IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 5 Ser. 6 (May. 2019), PP 76-83
www.iosrjournals.org

Results of Treatment of Modified Weaver- Dunn Procedure for Acromioclavicular Joint Reconstruction- A Case Series

Tridip Bharali Registrar, Kasinath Swainpg Trainee, Bikash Agarwal Registrar, Hrishikesh Bharali Registrar, Rajarshi Royregistrar
Department of Orthopaedics, Gauhati Medical College and Hospital, Guwahati, Assam
**Corresponding author: Tridip Bharali*

Abstract-*Acromioclavicular joint dislocation corresponds to 8.6% of all joint dislocation. These injuries are associated with contact sports or athletic activity where a direct blow to the lateral aspect of the shoulder occurs. Over last 10 to 15 years there has been increase in the number of publications of the surgical treatment of AC joint with repairs and reconstruction procedures. The rapid progression of orthopaedic implant technology has also led to improved application of surgical techniques. It is clear that a gold standard for surgical stabilization of chronic, painful AC joint dislocations has yet to be established. We report the result of a prospective study of fifteen patients with Rockwood's type III,IV,V,VI AC joint dislocation, treated by Modified Weaver-Dunn procedure.*

Key Words- *AC joint Dislocation, modified weaver- dunn procedure*

Date of Submission: 02-05-2019 Date of acceptance: 16-05-2019

I. Introduction

Of all joint dislocations acromio - clavicular, joint dislocation corresponds to 8.6%[1] and it represents a major injury to the shoulder girdle. These kind of dislocations most commonly occur in male patients <30 years and are associated with contact sports or athletic activity where a direct blow to the lateral aspect of the shoulder occurs and these injuries most commonly occur in high risk group specially playing sports like football, rugby and hockey.[2,3,4,5]

From a historical point of view the treatment of AC joint dislocation has been a subject of controversy from the earliest medical writings. For example **Hippocrates**[6] diagnosed AC joint dislocation as a case of shoulder dislocation.

Galen (129-199A.D) also diagnosed his own acromioclavicular dislocation received from wrestling and he treated himself with tight bandages when he sustained this injury from wrestling. He used tight bandages to hold the projecting clavicle down while keeping the arm elevated. In recent decades the surgical treatment of AC joint injuries has evolved with our understanding of local anatomy and the biomechanics of the joint and it demonstrates a clear historical progression**. Samuel Cooper**[7] is given credit for initial report of surgical management of a displaced, painful AC joint dislocation in 1861.

In 1917, **Cadenat**[8] described transfer of coracoacromial ligament, a procedure later popularised by **Weaver and Dunn[**9**]**

Over last 10 to 15 years there has been increase in the number of publications of the surgical treatment of AC joint with repairs and reconstruction procedures. The rapid progression of orthopaedic implant technology has also led to improved application of surgical techniques. The main objective of open reconstruction is to reduce the AC joint to an anatomic position. It is clear that a gold standard for surgical stabilization of chronic, painful AC joint dislocations has yet to be established.

Rockwood has classified AC joint dislocation into 6 types. The treatment of Type I and type II is conservative, whereas from type III onwards surgical treatments are nowadays preferred.

II. Materials and Methods

A prospective study was carried out for a total of 15 cases of painful, chronic complete AC joint dislocation aged between 18-60 years attending the OPD and Emergency department of Orthopaedics, Gauhati Medical College & Hospital who met the inclusion and exclusion criteria outlined below. All the cases were followed up for a minimum period of six months.In our study patients who gave consent, Rockwood's type III,IV,V,VI AC joint dislocations aged between 18 to 60 years, injuries more than 3 weeks old, with no associated fractures in same limb and intact neurological and vascular status of the affected limb, ipsilateral

elbow, wrist and fingers functionally good enough, so as not to exert a adverse effect on the rehabilitation process and who met the medical standards for surgery were included.

The patients excluded were who did not give consent, patients aged <18yrs and >60yrs, Rockwood's type I and II AC joint dislocation, fractures in the distal end clavicle on the same side, patients unable to take part in post-operative rehabilitation, not fit for surgery/anaesthesia, open fractures, fractures with history of trauma < 3 weeks.

After appropriate radiological and pre-operative investigations the individual was posted for surgery under general anaesthesia. Patients were routinely operated in supine position. A pillow support was given under the upper inter scapular space. We used a direct approach with saber incision made over the clavicle approximately 3.5 cm medial to AC joint. The incision starts posterior to the clavicle, crossing just medial to the tip of coracoid.The surgical technique was the Weaver Dunn procedure as described in 1972 and slightly modified by **Shoji et al** in 1986.The original Weaver-Dunn procedure involves a lateral end clavicle resection, reduction of the dislocated clavicle, and coracoacromial ligament transfer to the lateral clavicle, without additional fixation. Modified procedure consists of a lateral end clavicle resection, reduction of the dislocated clavicle, coracoclavicular fixation with heavy nonabsorbable suture or surgical tape, and coracoacromial ligament transfer to the lateral end clavicle.The incision is carried down directly to bone, while elevating the anterior and posterior soft tissues off the lateral clavicle with a scalpel or electrocautery exposing the entire lateral clavicle and acromioclavicular joint.Resection of the lateral clavicle, performed by using aoscillating saw, involves removing 1-1.5 cm of bone.With mobilization of the anterior deltoid, the coracoacromial ligament is identified & is carefully detached from its acromial insertion. A small piece of bone can be taken with the ligament from the acromion to allow bone-to-bone healing. Number two nonabsorbable braided sutures are passed in a horizontal mattress fashion through the proximal portion of the ligament. A curved suture passer directs the surgical tape around the base of the coracoid process.The surgical tape is knotted at one end so it can be grasped with a clamp as it is passed around the base of the coracoid. This tape is used to pass an additional surgical tape, as well as two number five nonabsorbable braided sutures. A single tape and two sutures are used for the coracoclavicular portion of the repair. The tape and sutures are seated around the base of the coracoid by pulling the ends back and forth in a sawing motion. The surgical tape and sutures from the lateral side of the coracoid are passed around the posterior aspect of the lateral clavicle.

Three small drill holes are placed through the superior cortex of the lateral clavicle with a 2-mm drill bit. A rongeur or curette is used to prepare a shallow trough in the cancellous bone of the lateral clavicle for insertion of the transferred coracoacromial ligament. The sutures that were placed in the coracoacromial ligament are passed through the drill holes in the lateral clavicle. Suction drained placed &Just prior to closure, the arm is placed through a complete range of motion to assess the security of the repair.

Patients wereimmobilised with modified shoulder immobilizer for 4 weeks &discharged usually after 2^{nd} or 3^{rd} post-operative day when reduction of pain, oedema and return of good active elbow and finger movements occured. Patients were followed up at 2 weeks for suture removal. Clinical evaluation was done for passive range of motion, neurovascular status, superficial and deep infection and necessity to re-operate.

Further follow ups were done on six week, three month and six month after the operative procedure. Patients were assessed for full function, minor limitation of function and major loss of function.Check X-rays were taken immediate post operative to see reduction of AC joint dislocation, measurement of coraclavicular ligament distance. At At 4 weeks follow up x ray was done for operated site without stress and with stress of 10 kg. At 6^{th} week physiotherapy was started with forward flexion, abduction and external rotation .For next 3-4 months full shoulder range of movement exercises were given.

III. Results

The patients were personally reviewed with clinical and radiological evaluation with an average follow-up of 8.2 months (range six – sixteen months).There were 15patients with a mean age of 35.67 years and youngest patient was 23years and the oldest patient was 54 years.The following chart shows a comparative study of the age of incidence in our study with other studies.

STUDY(YEARS)	NO. OF CASES	AGE RANGE 9YEARS)	A9VERAGE AGE (YEARS)
Chaoliangwang[10]	12	19-60	36.08
Fauci et al[11]	40	19-60	35 +/_ 3.2YEARS
Kocaoglu B et al[12]	32	22 – 60	39.7
Mardani kiwi et al[13]	39	22-60	32.6+/_11.8YEARS
Joneymandice et al[14]	38	22-60	42.1 YEARS
Gupta r et al[15]	35	18-48	31

The most common mechanism of injury was fall on ground followed by road traffic accidents and sports injury. Males (80%) were more commonly involved than females (20%). Right side (53.33%) was more commonly injured than left side(46.66%). Other studies showing side predominance are mentioned below in table.

STUDY(YEAR)	NO.OF CASES	LEFT(PERCENTAGE)	RIGHT(PERCENTAGE)
CLAUDIO CHILLEMI ET AL[16]	105	46.7%	53.3%
GUPTA R ET AL[15]	35	37.14%	62.85%
CJoneyMandice[14]	38	26.31%	73.68%
Renato LoureiroTeodoro, et al[17]	21	34.79%	65.21%

The most common dislocationin our series was Rockwood type V (93.33%) followed by Rockwood type III (6.67%).The mean operative time of surgery was 49.53(SD 4.6424) minutes.

Complications included 2 cases of superficial infection. These 2 patients were diabetic.There was 3 cases of stiffness upto 6 weeks which gradually decreased following physiotherapy.

The functional results were evaluated at 6 weeks, 3 months and 6 months according to Oxford shoulder score(OSS) and University of California, Los Angeles score (UCLA).Good results in 73.33% , reasonable in 20% and excellent in 6.67% patients were found. There were no poor results.

IV. Discussion

There have been many described procedure regarding the management of AC joint dislocation but, there are many controversies concerning the most appropriate management of AC joint dislocation.Normally for Rockwood's Type I and Type II AC joint dislocations conservative treatments are satisfactory.The treatment of more severely displaced (Rockwood type IIIonwards) dislocation remains controversial. The aim of our study was to develop a simple algorithm of treatment to provide the best functional and cosmetic result even when undertaken by less experienced surgeons and the simplest follow-up regime.

Superficial infection occurred in 2 cases which is comparable to Hegazy et alstudy[18]. Infection was treated with antibiotics and regular dressing. However, the loss of range of motion was greater in these 2 patient, compared to those without infection.No patient had deep infection,distal clavicle fracture or coracoid fracture.

In our series, the average abduction was 143.93 degrees, flexion was 172.60 degrees, external rotation was 55.60 degrees which compared favourably with series by GalalHegazy et al[18]. We did not find any significant improvement in range of motion after six months post surgery.

Post operatively at six months the mean CC distance was compared with the clinical scores of OSS and UCLA without stress and under stress (10kg).No significant correlation was found between the mean CC distance without stress and the clinical scores vizOSS(p 0.636,pearson correlation 0.038) and UCLA (p 0.114,pearson correlation 0.294) .

But there was significant correlation noted between the mean CC distance and the OSS(p 0.001,pearson correlation 0.777) , and UCLA(p 0.014,pearson correlation) under stress (10kg).The more displacement that occurred under stress loading,the lower was the clinical score**.**

Our study showed comparable results with respect to CC distance radiologically with GalalHegazy et al[18] , Murat Bezer et al[19].

The functional results were evaluated at 6 weeks, 3 months and 6 months according to Oxford shoulder score(OSS) and University of California, Los Angeles score (UCLA).Good results in 73.33% reasonable in 20% and excellent in 6.67% patients were found. There were no poor results.. The findings in our study were consistent with series of Gupta et al[15].

V. Conclusion

For AC joint reconstruction the optimal operative method remains controversial.Modified Weaver Dunn is one of the most time tested methodsas it provides better stability, diminishes pain and better function as well as better strength..This method can be done even by relatively inexperienced young orthopaedic surgeons with satisfactory functional outcome. Newer techniques like autogenous STT graft is increasingly getting popular nowadays. There is a clear indication for a detailed prospective randomised controlled study, involving a significant larger number of subjects for a longer duration,to compare the functional outcome of these two procedures.

Clinical photos:

OPERATIVE SIDE MARKED

AC JOINT EXPOSED

DISTAL END CLAVICLE EXPOSED

1CM DISTAL END CLAVICLE RESECTED

MEASUREMENT FOR TUNNELS

FIBRE TAPE PASSING THROUGH TUNNELS

FIXATION WITH FIBRE TAPE AND POLYESTER SUTURE WITH STAPLERS

SKIN CLOSED IN LAYERS

POSTOPERATIVE RANGE OF MOVEMENT

FLEXION

ABDUCTION

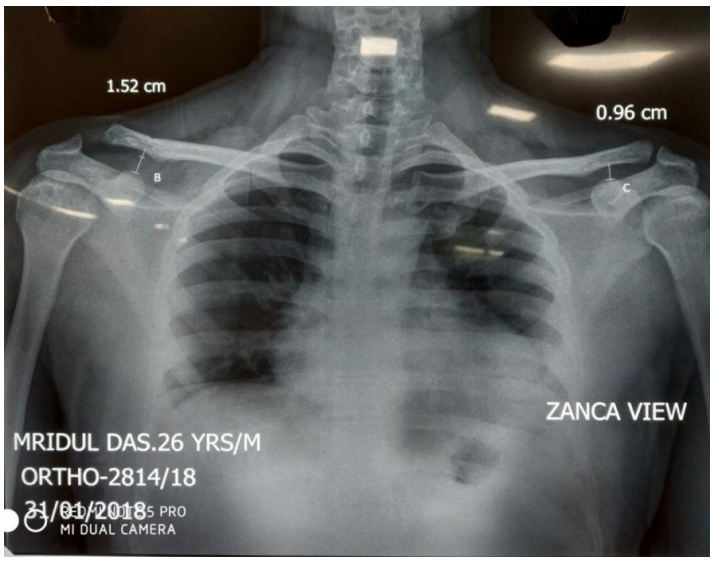
OVERHEADABDUCTION

INTERNAL ROTATION

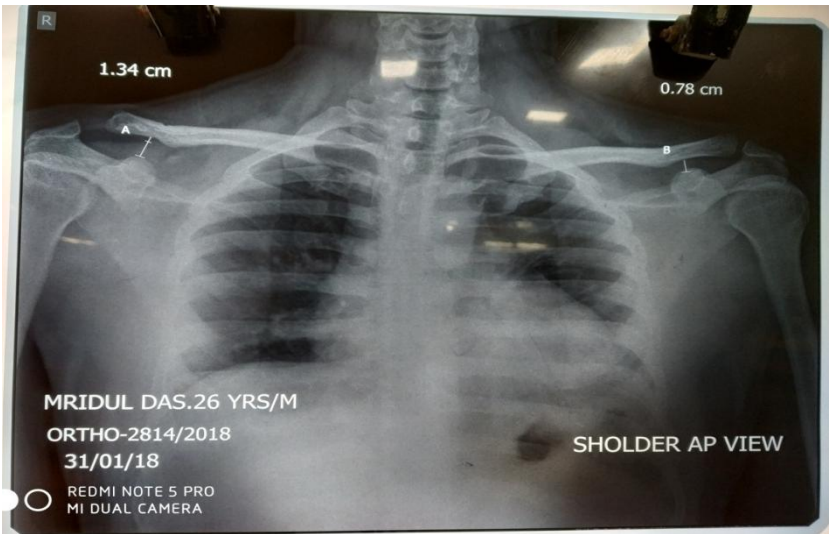
EXTERNAL ROTATION

Radiological ASSESSMENT

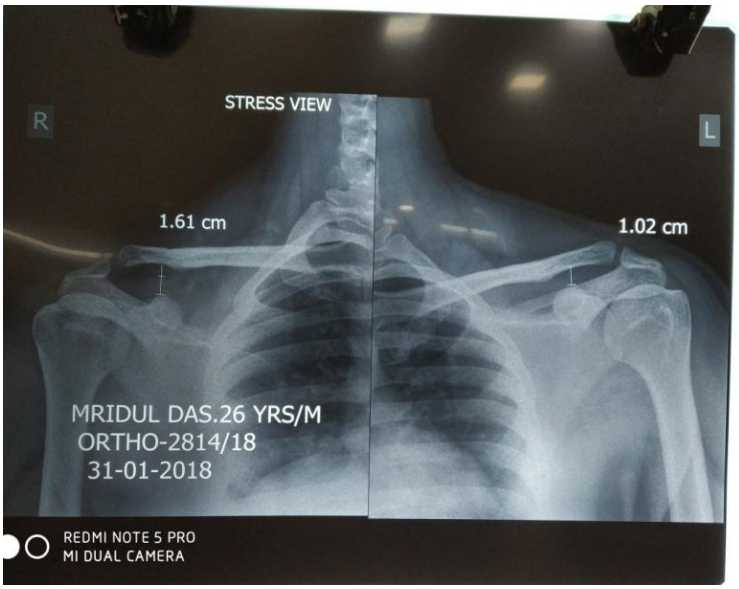
PREOPEERATIVE AP VIEW(TYPE V AC JOINT DISLOCATION)



POSTOPERATIVE ZANCA VIEW(CC DISTANCE=1.52CM)



POSTOPERATIVE AP VIEW(CC DISTANCE=1.34CM)



POSTOPERATIVE STRESS VIEW(CC DISTANCE=1.62CM)

POSTOPERATIVE AXILLARY VIEW

Abbreviations
OSS-Oxford shoulder score
UCLA-University of California, Los Angeles score
CC Distance-Coracoclavicular distance

References

[1]. De Tullio V, Orsi R, Celenza M. Surgical treatment of Allman type III acromio-clavicular dislocation. A long-term follow-up study. ActaOrthop Belg. 1994;60(3):300-2
[2]. Burri C, Neugebauer R. Carbon fiber replacement of the ligaments of the shoulder
[3]. girdle and the treatment of lateral instability of the ankle joint. ClinOrthop. 1985;196:112–117.
[4]. Castropil W, Ramadan LB, Bitar AC, et al. Sternoclavicular dislocation-reconstruction with semitendinosus tendon autograft: A case report. Knee Surg Sports TraumatolArthrosc. 2008;16:865–868.
[5]. Ferrandez L, Yubero J, Usabiaga J, et al. Sternoclavicular dislocation, treatment and complications. Ital J OrthopTraumatol. 1988;14:349–355.
[6]. Kahle M, Filler RL, Forster R. Luxations in the sternoclavicular joint. AktuelleTraumatol. 1990;20:83–86.
[7]. Adams FL. The Genuine Works of Hippocrates. Vols 1 and 2. New York, NY: William Wood; 1886.
[8]. Rockwood CA, Williams GR, Young DC. Disorders of the acromio-clavicular joint. In: Rockwood CA, Matsen FA, eds. The Shoulder. 3rd ed. Philadelphia, PA: WB Saunders Co;2004:521–586.
[9]. Cadenat FM. The treatment of dislocations and fractures of the outer end of the clavicle. IntClin. 1917;1:145-69.
[10]. Weaver JK, Dunn HK. Treatment of acromioclavicular injuries, especially complete acromioclavicular separation. JBJS. 1972 Sep 1;54(6):1187-94.
[11]. Chaoliang Wang*, Sufang Huang, Yingzhen Wang,, Xuesheng Sun, Tao Zhu, Chu LinComplete acromioclavicular joint dislocation treated with reconstructed ligament by trapezius muscle fascia and observation of fascial metaplasia. Open Med (Wars). 2015; 10(1): 370–376.
[12]. Fauci F, Merolla G, Paladini P, Campi F, Porcellini G. Surgical treatment of chronic acromioclavicular dislocation with biologic graft vs synthetic ligament: a prospective randomized comparative study. Journal of Orthopaedics and Traumatology. 2013 Dec 1;14(4):283-90.
[13]. Kocaoglu B, Ulku TK, Gereli A, Karahan M, Türkmen M. Modified Weaver-Dunn Procedure versus the Use of a Synthetic Ligament for Acromioclavicular Joint Reconstruction J Shoulder Elbow Surg. 2017 Sep;26(9):1546-1552.
[14]. Mardani-Kivi M, Mirbolook A, Salariyeh M, Hashemi-Motlagh K, Saheb-Ekhtiari K. The comparison of Ethibond sutures and semitendinosus autograft in the surgical treatment of acromioclavicular dislocation. ActaOrthopTraumatolTurc. 2013 Sep 1;47(5):307-10.
[15]. Mandice CJ, andHeberAnandan SM. Functional and radiological outcomes of acromioclavicular joint reconstruction in type iii disruption without allograft with synthetic materials. International Journal of Orthopaedics. 2017;3(4):836-9.
[16]. Gupta R, Sood M, Malhotra A, Masih GD, Khanna T, Raghav M. Functional outcome of modified weaver dunn technique for acromioclavicular joint dislocation. Indian journal of orthopaedics. 2018 Jul;52(4):418
[17]. Claudio Chillemi, Vincenzo Franceschini, Luca Dei Giudici, AmbraAlibardi, Francesco SalateSantone, Luis J. Ramos Alday, and Marcello Osimani Emergency Medicine International Volume 2013, Article ID 171609, 5 pages
[18]. Renato LoureiroTeodoro,Alexandre Yukio Nishimi,LucianoPascarelli,Roberto Rangel Bongiovanni,MarceloAndreotti Perez Velasco,and Eiffel Tsuyoshi Dobashs surgical treatment of ac joint dislocation using endobutton 2017 May-Jun.. ActaOrtop Bras. 2017 May-Jun; 25(3): 81–84.
[19]. Hegazy G, Safwat H, Seddik M, Al-shal EA, Al-Sebai I, Negm M. Modified Weaver-Dunn procedure versus the use of semitendinosus autogenous tendon graft for acromioclavicular joint reconstruction. The open orthopaedics journal. 2016;10:166.
[20]. Bezer M, Saygi B, Aydin N, Kucukdurmaz F, Ekinci G, Guven O. Quantification of acromioclavicular reduction parameters after the Weaver–Dunn procedure. Archives of orthopaedic and trauma surgery. 2009 Aug 1;129(8):1017-24.

Tridip Bharali. "Results of Treatment of Modified Weaver- Dunn Procedure for Acromioclavicular Joint Reconstruction- A Case Series." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 5, 2019, pp 76-83.