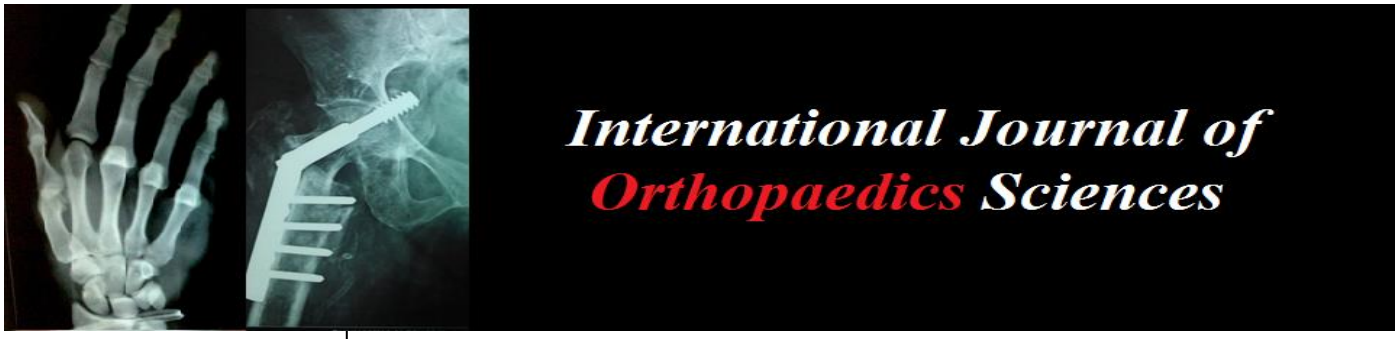

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Reconstruction of acromioclavicular joint reconstruction with palmaris longus autograft: Surgical technique

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Abstract
Objective: A common cause of shoulder pain in the young athletic male is Acromioclavicular (AC) joint separations, so reconstruction measures may be designated for efficient enhancement. A multitude of surgical reconstruction techniques exist.
Material and method: 15 patients of AC joint dislocation with type IV and V injury were treated by a technique using a Palmaris longus autograft in reduction and fixation of the joint.
Result: Postoperatively, pain and deformity was vanished, no superior relocation was noted even after three years of primary surgery, no infection and no restricted range of motion was noted.
Conclusion: The anatomic reconstruction of the coracoclavicular ligaments with grafts validates promising clinical and biomechanical effects.

Keywords: Acromioclavicular joint, dislocation, autograft, Ligament reconstruction

Introduction
The one of the most common shoulder injury is acromioclavicular (AC) joint injuries, may occur direct force to the acromion when the arm in an adducted position, mostly in the young athletic population and the incidence of these injuries is 9.2 per 1,000 person years [1, 2]. AC joint injuries are more pretentious in male as compare to female [1]. Nonoperative procedures are preferred for type I and II injuries and surgical interventions are done for type IV & V injuries but treatment of choice for type III injuries remain controversial and decided case to case basis [3, 4]. The good-quality randomized controlled trials which compare surgical interventions v/s nonoperative treatment are meagre [5]. For surgical treatment purpose many techniques are designed mainly focusing on substituting or reconstructing the coracoclavicular ligament like Coracoclavicular screw, Hook plate, Endobutton coracoclavicular fixation and Ligament reconstruction recommended by many researchers [6, 7, 8, 9, 10]. Out of which the autograft or allograft reconstruction used for the anatomic reconstruction of the CC and AC ligaments in those injuries has promptly gained acceptance in the past few years [11]. This autograft technique for AC joint reconstruction is more meticulously reinvents initial anterior-posterior and superior-inferior translational stability of the intuitive joint as compared to other procedure.

Technique
Radiographic evaluation
In suspected AC joint injuries, Plain anteroposterior (AP) and axillary radiographs are the preliminary imaging modality of choice where Perpendicular dislodgment of the distal clavicle may be detected on the AP view, while anteroposterior displacement may be obvious on the axillary view [12]. MRI can be used to imaging of ligamentous and soft tissue structures, to assess the magnitude of injury for operative judgement making [13].

Patient Positioning
The patient was placed in the modified beach chair position just after the induction of regional and general anaesthesia, taking caution to pad all bony eminences and properly place the neck

and contralateral extremity. The affected shoulder was examined under anesthesia for any evidence of glenohumeral joint instability. At this point, the injuried shoulder was prepped and draped sterilely. A time-out was called to confirm the correct patient, procedure, operative site and side, and administration of antibiotics.

Surgical technique

A vertical incision was placed 1.5 cm medial to AC joint, deltotrapezial fascia incised in Hocky stick shape fashion, where long lines was parallel to clavicle and short line was parallel to AC joint. Distal end of clavicle was identified and distal 1 cm of clavicle were exposed and removed, through the deltopectoral interval, coracoid process is identified and cleared from adjoining muscles and neurovascular structures, a special curved forceps was passed from medial to lateral underneath the coracoid process. A no 5 ethibond was grabbed laterally and passed with help of forcep, for pass of graft, soft tissue stretched with help of forcep. Two holes were made over the clavicle at distance of 4.5 cm and 3.5 cm form the distal end. Proximal hole was posteromedial and distal hole is anterolateral with a 4 mm drill bit, previously passed thread was taken from these representative hole, a palmaris longus autograft was prepared with Krackow technique. The graft was passed through the tunnel with help of previously passed ethibond, reduction of the clavicle was done with pusher and clamp. After reduction both ends of the graft tied with each other and further reinforcement was done with Vicryl no 1, after knot tying, both remaining limbs were sutured to soft tissue over acromion on posterior aspect to prevent horizontal translation. Wound wash was given and deltotrapezial fascia was repaired with ethibond no 2, knot keep embedded deep to fascia to prevent irritation rest closure was done in routine fashion.

Postoperative Rehabilitation

The operated extremity was put in pouch for support for 4 weeks. Pendulum exercise and passive stretching exercise were begun at 4 week time. Active and active-assisted motion commenced after the 6-8 week. Strengthening was typically delayed until 10–12 weeks after surgery. Sports were avoided for approximately 4 months.

Results

15 patients of AC joint dislocation with type IV (fig no 1a) and type V injuries were operated over the time period of last three years with described technique (fig no 1b). Mean injury time was 3 weeks, range from one week to 6 months. Out of which one patient was having communited fracture of lateral end of clavicle treated with locking plate somewhere else and present with failure. All treated patient in preoperative condition had deformity at AC joint and pain but their range of motion (ROM) was almost full. Preoperatively, abduction and external rotation strength was 4/5 in all patients that was improved to 5/5 in all patients.

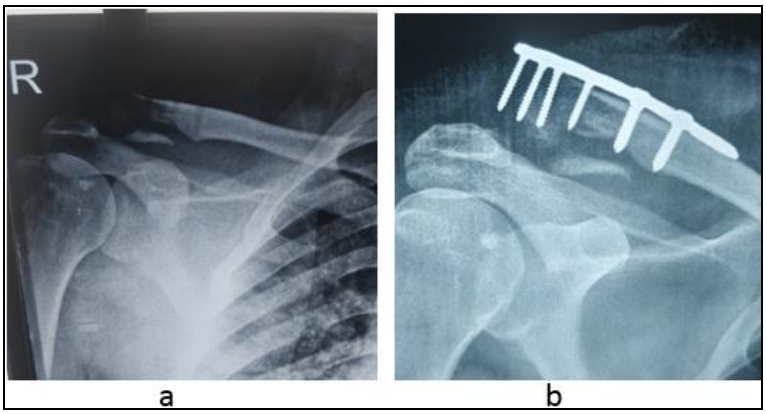

Fig 1: (a) Preoperative skaigram of patient showing type IV AC joint injury. (b) Postoperative skaigram of patient treated with Plmeris longus autograft technique.

Postoperatively, pain and deformity was gone, no superior migration was noted even after three years of primary surgery, all patients were happy with outcome, no infection and no restricted range of motion was noted.

Discussion

In the present study a new technique for an open anatomic reconstruction using a Palmaris longus autograft in AC joint injury in type IV and type V injuries. This autograft preparation can be performed at any time with a simple whipstitch using high-strength, nonabsorbable suture. The management of type III are remain disputed, some are preferred surgery over the conservative approach while others have different opinion. Many surgical techniques for AC joint injuries are defined time to time. Factually, first generation fixation techniques with cerclage wire, hook plate, or lag screw showed decent initial results [14, 15]. However, complications including hardware migration, loss of reduction, fracture, and hardware failure were a concern, and alternative methods were introduced.

Weaver Dunn procedure, a nonanatomic reconstruction technique, was the most often used process for indulgence of acute or chronic AC joint separations [9]; still, biomechanical studies revealed subservience in strength building along with an undesirable rate of recurrence [14, 15] in this nonanatomical reconstruction, when the coracoacromial ligament is transferred from the acromion to the distal end of the clavicle, this often displaces the clavicle anteriorly and can cause permanent deformity [16]. Recently, novel techniques for acute fixation have been encouraged for curing of the innate CC ligaments. A suture button through or around the coracoid and through the clavicle are most commonly embrace in this line and study suggested comparable results to the native ligaments and the clavicle is restored to its anatomic position for better cosmesis [17] but with a reported complication rate up to 44% [18] including coracoid fracture, button failure as well as suture fatigue resulting in loss of reduction. Tauber *et al*. conducted a prospective comparison study, with 24 patients observing clinical outcomes between the modified Weaver-Dunn and anatomic CC reconstruction techniques

using a semitendinosus tendon autograft. Although both groups experienced improvements in ASES and Constant Scores at 37 months, the patients receiving an anatomic reconstruction experienced superior outcomes relative to the modified Weaver-Dunn group. In addition, the anatomic group had a decreased CC distance under stress loading (P ¼. 027), indicating greater postoperative stability [16].

In present study a technique using a Palmaris longus autograft was used in reduction and fixation of the joint, to elude the jeopardy of coracoid fracture as the graft was looped under the coracoid and the results are comparable with previous study done on 32 patients by Kocaoglu B *et al.* [19]. The hazard of clavicle fracture was condensed by a small drill bit. Another exceptional feature is the biologic supplement can then be secured with the AC joint which was already reduced. Overall, this modest practice deliver an anatomic reconstruction with imitation of the CC ligament, improved initial fixation with the graft and lessened risk of coracoid fracture.

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