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A case of acute Rockwood type 5 acromioclavicular joint disruption treated by Mersilene tape and trans acromioclavicular K-wire fixation.

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Introduction

Injuries in and around shoulder joint, including acromio clavicular injuries, are common in young age groups. Acromio clavicular injuries account for 9% to 12% of all shoulder injuries. It is associated with an injury related to direct blow to the lateral aspect of the shoulder which is often seen during road traffic accidents, contact sports, collision sports such as football, hockey and rugby and other athletic activities. According to TOSSY ROCKWOOD classification grades 1 and 2 injuries represent strain and partial tearing of supporting ligaments and are best treated by conservative management. grade 3 to 6 have significant injury to both coracoclavicular and acromioclavicular ligament and hence need surgical intervention.

Various surgical procedures have been described for fixing the acute AC joint injuries. They are broadly divided into hardware related and non-hardware related methods. Hardware related methods include clavicular hook plate, trans acromioclavicular k-wire fixation and Steinman pin fixation, Coracoclavicular screw fixation and tension bend wire constructs. Non-Hardware related treatment options include acromioclavicular fixation and coracoclavicular ligament reconstruction using various absorbable and nonabsorbable sutures, suture anchors, Endo button and various autograft and allograft techniques for coracoclavicular ligament reconstruction. [2-9]

Surprisingly there have been multiple publications and research papers presented over the past 1.5 decades describing different techniques of AC joint fixation and reconstruction procedures. But till date no consensus has been achieved for an ideal method for surgical repair of acute type 3 ,4 and 5 AC joint injuries.

Our study is based on assessing the radiological and clinical outcomes of acute type 5 AC injury fixed by trans acromioclavicular k-wiring and coracoclavicular ligament reconstruction by mersilene tape.

Material and methodology:

A 44-year-old male patient came to our hospital with chief complain of right shoulder pain since 6 days with A/H/O skidding of two wheeler at Khokhra, Ahmedabad on25-01-2021at10.30pm.

Patient is evaluated by thorough history followed by complete physical examination and range of motion estimation. AP, lateral and zanca views of shoulder joint were done and injury was classified as per Rockwood classification system

In this patient type 5 ac joint injury has been treated surgically by using trans acromioclavicular k-wiring and coracoclavicular reconstruction by mersilene tape.

Procedure was done in supine position with a sandbag over the operative shoulder in order to elevate it. Now firstly closed or open reduction is performed at the AC joint and it is transfixed by two 1.5mm k-wires. K-wires will provide anteroposterior stability to the AC joint. Now for superoinferior stability mersilene tape is used. For that SABER approach was used to expose the acromioclavicular joint. Incision was put just over skin overlying the coracoclavicular ligaments. Following figure depicts the surface markings, dotted line representing the skin overlying the coracoclavicular ligament.

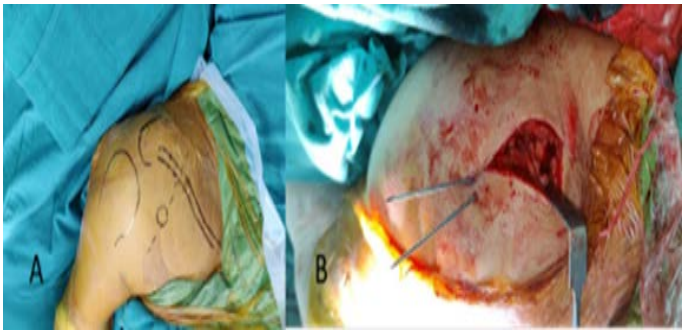


Figure 1: A -surface markings b - open reduction of ac joint and fixed by k-wiring.

Pectoralis major was used for going into deeper planes. Cephalic vein was identified and spared during the procedure. Conjoint tendon at the coracoid process was identified. Coracoacromial ligament were found torn. Now 5mm mersilene tape was taken and passed under the coracoid process and cross looped around the middle 1/3rd of the clavicle in the figure of eight pattern as shown in the line figure below and a knot was placed on the superior surface of the clavicle. Following are intraoperative few clinical images and a line drawing representing the method of fixation.

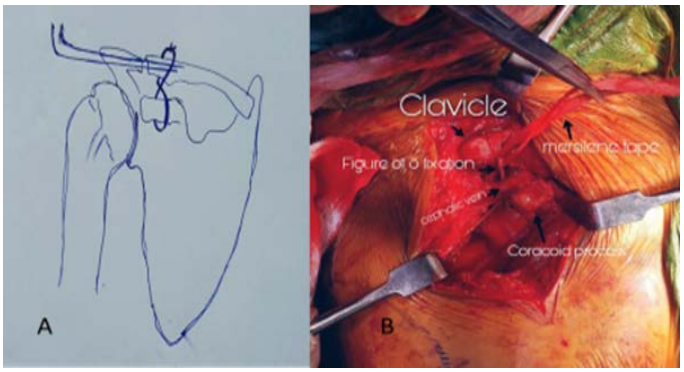


Figure 2: A - line drawing of the fixation technique b- intraop clinical image

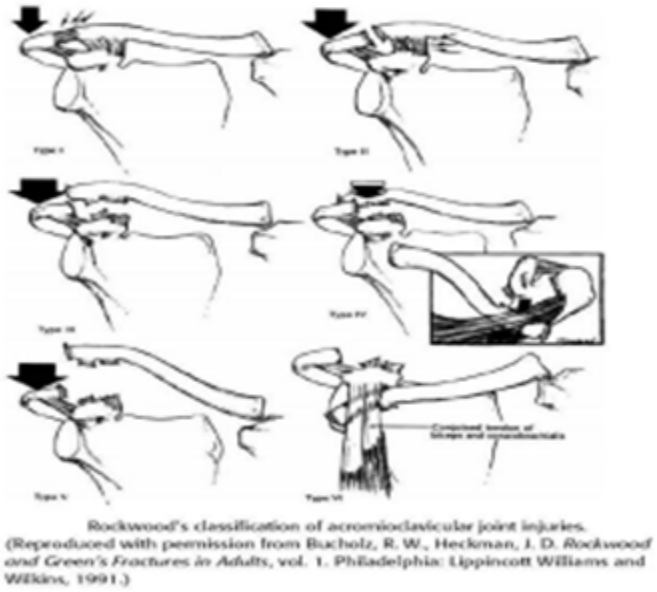
In the postoperative period the patient was given acromioclavicular brace which kept the ligaments around the clavicle relaxed to aid the primary healing. Range of motion exercises of elbow and wrist were started immediately while the shoulder was kept immobile. Suture removal was done on the 15th day. k- wire was

removed after 6 weeks and active ROM of the shoulder was started. Follow-up Xray were taken in ap , lateral and zanca views and the patient was evaluated functionally using visual analog scale , UCLA and OXFORD SHOULDER SCORE , Constant and Murley scores and radiological for Redis placement and fixation. The following picture shows the suture site and positioning of the AC brace.

Figure 3: A & B - Stitch line C-AC brace

Discussion

To plan the appropriate treatment of ac joint injury one must know the basic anatomical aspects and biomechanics of acromioclavicular joint. AC joint is a diarthrodial joint which is located between the medial margin of acromion and lateral end of the clavicle. Within the AC joint there is a fibrocartilaginous disc of varying size and shape. Surrounding the disc acromioclavicular ligaments are present in its anterior, posterior, superior and inferior aspects. The coracoclavicular ligament is a very strong, heavy ligament whose Fibres run from outer inferior surface of the clavicle to the base of the coracoid process of the scapula. It has two components – conoid and trapezoid ligaments.



Rockwood's classification of acromioclavicular joint injuries. (Reproduced with permission from Bucholz, R. W., Heckman, J. D. *Rockwood and Green's Fractures in Adults*, vol. 1. Philadelphia: Lippincott Williams and Wilkins, 1991.)

Figure 4

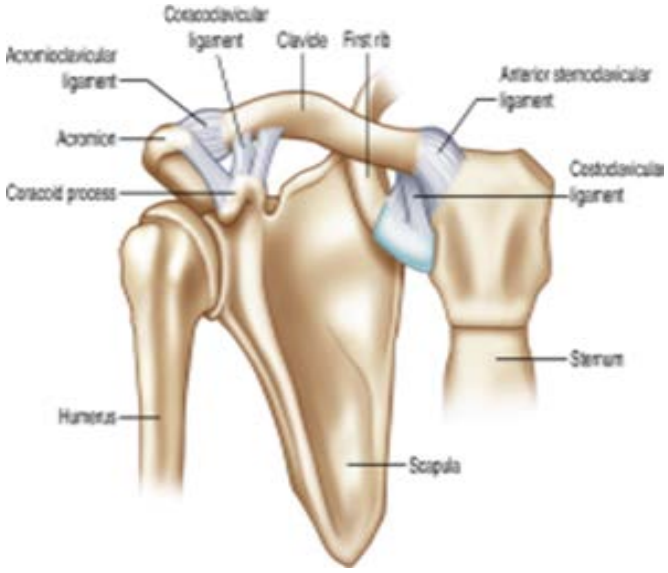


Figure 5

The biomechanics of AC joint involve static stability, dynamic stability and ac joint motion. Stable construction of the AC joint is kept by surrounding ligaments, specifically the CC ligaments, ac capsule and ac ligament. Just as the jet engines are suspended from the underside of the wings, the upper extremities are suspended from the distal clavicles through the CC ligament. Hence the CC ligament is the prime suspensory ligament of the upper extremity. Horizontal stability is controlled by AC capsule and ligament and vertical

stability is provided by CC ligament.

From the given figure of Rockwood classification, we can see that in type 5 injury is markedly more severe version of type 3 injury. The distal clavicle has been stripped of all its soft tissue attachments (AC ligament, CC ligament and deltotrapezoidal muscle attachments). In type 5 there is buttonholing of distal clavicle in deltotrapezoidal tissue which makes it difficult in reduction and hence cannot be treated conservatively. In type 5 injury clinically the distal end of clavicle appears to be grossly superiorly displaced and tenting of the skin is present. Radiographically the coracoclavicular space is increased greater than 100% in comparison to the opposite, normal shoulder.

Following are the clinical images and radiographical images of type 5 injury.

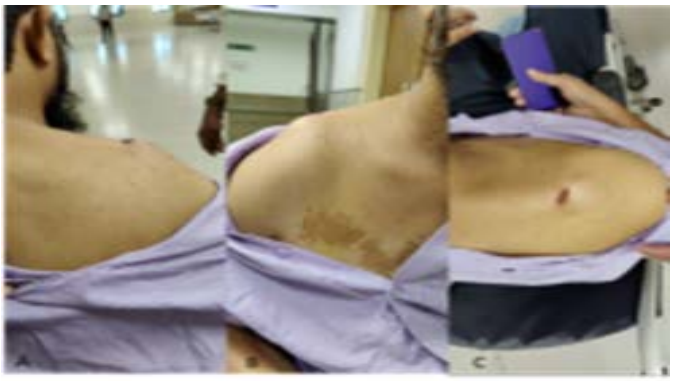


Figure 6: preoperative clinic

A. anterior b. Posterior view c. Superior view.

Figure 7: preoperative x ray showing right side type 5 ac joint injury.

After the fixation adequate reduction could be achieved following are the post op and follow up x-rays

Figure 8

Figure 9

Figure 10

Mersilene tape

Mersilene tape (Ethicon Endo- Surgery Inc.) is a polyethylene terephthalate suture, which is non-absorbable and braided. It is prepared from fibers of high molecular weight, long-chain, linear polyesters having recurrent aromatic rings as an integral component. Its tensile strength is very good.

Fixation with mersilene tape is a non-hardware related method. So, it will not need removal like hook plate and

screw techniques so secondary surgical procedures and related complications such as distal clavicular osteolysis, subacromial impingement, subacromial arthritis, rotator cuff lesions can be avoided. SABER incision has multiple benefits such as vertical incision being cosmetically better, with better healing. In comparison with other ligament reconstruction methods such as gracilis and semitendinosus this allograft technique has no donor site complication such as pain, infection and scarring. Autograft may become weak because of inadequate revascularisation whereas mersilene tape will maintain its tensile strength. Fixation through mersilene tape has proven to be easy to use and less time-consuming procedure. Few techniques which include coracoclavicular fixation such as suture anchor, Endo button, cc screw involve drilling the shaft of the clavicle which my cause fracture during the procedure and failure of the purpose of fixation, our technique has no such complication. As per the study done by Yeng Chang et al. during the follow up patients treated by mersilene tape have less amount of reduction loss over CC distance as compared to hook plate patients. Apart from that, mersilene tape has shown better range of shoulder abduction with respect to hook plating. Mersilene tape has been proven to be equivalent in terms [4] of load at failure, stiffness, elongation and mode of failure.

Results

A single case of a 40-year male with Rockwood grade 5 AC joint injuries is included in this study. The mean preoperative VAS score (0-10) improved from 6.41 to post operative score of 2.68 and 1.25 at 6 months respectively. Constant Murley score (73-100) improved from a pre operative score of 51 to a post operative score of 88.33 and 92.08 at 6 months respectively. At the final follow up patient had satisfactory results in terms of pain, cosmetic correction and movement and strength of the shoulder. There are no postoperative wound complications, loss of fixation or osteolysis, requirement of revision surgery. The AC joint was clinically as well as radiologically stable with normal alignment and anatomical reduction of AC joint.

Conclusion

Acute type 5 AC injury fixed with k-wiring and mersilene tape is easy to use, simple technique, with less complication and has equivalent results to other treatment options.

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