [8, 9]. DeBerardino *et al.* showed excellent early clinical results without complications after AC reconstruction using a hybrid device that incorporated a graft with suture fixation, although concerns exist regarding coracoids fractures due to the size of the hole that needs to be drilled and the technical aspects of drilling such a hole in the base of the coracoid made the technique controversial [12]. In 2010, Salzmann *et al.* [4] reported outcomes of arthroscopic anatomic 2-bundle cortical fixation button reconstruction of AC joint separations. They showed satisfactory clinical results in 23 patients at a minimum of 24 months followup. However, an 11.5% (3 of 26 patients) revision rate included 1 coracoid fracture, 1 button slippage, and 1 wound infection. Also caudal migration of the button (4 patients) or break out (1 patient) was noted in 22% [6].

Biomechanical data has demonstrated that free graft reconstruction techniques with additional fixation with K wires and SS wire loops provides more stable fixation constructs than other techniques for treatment of ACJ injuries [9]. The results obtained in present study correlate well with this data, providing good to excellent outcome in majority of

the patients with minimal complications. Our patients had relatively early post operative mobilization and more stable fixation with excellent long term results. Thus, the present study provides with a novel technique for treatment of chronic AC joint injuries and may help in streamlining its management. however larger patients group is required to further validate these results.

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