Standard of Care: Acromioclavicular Joint Separation

Physical Therapy Management of the patient with an acromioclavicular joint separation; primarily conservative management.

Case Type / Diagnosis: (diagnosis specific, impairment/ dysfunction specific)

Practice Pattern E: Impaired Joint Mobility, Muscle Performance, and Range of Motion Associated with Ligament or Other Connective Tissue Disorders
ICD-9 Code: 831.04 (AC dislocation)

An acromioclavicular (AC) separation is usually the result of a direct force to the superior aspect of the acromion; often from a fall with the arm in an adducted position. In a fall the acromion is driven inferiorly spraining the intra-articular AC ligaments. Greater forces may also sprain the extra-articular coracoclavicular (CC) ligament. Radiographs help to confirm the injury.[1] Another mechanism of injury can be caused by an indirect force from a fall with an outstretched hand. The CC ligament is usually not injured with this type of fall. [1,2]

Acromioclavicular joint injuries account for 40-50% of athletic shoulder injuries. They are frequently seen in competitive athletes who play rugby, hockey, and football. It is most frequent in the second decade of life. This age group usually does not present with degenerative rotator cuff tears or impingement. The ratio of males to females is 5:1. Severe injuries (Type VI, see below) are usually due to a fall from an extreme height or from a motor vehicle accident.[1, 2, 3, 4]

Patients typically present with pain and swelling at the superior part of the shoulder with restricted shoulder ROM after a fall.[1, 4] Individuals may also report generalized shoulder or trapezius area pain and tenderness with more localized AC joint pain and tenderness as the acute symptoms resolve. The patient may have pain at night and when rolling onto the involved side due to compression of the AC joint.[4] Treatment is usually nonoperative (the focus of this standard of care) except in severe sprains or fractures.[5]

Acromioclavicular Joint Anatomy: (refer to Figure 1 for anatomical reference)

The AC joint is a plane synovial joint comprised of the acromial process of the scapula and the lateral end of the clavicle. A fibrous capsule surrounds the joint and there may be a fibrocartilaginous intra-articular disc. The joint has 3 degrees of freedom with 5-8 degrees rotation.[2, 6, 7] The joint has a transverse orientation and downward forces can cause sheer stresses and disruption of the muscular and ligamentous structures.[1] However, there is a vertical orientation in 36% of population and oblique orientation in 49%.[2]

The acromioclavicular ligament is a capsular ligament which maintains horizontal stability in the anteroposterior plane and protects against posterior translation and axial distraction of the clavicle. The coracoclavicular ligament has 2 components – the trapezoid which provides resistance against axial compression and superior translation and the conoid ligament which resists superior and anterior translation and provides vertical stablity.[1, 2, 4]

The ligaments and the dynamic muscle control of the deltoid and trapezius muscles provide the stability of the joint. The fibers of the AC ligament blend with the fibers of deltoid and the trapezius and help to reinforce the AC joint and add stability.[8] These muscles provide dynamic stability if ligaments are damaged.[1]

The resting position of the AC joint is with the arm by the side in standing. The closed packed position is at 90 degrees abduction. The capsular pattern is at the extremes of ROM especially horizontal adduction and full elevation.[7]

Thirty to forty degrees of clavicular elevation and 45-60 degrees of scapula rotation are required for successful elevation of the arm. The scapula provides the stable base for shoulder movement. Problems with movement and alignment of the clavicle or scapula can lead to impingement and/or instability.[6]

The innervation of the AC joint comes from the branches of suprascapular and lateral pectoral nerve. [7]

Classification of AC Joint Separation - Rockwood Classification, 1990 [4, 6]

- Type I
  - Mild sprain of the AC ligament
  - No disruption of AC or coracoclavicular ligaments

- Type II
  - Disruption of the AC joint
  - AC joint wider because of disruption (<4mm or 40% difference)
  - Sprained but *intact* coracoclavicular ligaments with coracoclavicular space essentially the same as the normal shoulder on radiographs
  - Downward force (weight) may disrupt AC ligament, but *not* the coracoacromial ligament
- Type III
  - Coracoclavicular and AC ligaments disrupted leading to separation of the joint
  - Shoulder complex displaced inferiorly
  - Coracoclavicular interspace 25-100% greater than in normal shoulder, or 4 mm distance (especially with weights applied)
- Type IV
  - Clavicle is displaced posteriorly through fibers of trapezius
  - AC ligament and coracoclavicular ligaments disrupted
  - Deltoid and trapezius muscles detached from distal clavicle
- Type V
  - Vertical separation of clavicle is greatly separated from scapula over a type III injury (100 to 300% more than normal shoulder)
  - Significant prominence of clavicle
- Type VI
  - Clavicle is dislocated inferiorly under the coracoid process

Type I and II injuries are usually treated conservatively. There are differing opinions regarding management of Type III injuries with a shift toward more conservative management. Surgery should be considered for younger more active patients, in individuals who do heavy repetitive

lifting[1], in thin individuals with prominent distal clavicles or those who work with their arms above 90 degrees. [1, 2, 6] Nonsurgical treatment of Type III AC separations was found to be superior to surgical treatment in the first year after surgery. [9] A prospective study of the natural history of untreated Grade III AC separations done in 2001 showed a majority (80%) of patients did well without formal treatment. The authors state that a small percent of patients may require surgery especially in those who do heavy lifting or repetitive manual labor. The study did not include athletes involved in overhead activities and did not include conclusions regarding return to sports or information about surgical outcomes. [10] Those individuals with type IV, V, and VI injuries should have a surgical consult and often require early surgical intervention with open reduction and internal fixation.[1]

Indications for Treatment:

The indications for treatment can include:

- Shoulder pain
- Shoulder swelling
- Decreased active and/or passive ROM of upper extremity
- Decreased scapulothoracic rhythm
- Muscle imbalances
- Impaired muscle strength
- Impaired function

Patients can be referred with an acute, sub-acute or chronic injury. Treatment will depend on injury type, duration and intensity of symptoms. The focus of rehabilitation after shoulder injury is on pain control and regaining coordinated movement throughout the shoulder complex, then on muscle strengthening and muscle re-education and return to functional, sports and work activities.

Contraindications / Precautions for Treatment:

- Acute infection
- Acute Fracture – clavicle , coracoid process, acromial process
- Tumor
- Avoid increased pain or swelling

Evaluation:

Medical History:

- Review medical history questionnaire (on an ambulatory evaluation), patient's medical record and medical history reported in the Hospital's Computerized Medical Record.
- Review any diagnostic imaging, tests, work up and operative report listed under LMR
- Any previous trauma to upper extremity, any repetitive or overuse injuries involving upper extremities

History of Present Illness:
Interview patient at time of examination:

- Include onset (acute, subacute, or chronic), duration of symptoms and mechanism of injury.
- Inquire and document if there was a deformity at the time of injury and whether the patient was able to immediately use the upper extremity or continue the activity after the injury.
- Location of pain and pain level
- Activities and positions which increase or decrease pain
- Functional limitations
- Inquire if any other previous shoulder problems or symptoms

Social History:

- Review patient's home, work, recreational and social situation.
- Recreational activities – type, frequency, duration
- Type of work activities – especially inquire if patient does heavy labor and/or lifting especially overhead lifting

Medications:

- NSAID's and/or analgesics (OTC, prescription)

Examination (Physical / Cognitive / applicable tests and measures / other)
This section is intended to capture the most commonly used assessment tools for this case type/diagnosis. It is not intended to be either inclusive or exclusive of assessment tools.

Visual Inspection/Observation:

- Symmetry
- Check if deformity of AC joint
- Swelling
- Bruising
- Atrophy or hypertrophy of shoulder girdle musculature
- Willingness to use UE
- Protective positioning of UE
- Use of support/sling

A prominent clavicle (Grade II or III) with loss of normal contour of the shoulder due to sagging of the acromion indicates ligamentous disruption of the AC joint.[1, 6]

Pain:

- As described using VAS. Note location, description and activities that increase or decrease symptoms.
- Pain is often located at the AC joint

Posture/alignment:

Focus is on the shoulder girdle

- Note level of shoulders and scapulae - compare heights of clavicles and scapular spines
- Positioning of UE

Palpation:[6, 7]

Palpate the entire shoulder girdle focusing on the AC joint and including the sternoclavicular joint and clavicle.

- Check for normal positioning of AC joint.
- Note if tenderness at AC and CC ligaments.
- Note muscle tenderness and spasm – particularly the anterior, posterior and middle deltoid, trapezius and subclavius muscles.
- Check for tenderness and prominence at AC joint.[6]

ROM:

- Take goniometric measurements of active and passive shoulder ROM of shoulder, elbow and wrist; compare to uninvolved side.
- Note scapular ROM and functional ROM.
- Expect pain at extremes of AROM especially horizontal adduction and full elevation and pain on passive horizontal adduction and elevation.
- Patient may have a muscle spasm end feel.[7]

Strength:

- MMT shoulder, scapular, elbow, hand and wrist muscles.
- If patient is unable to tolerate MMT due to pain, resistive isometrics can be used to test shoulder extension, flexion, abduction, adduction, ER and IR, elbow flexion and extension and wrist strength.

Accessory Joint Motion of AC Joint:[7]

- Cephalad/caudad
- Anterior/posterior
- Compare to other side
- Can be quite painful
- Determine if hypermobility

Neuro Testing:

Perform an upper quarter screen to assess dermatomes and myotomes and determine if further assessment of cervical and/or thoracic spine is indicated.

Functional Strength:

Will likely have pain on extremes of movement[7]

Functional Scale:

Shoulder Pain and Disability Test - (SPADI)

Special Tests:

- Acromioclavicular shear test: positive if abnormal movement of AC joint or pain at joint[7]
- Passive cross-chest adduction[6]
- O'Brien test[6,7]

"The integrity of the conoid portion of the the coracoacromial ligament may be tested by placing the patient in side lying on the unaffected side. The examiner stabilizes the clavicle while pulling the inferior angle of the scapula away from the chest wall. The trapezoid portion of the ligament may be tested from the same position. The examiner stabilizes the clavicle and pulls the medial border of the scapula away from the chest wall. Pain in either case in the area of the ligament constitutes a positive test."[7]

Differential Diagnosis [1,2,4,8]

- Fracture – medial or distal clavicle, acromial process or coracoid process
- Rotator cuff tear

Pain more medial to AC joint may indicate clavicle fracture. If the pain is more lateral an acromial fracture or rotator cuff tear may be indicated. Coracoid process fractures are uncommon.

If no history of trauma or 2 months post-injury consider other diagnosis:

- Osteoarthritis may develop as part of natural aging, from previous history of fractures or dislocations, with repetitive UE activity, deterioration of articular disk and from bony changes on both sides of the joint.[2, 6]
- Osteolysis of distal clavicle occurs in various diseases, ie RA, hyperparathyroidism, infection, multiple myeloma, scleroderma and those who do extensive weight-lifting.[2, 6] It can be accompanied by osteolysis of the acromion. The symptoms can mimic osteoarthritis. Bone scan can confirm diagnosis. (Evidence on x-ray may take weeks; MRI may be indicated in some cases.)[4]
- Superior entrapment of the clavicle – The clavicle can be entrapped on top of acromion and is suspected if the examiner is unable to move clavicle to a reduced position. Local anesthesia, manipulation by a physician and a splint/harness are used to reduce and maintain clavicle position. Excision may be necessary in chronic cases. Leonard indicated a 6% incidence in their facility.[11]
- Other chronic shoulder conditions should be considered if continuing pain. They are uncommon in young (second decade of life) athletes but older individuals may have rotator cuff involvement or impingement. MRI may be indicated to determine possible rotator cuff tear.[4]
- Neck pain

Assessment:

Establish Diagnosis and Need for Skilled Services

Problem List (Identify Impairment(s) and/ or dysfunction(s))

- Pain
- Swelling
- Impaired ROM
- Impaired strength
- Impaired joint play
- Impaired posture
- Impaired function
- Impaired knowledge: diagnosis, condition, self-management, home program, potential for deformity, avoiding pain and re-injury

Prognosis:[1, 2, 8, 10, 12, 13]

Prognosis is dependent on type of injury. Course of recovery is often prolonged if surgery was required.

- Type I and II injuries usually have good to excellent results with return to full function in 1-3 weeks. Some individuals may have persistent pain or dysfunction. A small percent may need eventual surgery for degenerative disease of AC joint.
- Type III injuries usually return to full function in 6-12 weeks. Most patients treated conservatively have excellent functional outcome. Younger patients and heavy laborers may need surgery to prevent muscle fatigue and discomfort and difficulty lifting due to the displacement. Type III injuries may develop impingement symptoms, muscle discomfort and neurovascular symptoms. Late surgery may be required. Surgical outcomes can be acceptable in more than 90% if treated appropriately.
- Type IV, V, and VI generally require surgery and return to play depends on healing and restoration of near normal strength and ROM.
- Scapular instability may be a result of disruption the scapula's articulation with the AC joint and not due to muscular weakness.[13]

Goals

- Pain Relief/Reduction
- Protect injured ligaments against re-injury
- Increased ROM
- Increased strength
- Improved joint play
- Maximize posture
- Maximize Functional Independence
- Independent home exercise program, self-management of symptoms, independence with prevention of re-injury
- Maximize ability to return to previous vocational, avocational and recreational activities

Age Specific Considerations:

- Osteoarthritis and other degenerative changes can occur later in life.[2]

Treatment Planning / Interventions

Established Pathway	___ Yes, see attached.	__**x**_ No
Established Protocol	___ Yes, see attached.	__**x**_ No

Interventions most commonly used for this case type/diagnosis.

This section is intended to capture the most commonly used interventions for this case type/diagnosis. It is not intended to be either inclusive or exclusive of appropriate interventions.

Treatment in this standard of care is targeted to the conservative management. Close communication with the surgeon is needed for post-operative rehabilitation.

Acute Stage:[6, 8]

Type I Injury

Days 1-7

- Ice
- NSAID's
- Shoulder sling for 5-7 days– rest as needed
- AROM fingers, wrist and elbow
- Begin Pendulum Exercises – day 2 or 3
- Shoulder isometrics trapezius and deltoid muscles

Days 7-10

- Expect symptoms to subside
- Discontinue sling
- AROM and strengthening as symptoms allow[2]

Type II Injury

Day 1

- Ice for 24-48 hours
- NSAID's
- Sling for comfort 1-2 weeks

Day 7

- Gentle ROM of shoulder
- Allow use of arm for ADL
- Discontinue sling at 7-14 days

Type III Injury – Non-operative

- Ice for 24 hours
- Sling – discontinue as symptoms subside (1-4 weeks)
- Leukotape - may increase comfort and facilitate weaning from sling and allow progression of ROM and strengthening exercises.[15]
- Begin ADL with arm at 3-4 days
- Slowly progress functional ROM, gentle PROM at 7 days

Type IV, V and VI injuries are diagnosed by radiographs and will need surgical consult. Return to athletics and play depends on healing and restoration of near normal strength and ROM.[2]

After Acute Stage:

Type I and Type II injuries can progress to ROM and strength training as symptoms permit. Type I can return to sport when nearly normal ROM and strength. No heavy lifting, stresses, or contact sports until full painless ROM, and no point tenderness over AC joint (usually by 2-3 weeks)[2, 6] Type II injuries should avoid heavy lifting, pushing, pulling or contact sports for at least 6 weeks.[6]

Type III injuries typically have full ROM at 2-3 weeks with gentle ROM exercises and return to activity in 6-12 weeks with protection of AC joint.

- Continue patient education
- PROM, AAROM, AROM progression
- Posture training
- Strengthening of trapezius, deltoid, rotator cuff and scapular musculature – may include isometrics, exercise bands, active progressing to resistive forward flexion, scaption, side-lying external rotation, seated press-ups, push-ups plus[5]
- Weightbearing scapular stabilization using physioball[13]
- Joint mobilization if glenohumeral joint limitations; contraindicated at AC joint if hypermobility.
- Protection of the AC joint with padding if patient will return to collision sports, using a "doughnut" from foam or felt. A pad can be used beneath the shoulder padding used in the patient's sport.[5] Literature did not specify commercial pads or slings.
- Modalities as needed– ice, electrical stimulation *(refer to each individual practice standard for procedural guidelines.)*

Frequency & Duration:

- 1-2 times per week for 2-4 weeks if Type I or II
- 1-2 times per week for 4-12 weeks if Type III, non-operative

Patient / family education

- Role of PT, PT findings, plan of care
- Pain and swelling management – avoid exercises and activities which provoke the pain or cause swelling
- Re-injury prevention
  - "Weight lifters should avoid locking the elbows during the bench press, use a narrower grip on the bar, and avoid bending the elbows below the horizontal."[5]
  - Use of protection if returning to collision sports. (see above)
  - Avoid repetitive tasks
- Posture
- Sports specific training
- Home exercise program
- Future complications

- Patient may develop arthritis as part of normal aging, (50%) or if they are weight lifters, do upper body workouts, or play sports involving shoulder strength or throwing.[5]
- Patient may have a residual "bump" at AC joint.

Recommendations and referrals to other providers.

- Orthopedic Surgeon
- PCP

Re-evaluation / assessment

Standard Time Frame – every 30 days or less if significant change in status

Other Possible Triggers –

- Significant change in symptoms, fall, re-injury, or pain after 8-12 weeks of intervention.
- Failure to progress per established short-term goals

Discharge Planning

Commonly expected outcomes at discharge:

- Minimal to no pain or swelling
- Functional ROM and strength
- Independent functional mobility
- Independent home exercise program
- Return to pre-injury function, work and/or previous avocational and recreational activities

Transfer of Care

Consult with referring physician if no improvement or worsening of symptoms.

Patient's discharge instructions

- Continue and progress home exercise program as directed.
- Sports specific training
- Injury prevention
- Awareness of posture and positioning
- Contact clinic or physician if patient experiences increased symptoms or re-injury

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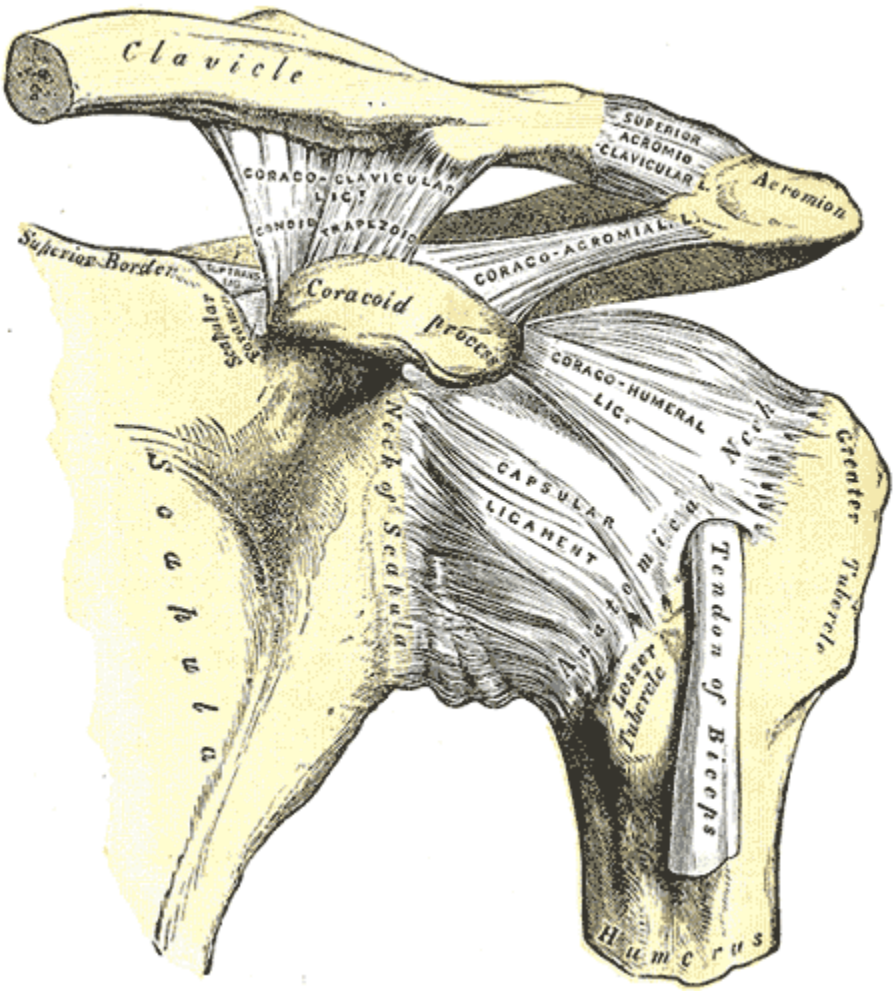

Figure 1
From: Bartleby.com edition of Gray's *Anatomy of the Human Body*
http://www.bartleby.com/107/illus326.html

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