Volume : 4 | Issue : 9 | Sept 2015 • ISSN No 2277 - 8179

Research Paper

Results of Modified Weaver Dunn Procedure in Chronic Symptomatic Acromio-Clavicular Dislocation - A Prospective Study Of 43 Cases.

Medical Science

KEYWORDS : Acromio-clavicular joint, Constant Score, Modified Weaver Dunn Procedure, American Shoulder & Elbow Surgeons (ASES) Score.

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ABSTRACT

Background: Symptomatic chronic acromio-clavicular joint dislocation cause significant morbidity affecting daily activities. Presence of various treatment options makes management controversial. This prospective study was conducted to assess the outcome of Modified Weaver Dunn procedure.

Materials & methods: Forty-three consecutive patients suffering from significant pain and disability from chronic acromio-clavicular dislocation (Rockwood types III-V) were included in the study. They underwent Modified Weaver Dunn procedure and were followed up for two years.

Results: Mean ASES score improved from 66±7 points preoperatively to 82±5 postoperatively. Mean Constant score improved from 66±4 to 80±6. Both were statistically significant ($p<0.001$). The patients could resume their work after an average of 18.3 weeks. Radiologically, the mean coraco-clavicular distance improved significantly ($p<0.001$) from 19±7.5mm pre-operatively to 11.4±2.8mm post-operatively.

Conclusion: By virtue of being based on sound biomechanical principles and relative ease of execution, Modified Weaver-Dunn surgery may be the preferred procedure in chronic symptomatic acromio-clavicular dislocations.

Introduction:

Acromio-clavicular joint disruption is a common orthopaedic problem. Since the earliest chapters of the medical history this entity has been a subject of attention as well as controversy. Hippocrates himself stated that no impediment, small or large would result from such an injury (Bircher 1996). At the same time he also said that there would be a "tumefication" or deformity in "the bone which cannot be restored to its normal anatomy". While lower grades of injury, viz. Types I and II as described by Rockwood, heal with conservative treatment (Bjerneld 1983), the higher ones i.e. from III to VI often at best heal only partially, with frequent long term disability. This can even lead to an impingement syndrome, going as far as tearing the rotator cuff. This is especially more significant in case of upper-limb dominant professionals, necessitating operative intervention. There are broadly three types of procedures for acromio-clavicular disruptions: repair of the acromio-clavicular and coraco-clavicular ligaments, reconstruction of the acromio-clavicular and coraco-clavicular ligaments, and tendon transfers. While in acute set up, repair of the torn ligaments is relatively feasible, in long standing symptomatic cases with history of trauma, the torn ligaments are not easy to find and repair because of resorption, atrophy and fibrosis. The resection of the distal end of the clavicle along with transposition of the coraco-acromial ligament which survives the trauma, to the lateral end of the clavicle provides satisfactory solution to the dual problem of pain and instability. This is the Modified Weaver Dunn Procedure, which currently holds good promise for chronically symptomatic acromio-clavicular joint dislocations.

Materials and Methods:

The study consisted of forty-three consecutive patients (mean age 317.8 years) with painful, chronic Rockwood type III through V acromio-clavicular joint dislocations. The inclusion criteria included painful acromio-clavicular joint with traumatic etiology at least three months prior to presentation which resulted in significant upper limb disability. The patients who had only pain and no deformity were excluded. Also the patients with persistent subluxation but without symptoms were not included in the study. Pain or shoulder stiffness from any etiology other than acromio-clavicular dislocation also did not qualify for the study. For radiological evaluation, normal as well as stress radiographs were taken and compared with the contralateral normal side. After preoperative check-up and informed written consent, the patients were taken for surgery (Figure 1). The Modified Weaver Dunn procedure was performed under general anaesthesia. The patient was placed supine. The skin incision was made for the posterior border of the acromio-clavicular joint toward the coracoid process. This incision, the so-called "Strap" incision is not only cosmetically acceptable to the patient but also enables sufficient exposure to required anatomical structures. The deltoid was detached from the outer third of the clavicle. The acromio-clavicular joint was exposed, the articular cartilage, meniscus, joint capsule along with lateral end of the clavicle was resected. The medullary canal was made wider to receive the thick coraco-acromial ligament. The coraco-acromial ligament was detached from the acromial end along with a piece of attached bone. To protect the reconstruction from disruptive stresses till sufficient healing has occurred, one or two loops of no. 5 Ethibond sutures were passed underneath the coracoid process and looped around the clavicle after reducing the displaced clavicle. To have uniformity, the same approach with similar incisions and steps were followed in each of the cases.

Table:1

Characteristics of the Total Patient Group (n = 43)

Characteristic	Value
Age (in years)	317.8
Sex (M : F)	36 : 7
Time since trauma (in weeks)	13.4511.05
Rockwood Type	
III	19
IV	11
V	13
Occupation	
Professional Athlete	12
Recreational Athlete	15
Manual Labourer	7
Sedentary	9

Post-operatively, pendulum exercises three times a day were started immediately. The patients were informed that their limb would be in an arm pouch support for 6 weeks. Between six to twelve weeks, supervised therapy consisting of assisted range of movement in all planes were started and sling was progressively discontinued. Between 12-24 weeks isometric exercises were initiated. Resistive exercises were started only after healing

Volume : 4 | Issue : 9 | Sept 2015 • ISSN No 2277 - 8179

and maturation of the transferred ligament was strong enough to withstand load, which averaged about 18-26 weeks. Contact sports and heavy activity was allowed six months after the surgery.

Clinical evaluation was performed using the American Shoulder and Elbow Surgeons shoulder score and the Constant score after a mean follow-up of two years. Pain was assessed using Visual Analogue Scale. Preoperative and postoperative radiographs in both resting state and also in stress-loaded state were compared.

For statistical analysis, Paired T-tests, Student T-test and Chi-square tests were performed. The statistical significance was set at 99% confidence level (p value=0.01 or less).

Results:

The mean age in the study cohort was 317.8 years (Table 1). Males out-numbered females (36 to 7). The mean follow-up period was 26 2.3 months. The mean American Shoulder and Elbow Surgeons shoulder score improved from 667 points pre-operatively to 825 points 6 months post-operatively and to 898 at 2 years. The mean Constant score improved from 664 points to 806 points at 6 months and to 824 at 2 years. Before surgery the radiologic measurements showed a mean coraco-clavicular distance of 197.5 mm, increasing to 246.8 mm under stress loading. After the surgery the corresponding figures were11.42.8mm and 12.43 mm respectively (Figure 2). The differences before and after the operation both with and without stress-loading were statistically significant (P <0.001 in each case). The pain scores in terms of Visual analogue scale improved significantly (p<0.0001) from 3.1 ± 1.2cm before the procedure to 1.1±0.8cm 6 months and to 0.80.48 cm 2 years after the procedure. Subjectively, 44.2 %(n=19) cases reported excellent, 39.5% (n=17) regarded the improvement as good. 11.6% (n=5) reported no improvement in the disability while 4.6% (n=2) complained a worsening of the symptoms.

Two patients showed poor results. The first patient was 46 years old male patient, who underwent surgery but was unable to carry out post-operative rehabilitation protocol as he suffered from a motor vehicle accident with a consequent head

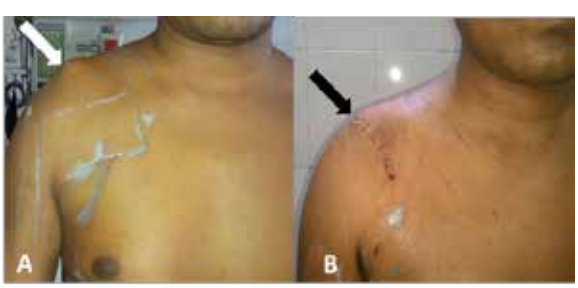

***Fig 1** : Clinical Photographs. A)Four months old AC Dislocation (Dislocated joint shown in White arrow) B) Post-operative photograph showing reduced AC joint (Black Arrow).*

injury for which he had to be bed ridden for the subsequent month. The second patient was noncompliant to post-operative rehabilitation resulting in restriction of overhead abduction. However both the patients could perform day-to-day activities without pain, and resume their work; the former being a shop-keeper and the latter a mechanic at the electrical workshop.

There were no failures or re-dislocations in the series. There was no failure of the fixation or the suture loops or cut-through of the sutures across the clavicle. All the patients went back to their normal activities including sports.

Discussion:

There has been a great controversy in the literature regarding management of the acromio-clavicular joint dislocations (Neviaser, 1951; Philips, 1998). Despite a multitude of treatment options, many patients suffer from chronic pain and disability resulting from acromio-clavicular joint instability resulting from trauma. In a few cases even impingement and rotator cuff tear can occur due to an improperly managed acromio-clavicular joint injury. Weaver and Dunn (1972) described a new procedure for the treatment of unstable acromio-clavicular joints. This involved the excision of the painful acromio-clavicular joint by resecting the lateral end of the clavicle and ***Fig 2:** Stress radiographs. A) Showing dislocated right AC joint (White arrow) B) Stable AC joint after the Modified Weaver Dunn Procedure (white arrow-head).*

the stabilization of the clavicle by transposing the coraco-acromial ligament to the lateral part of the clavicle to substitute for the torn coraco-clavicular ligaments. Soon, Bircher et al (1996) came up with the modification of the procedure by reinforcing the ligamentous reconstruction by passing a non-absorbable sling around the coracoid process and the clavicle and transposing a flake of bone attached to the ligament so that better incorporation of the ligament on the clavicle is ensured. This claimed better results because of reasons more than one. Firstly it protected the transferred ligament until the graft take up and healing was complete. Secondly, being non-absorbable, it shared the load in cases of excessive strain, as it is found that the coraco-acromial ligament in a few cases is of thinner calibre compared to patients own coraco-clavicular ligaments. Numerous studies have shown promising results of the procedure. (Glick, 1977; Dewar, 1965; Cox,1992; Lemos, 1998; Weinstein, 1995) In the original article of Bircher (1996), the patients showed full shoulder movement without pain. His patients could go back to work or sports at an average 3.3 months after the procedure.

In our study, the majority of the population consisted of young active males, amongst whom 27.9 %(n=12) were competitive athletes, 34.9% (n=15) were recreational athletes, 16.2 %(n=7) manual labourers. Most of them had significant disability at presentation (mean ASES score of 667). Enabling all of them to return to full activity reflects the reproducible success of the procedure. Radiological improvements especially the stability in the stress radiographs substantiates the clinical success.

In the present study, a long follow-up period of at least two years was considered as many of the functional results and complications like suture cut-through, and clavicular osteolysis, described as late complications needed to be assessed. In our study, provided the patients remained active and they abided by the rehabilitation protocol, the functional results remained good at the end of two years of follow-up.

The striking success rate in prevention of recurrence of the deformity and suture loop related complications lies in the meticulous positioning of the flake of bone into the medullary canal of the lateral end of the clavicle. If the coraco-clavicular ligament along with the attached flake of bone fails to reach sufficiently inside the clavicle some laxity is bound to remain. Even if the

Ethibond loops are placed around the coracoid and the clavicle, and the reinforcement makes it appear acceptable; be it intra-operatively or in the clinic-radiological evaluation immediately after the surgery, in the long run it is liable to failure in the form of severance of the suture or cutting of the suture through the clavicle. This is obvious, as any mechanical reinforcement will fail unless the biological healing fails to support it in the long run. A taut coraco-acromial ligament attached to the clavicle facilitates healing of all structures around the surgical site, without any stress to the suture reinforcement thereby minimising the chance of failure.

There can be a few potential complications of the procedure also (Guttman, 2003). The pain and disability may persist despite surgical treatment, probably because of inadequate resection of the AC joint. The bones being subcutaneous in location, the surgical wound may show problems in healing, with resultant skin sloughing. Though there were no infections in the present study, it can be a complication in such surgeries and can be a potential reason for poor outcomes.

Conclusion:

It can thus be concluded that a meticulously performed Modified Weaver Dunn procedure, coupled with strict adherence to a comprehensive rehabilitation protocol gives a good outcome in chronic acromio-clavicular dislocations. It may be regarded as the procedure of choice in chronic symptomatic acromio-clavicular joint dislocations which has so long been a difficult entity to manage.

REFERENCE

1. Bircher HP, Jülke M, Thür C. (1996;2) Reconstruction of chronic symptomatic acromioclavicular joint dislocation (Rockwood III-V) using the modified Weaver-Dunn method. 24 operated patients (1988-95), surgical technique, results. Swiss Surg.pp 46-50. | 2. Bjerneld H, Hovelius L, Thorling J. (1983).Acromio-clavicular separations treated conservatively. A 5-year follow-up study. Acta Orthop Scand.; 54:pp743-745. | 3. Cox JS. (1992) Current method of treatment of acromioclavicular joint dislocations. Orthopedics; 15:pp1041-1044. | 4. Dewar FP, Barrington TW.(1965) The treatment of chronic acromioclavicular dislocation. J Bone Joint Surg Br; 47:pp32-35. | 5. Glick JM, Milburn LJ, Haggerty JF, Nishimoto D. (1977) Dislocated acromioclavicular joint: follow-up study of 35 unreduced acromioclavicular dislocations. Am J Sports Med.; 5:pp264-270. | 6. Guttmann D, Paksima NE, Zuckerman JD.(2000) Complications of treatment of complete acromioclavicular joint dislocations. In: Price CT, ed. Instructional Course Lectures 49. Rosemont, Ill: American Academy of Orthopaedic Surgeons;pp:407-413. | 7. Jerosch J,Filler T, Pueker T, et al. (1999). Which stabilisation technique corrects anatomy best in patients with AC- separation: an experimental study. Knee Surg Sports Traumatol Arthrosc.;7 pp:365-372. | 8. Lemos MJ. (1998) The evaluation and treatment of the injured acromioclavicular joint in athletes. Am J Sports Med.; 26:pp137-144. | 9. Neviaser JS. (1951) Acromioclavicular dislocation treated by transference of the coracoacromial ligament. Bull Hosp Joint Dis.; 12:pp46-54. | 10. Phillips AM, Smart C, Groom AF. (1998). Acromioclavicular dislocation. Conservative or surgical therapy. Clin Orthop.; 353: pp10-17 | 11. Weaver JK, Dunn HK.(1972) Treatment of acromioclavicular injuries, especially complete acromioclavicular separation. J Bone Joint Surg Am.; 54: pp1187-1194. | 12. Weinstein DM, McCann PD, McIlveen SJ, Flatow EL, Bigliani LU.(1995) Surgical treatment of complete acromioclavicular dislocations. Am J Sports Med.; 23 pp:324-331.