

ACROMIOCLAVICULAR JOINT INJURIES

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ACROMIOCLAVICULAR JOINT INJURIES

- 1. Surgical Anatomy
- 2. Function of ACJ
- 3. Classification of ACJ-Injuries
- 4. Decision making for treatment
- 5. Common surgical Techniques
- 6. Complications (not discussed)

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ACJ- Injuries

- 12%-15% of all Shoulder injuries
- First Reports:
- **Hippocrates** (460-377B.C.)

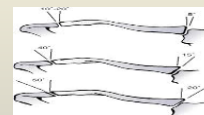
Galen (129-199A.D.) -> Treated himself after having ACJ-dislocation, but he abandoned the treatment.

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Surgical Anatomy



- Articular surfaces are covered with hyaline cartilage up to the age of 20 years
- Fibrocartilaginous disc
- Shape and inclination of the articular surfaces show variations
- variability in congruity
- Overriding in 50%

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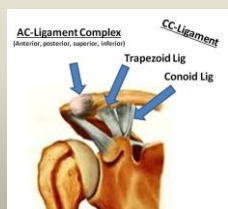
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ACJ- Stability is based on :

Static Stabilizers

- **Acromioclavicular ligaments complex** (anterior, posterior, superior, inferior)
- Anteroposterior Stability
- **CoracoClavicular Lig (CC-Lig)** (Trapezoid, Conoid)
- Superoinferior Stability



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ACJ-Stability

Dynamic Stabilizers

- **Deltoid Muscle** (anterior)
- **Trapezius Muscle** (through its facial attachment)



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Function of ACJ

- The ACJ is the only connection of the upper extremity to the axial skeleton
- It helps to couple the glenohumeral abduction and flexion with the scapular rotation
- So the synchronous glenohumeral and scapulothoracic motion can take place, and the elevation of the arm is possible
- CC-Lig is the prime suspensory Lig of the upper extremity



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Range of Motion in ACJ

- **Inman and colleagues** in 1944 suggested that the total range of motion in the ACJ is 20°
- **Codman and Rockwood** theorized the ROM is only 5°
- **The main motion takes place in scapular level.**
- The ROM of ACJ is **still in debate**

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Mechanism of injury

- Direct force on acromion from superior to inferior.



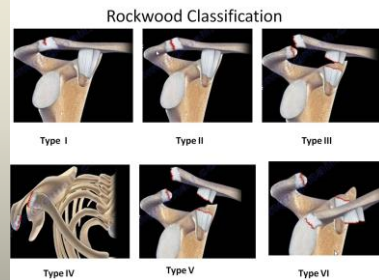
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Classification of ACJ Dislocations

Rockwood Classification



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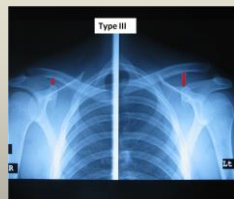
Beware of:

Type III

Elevation of clavicle is up to 50%-100% compare to normal side

Uncommon association with fracture of the clavicle

Extremely uncommon additional fracture of coracoid.



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Beware of:

Type IV

Clavicle is dislocated posteriorly through the trapezius muscle.

AP -X-ray may show normal CC-space.

Sparse reports of bipolar dislocation



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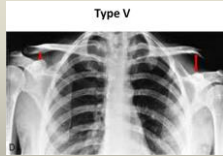
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Beware of :

Type V

clavicle is grossly elevated (the CC- space may appear greater than 100%-300 % of the normal space) muscles are also grossly detached



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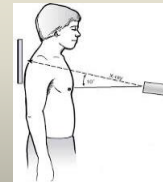
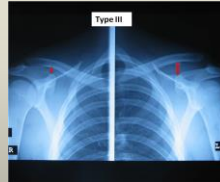
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X-RAY Evaluation

X-Ray of both Shoulders

Zanka view to avoid superimpositions



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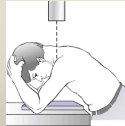
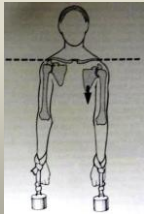
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X-RAY Evaluation

Stress view with Weights

Further Views : Axillary, Stryker etc



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X-RAY Evaluation

Where is actually the Deformity ?

- CC-Lig is the main suspensory Lig of the arm
- The arm drops down and the clavicle looks to be elevated



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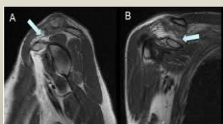


Should an MRI investigation be done ?

yes

Direct Picture of torn Ligs

Concomitant lesions in Glenohumeral joint



Up to 25% concomitant lesions

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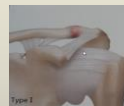
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TREATMENT

Type I & Type II

Conservative : SLING FOR COMFORT AND EARLY MOBILIZATION



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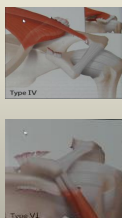


TREATMENT

Type IV & Type V & Type VI

No doubt : **Surgical**

More than 150 procedures, no 'ideal' op



TREATMENT

• Type III , What to do?

• One from JBJS published in 2014



Treatment is controversial

• and the other from Arthroscopy Journal published in 2013

No consensus for treatment



Two recent representative review publications

CURRENT CONCEPTS REVIEW Management of Acromioclavicular Joint Injuries

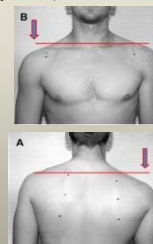
Xinming Li, MD, Richard Ma, MD, Ashrafh Beeli, MD, David M. Elson, MD, David W. Altchek, MD, and Joshua S. Dines, MD
Investigation performed at the Division of Sports Medicine and Shoulder Surgery, Hospital for Special Surgery, New York, NY

► The management of type-III injuries remains controversial and is individualized. While a return to the previous level of functional activity with nonsurgical treatment has been documented in a number of case series, **surgical** reduction and coracoclavicular ligament reconstruction **has been associated with a favorable outcome** and can be considered in patients who place high functional demands on their shoulders or in athletes who participate in overhead sports.

J Bone Joint Surg Am. 2014;96:73-84 • <http://dx.doi.org/10.2106/JBJS.L.00734>

Nonsurgical Management
Several authors have reported satisfactory outcomes in patients with type-II acromioclavicular separations that were managed nonsurgically. Click et al.²⁷ reported satisfactory outcomes with no substantial functional disability in thirty-five patients who had a mean follow-up of three years after nonsurgical treatment. Das et al.²⁸ reviewed forty-four patients approximately five years after nonsurgical management and reported good-to-excellent results in all patients except one, who had persistent subluxation of the acromioclavicular joint. In addition, 55% of the patients had mild symptoms over the acromioclavicular joint, 82% had obvious deformity, and 11% had a decrease in shoulder abduction of 20°; however, these findings did not limit the overall function of the patients. The long-term results in this same cohort of patients were reported by Rowe and Diaz²⁹ at an average of 12.5 years after injury. Of the thirty patients reviewed (fourteen patients were lost to follow-up), the acromioclavicular joint remained subluxated or dislocated in all patients; however, 97% still had good-to-excellent results according to the classification system of Imatani et al.³⁰ Bernardi et al.³¹ also reported good-to-excellent results in 91% of patients (thirty of thirty-three) whose type-III separations were treated nonsurgically. The authors also noted that a reduction of the acromioclavicular joint was not necessary, as there is a potential for healing and the ability to adapt after injury. Schlegel et al.³² prospectively evaluated twenty-five patients whose type-III injuries had been managed nonsurgically. In comparing the injured shoulder to the contralateral, normal shoulder, there was no significant difference in range of motion and rotational strength. However, a 17% decrease in bench-press strength was found on the side of

SICK Scapula Syndrome :
(Scapular malposition, Inferior medial border prominence, Coracoid pain and malposition, and dyskinesia)



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Type III

The management of type-III acromioclavicular joint injuries remains controversial. Most studies are case series with Level-IV evidence, and there are very few reports with Level-II (Table II) or Level-III (Table III) evidence available to guide treatment decisions³³. While most authors have obtained good-to-excellent results with nonsurgical management in patients with type-III injuries^{27,28}, others have reported persistent pain and residual symptoms associated with the acromioclavicular joint on final follow-up^{29,30}. Thus, to maximize function, some authors have advocated surgery for acute type-III acromioclavicular joint injuries in young and active patients³⁴. As a result, there is no consensus among orthopaedic surgeons with regard to the management of type-III acromioclavicular joint injuries. Therefore, individual assessment of each patient is essential, as the optimal treatment (surgical or nonsurgical) for an athlete who plays overhead sports and places high functional demands on the acromioclavicular joint may be different for older, less active patients.

J Bone Joint Surg Am. 2014;96:73-84 • <http://dx.doi.org/10.2106/JBJS.L.00734>

In summary, there is currently a lack of studies with a high level of evidence that evaluate nonsurgical compared with surgical management of type-III acromioclavicular joint injuries. The three prospective randomized studies are over twenty years old and involve surgical fixation methods that are not currently utilized. More recent studies are limited by retrospective study design, patient heterogeneity, and lack of standardized outcome measurements^{27-34,35,36}. On the basis of the available literature, the current consensus is that no functional difference is demonstrated between the two groups; however, a higher overall complication rate and longer time before return to previous level of activity or work is seen in the surgical group. Hence, the recommendation for treatment of uncomplicated type-III acromioclavicular joint injury is to start with an initial trial of nonsurgical treatment for three to four months. Surgical management should be considered in patients who have significant acromioclavicular deformity, tenting of the skin, or persistent pain despite nonsurgical management, or in patients who place a higher functional demand (work or sports) on the injured shoulder.

J Bone Joint Surg Am. 2014;96:73-84 • <http://dx.doi.org/10.2106/JBJS.L.00734>

Current Concepts in the Treatment of Acromioclavicular Joint Dislocations

Knut Beitzel, M.A., M.D., Mark P. Cote, P.T., D.P.T., M.C.T.R., John Apostolakis, B.S., Olga Solovyova, B.S., Christopher H. Judson, M.D., Connor G. Ziegler, M.D., Cory M. Edgar, M.D., Ph.D., Andreas B. Imhoff, M.D., Robert A. Arciero, M.D., and Augustus D. Mazzocca, M.S., M.D.

Purpose: To conduct a systematic review of the literature in relation to 3 considerations in determining treatment options for patients with acromioclavicular (AC) joint dislocation: (1) operative versus nonoperative management, (2) early versus delayed surgical intervention, and (3) anatomic versus nonanatomic techniques. **Methods:** The PubMed database was searched in October 2011 using the single term acromioclavicular and the following search limits: any date, human, English, and all cited (19+). Studies were included if they compared operative with nonoperative treatment, early with delayed surgical intervention, or anatomic with nonanatomic surgical techniques. Exclusion criteria consisted of the following: Level V evidence, laboratory studies, radiographic studies, biomechanical studies, fractures or revisions, meta-analyses, and studies reporting preliminary results. **Results:** This query resulted in 821 citations. Of these, 617 were excluded based on the title of the study. The abstracts and articles were reviewed, which resulted in the final group of 20 studies that consisted of 14 comparing operative with nonoperative treatment, 4 comparing early with delayed surgical intervention, and 2 comparing anatomic with nonanatomic surgical techniques. The lack of higher level evidence prompted review of previously excluded studies in an effort to explore patterns of publications related to operative treatment of the AC joint. This review identified 120 studies describing 162 techniques for operative reconstruction of the AC joint. **Conclusions:** There is a lack of evidence to support treatment options for patients with AC joint dislocation. Although there is a general consensus for nonoperative treatment of Rockwood type I and II lesions, initial nonoperative treatment of type III lesions, and operative intervention for Rockwood type IV to VI lesions, further research is needed to determine if differences exist regarding early versus delayed surgical intervention and anatomic versus nonanatomic surgical techniques in the treatment of patients with AC joint dislocations. **Level of Evidence:** Level III, systematic review of Level II and Level III studies and one case series.

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 29, No 2 (February), 2013; pp 387-397

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joint. Despite the miscalculated and inconsistent references to this book (including the past publications of the senior author), recent reports have indicated AC joint injuries to be among the most common orthopaedic injuries to the shoulder in a young athletic population.^{2,3}

Rockwood and Green⁴ described 2 fundamental schools of thought in the consideration of treatment options for patients with AC joint separations: (1) conservative or nonoperative treatment and (2) surgical repair.⁵ Although simple in concept, the abundant number of surgical techniques described in the current literature makes it difficult to discern which techniques or approaches work best for a given AC separation. Further, considerations regarding the timing of surgical intervention and the type of reconstruction need to be explored to elucidate a management scheme that maximizes the potential for a favorable treatment outcome for patients with AC joint separation.

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 29, No 2 (February), 2013; pp 387-397

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SURGICAL TREATMENT

- **Historically:**
- In 1941 **Bosworth** described his technique of placing a screw between the clavicle and the coracoid.
- In 1972 **Weaver and Dunn** described their procedure consisting of excision of the distal end of the clavicle and stabilizing the clavicle by inserting the acromioclavicular Lig in the medullary cavity of the clavicle

Weaver and Dunn 1972 JBJS 54 1187-1194

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"OLD" SURGICAL PROCEDURES



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NOWADAYS ???



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Essential key elements to successful surgical management


1. Anatomic and accurate reduction of ACJ
2. Direct or indirect repair (by closing the CC-gap) in acute stage, and reconstruction of CC-Lig (by using graft) in chronic stage
3. Protection of the CC-Lig repair or reconstruction
4. Repair of the Deltoid and Trapezius fascia in high Type of injuries
5. Arthroscopy of glenohumeral joint may be indicated even in open procedures
6. Distal clavicle resection only in patient with chronic dislocation and clinical evidence of osteoarthritis

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- Many procedures have been suggested: more than 150
- **Open**
- **Arthroscopic assisted**
- **In acute stage:** Closing the CC-space
(once you operate, why not to reconstruct?)
- **In Chronic Stage:** Reconstruction of CC-Lig
Protection of the Graft

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Popular arthroscopic techniques

- **Tight Rope**
(Two buttons and a loop of Fiber Wire #5, Tunnel 4mm)
- **Twin Tight Rope**
(matches the CC-Lig anatomy)

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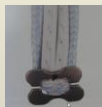
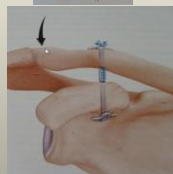

Courtesy of Arthroex




Popular arthroscopic techniques

- **“Dog Bone”** technique
(Loop of Fiber tape, Tunnel only 3mm)

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Popular open technique

- **Twin Tail TightRope**
(4,5 mm Tunnel in Coracoid
4,0mm tunnels in clavicle)

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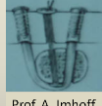
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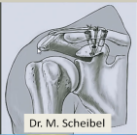
Delayed or Chronic Stage

- The CC-Lig must be reconstructed
- Usually autograft of Gracilis or Semitendinosus
- Many procedures
- Either around the coracoid
- or through a bony canal in coracoid


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Prof. A. Imhoff



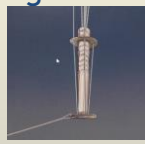
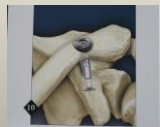
Dr. M. Scheibel




Delayed or Chronic stage

- **Graft Rope**
(Arthroscopic Technique
graft is secured in the implant
a 6 mm tunnel is needed
Not (widely) used any more)

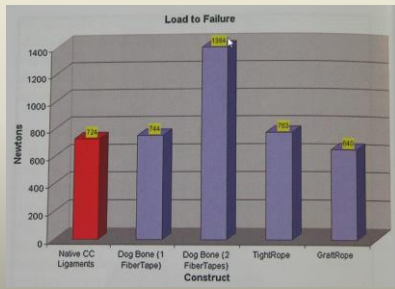
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Experimental Studies



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Arthroscopic Procedure

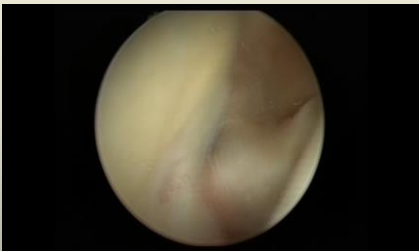
- **Basic Steps:**
- 1. Diagnostic Arthroscopy of glenohumeral joint
- 2. Opening of a window in rotator interval
- 3. Preparation of coracoid
- 4. Mini skin incision on the top of the clavicle
- 5. Insertion of K- wire from clavicle to coracoid
- 6. Over drilling the K-wire for tunnel
- 7. Insertion of nitinol wire
- 8. Passing the TightRope, flipping the button, reduction of ACJ and tie the knots

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Video Demonstration



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Video Case



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