COMPARATIVE ANALYSIS OF AUTOGRAFT TECHNIQUE AND CLAVICULAR HOOK PLATE IN GRADE 3 ACROMIOCLAVICULAR DISLOCATIONS

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ABSTRACT

OBJECTIVE
To evaluate clinical outcome of clavicular hook plate and autograft technique in the surgical treatment of Rockwood Grade-III acromioclavicular joint dislocation.

METHODS
Fifteen patients were operated using standard clavicular hook plate and another fifteen patients were operated using autograft technique. After a minimum follow-up of one year, clinical assessment was done using Constant-Murley Score. Statistical evaluation was done using SPSS ver. 21.0.

RESULTS
Mean age group was 31.44 ± 7.8 years. Average constant shoulder score for the hook plate group was 81.3 (Range 74-89) and that for autograft technique group was 91.7 (Range 88-97).

CONCLUSION
Autograft technique was found to be superior in terms of functional outcome when compared to clavicular hook plate. Such superiority can be attributed to the biologic nature of coracoclavicular ligament reconstruction in the autograft technique.

KEYWORDS
Acromioclavicular Dislocation; Autograft; Hook Plate.


INTRODUCTION
Injuries to Acromioclavicular joint are fairly common and constitutes 12% of all injuries to shoulder girdle.¹ Acromioclavicular dislocation is classified as per criteria given by Rockwood et al.² In Grade III dislocation, both acromioclavicular and coracoclavicular ligaments are completely disrupted resulting in superior displacement of the distal clavicle. Many surgical treatments have been proposed to deal with such challenging injuries, but still there is no gold standard procedure yet.

Furthermore, conservative approach to Grade III Acromioclavicular dislocations is considered appropriate by many authors.³ In this paper, we have done a comparative analysis between clavicular hook plate technique and autograft technique in a fairly young study population suffering from chronic Grade III Acromioclavicular dislocation.

MATERIAL AND METHODS
In our hospital, between May 2010 and February 2013, thirty patients who had Rockwood Grade III AC Dislocation were operated by the senior author:

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All the patients were operated under general anaesthesia in the beach chair position. Interscalene block was also given. In the first group of fifteen patients, clavicular hook plate was used to stabilize the acromioclavicular joint with no attempt at coracoclavicular reconstruction.

In the other group of remaining fifteen patients, tendon autograft in form of semitendinosus was harvested from ipsilateral knee using a tendon stripper. After standard graft preparation, drill holes were made in the distal clavicle corresponding to anatomical attachment points of coracoclavicular ligament and the graft was then passed under the coracoid process in a figure of eight fashion. After reduction of the AC joint, the graft ends were secured using Ethibond No. 5. In both the groups, distal clavicle excision as done in Mumford procedure, was performed in a standard fashion. Post-operatively, both the groups were placed in an universal shoulder immobilizer for two weeks till suture removal.

Pendulum exercises were started at post-operative day 15 and active range of motion was subsequently started. Strengthening protocol was begun after three months and patients were allowed to gradually return to their normal activities. Clinical assessment of recovery was made by an independent observer using Constant-Murley score. Such assessments were made after a mean follow-up of 15.3 months, ±3.8 months post-operatively. In this study, there were 24 males and 6 females with a mean age of 31.4±7.8 years.

Statistical Analysis was made using SPSS ver: 21.0 (Chicago, USA) and rejection of null hypothesis was done when p values were <0.05.

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Student t-test, descriptive statistics and the MannWhitney U-test were employed to study outcome between the
two treatment groups.

OBSERVATIONS AND RESULTS
Mean age of the entire study population was 31.4±7.8 years.
Average constant shoulder score for the hook plate group was
81.3 (Range 74–89) and that for autograft technique group
was 91.7 (Range 88–97). This difference with regard to clinical
outcome was found to be statistically significant. Furthermore,
loss of reduction did not occur in the autograft technique
group, but such failure was observed in three patients (20%)
of hook plate group. There was one incidence of superficial
infection in autograft technique group and a single incidence
of deep infection in hook plate group.

Fig. 1: Demonstration of Technique of Reconstruction of
Coracoclavicular Ligament with Semitendinosus Graft

Fig. 2: Post-Op x-ray Depicting Clavicular Drill Holes for
the Graft and Good Acromioclavicular Reduction

DISCUSSION
Acromioclavicular joint is a diarthrodial joint. Static stability is
provided by coracoclavicular and acromioclavicular ligaments;
whereas trapezius and deltoid contribute to dynamic stability
of this joint. Acromioclavicular joint injuries are classified most commonly using the 6 grade system described
by Rockwood. Type I: Mild A.C. ligament sprain. Type II:
Ruptured A.C. ligament with C.C. ligament sprain. Type III: Both
C.C. and A.C. ligaments are ruptured. Clavicle elevated above
the superior border of the acromion, but coracoclavicular
distance is less than twice normal. Type IV: Clavicle displaced
posteriorly into trapezius. Type V: Clavicle is markedly
elevated and coracoclavicular distance is more than double
normal (i.e. >25 mm). Type VI: Clavicle inferiorly displaced
behind coracobrachials and biceps tendons.

As far as treatment of acromioclavicular dislocations is
concerned, there is quite a bit of confusion with regards to
treating a Grade III injury. Despite our greater knowledge of
tendon healing and incorporation and vast improvement in
our surgical techniques, we are yet to arrive at a ‘Gold
Standard.’ Grade III injuries are usually treated conservatively
and various authors have obtained satisfactory results with
conservative line of management. On the other hand,
several reports have supported operative management of such
injuries in young population who are physically active. With
towards surgical options, variety of procedures have been
described in the literature, viz. tension band wiring, K-wire
fixation, hook plate, autograft or allograft reconstruction of
acromioclavicular joint, Bosworth screw fixation, use of
synthetic ligament, mersilene tape sling, etc. The purpose of
our study was to compare outcome between clavicular hook
plate and coracoclavicular ligament reconstruction using
autograft in chronic Grade III injury. Hook plates have recently
 gained popularity, particularly over the traditional methods
such as tension band wiring and K-wire fixation.

Traditional techniques had problems of metal breakage,
pin migration, neurovascular injury, loss of reduction, implant
failure, etc. With use of hook plates, such problems are not
there. Several studies have published promising results with
usage of hook plates. However, this technique is not without complications. Subacromial impingement is often reported;
acromial erosions or distal clavicle fracture may occur due to
altered biomechanics. Loss of reduction may also occur,
although it is much less common than traditional techniques.
Second surgery for hardware removal is also advocated after
complete healing.

Recent biomechanical studies have proved beyond doubt
that reconstruction of acromioclavicular joint using tendon
graft is more biological and the resultant repair tissue is
desirable in terms of strength and kinematics. The described
reconstruction techniques deal only with coracoclavicular ligament, but it has been shown that
additional acromioclavicular ligament reconstruction adds to
the final stability in a significant way. However, in our
study we aimed to reconstruct coracoclavicular ligament only.
As per our results, we observed a significant difference
between clinical outcome of graft reconstruction versus hook
plate fixation. Anatomic technique using semitendinosus graft
showed improved outcome over the non-anatomic procedure
using hook plate. Similar results have been reproduced by
various authors as well, in both clinical and cadaveric
scenarios. This is in accordance with idea of anatomic
reconstruction of damaged ligaments after they have been
injured.

Various procedures around the knee now focus on
defining isometric points and subsequent anatomic
reconstruction. Hook plates have an inherent disadvantage
due to its non-biologic nature leading to stress shielding effect
and subacromial impingement. Furthermore, they invariably
require second surgery for hardware removal. Considering
such disadvantages, we would like to recommend autograft technique over hook plates in chronic Grade III
acromioclavicular injuries. Our study has few limitations. The
study population was relatively small. Minor modifications in
surgical technique might have occurred with passage of time
as reconstruction of coracoclavicular ligament was a demanding procedure and we were relatively new to this technique. Still we tried our best not to allow any major change in the operative technique, so as to keep such a bias to minimum in our study.

CONCLUSION
In conclusion, we obtained favourable results in autograft technique of reconstruction of coracoclavicular ligament when compared to A.C. joint fixation with hook plate in chronic Grade III A.C. dislocations. We attribute this to the biological nature of anatomic reconstruction of A.C. joint. Furthermore, hook plates have additional problems which include subacromial impingement, acromial erosions, distal clavicle fractures, need for second surgery for hardware removal, etc.

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