Conservative management of a type III acromioclavicular separation: a case report and 10-year follow-up

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Abstract

Objective: The purpose of this study is to present a 10-year prospective case of a right incomplete type III acromioclavicular (AC) separation in a 26-year-old patient.

Clinical Features: A 26-year-old male patient fell directly on his right shoulder with the arm in an outstretched and overhead position. Pain and swelling were immediate and were associated with a “step deformity.” The patient had limited right shoulder range of motion (ROM), strength, and function. Radiographic findings confirmed a type III AC separation on the right. At 1-year follow-up, the patient did not report any deficits in ROM or function, but did note a prominent distal clavicle on the right. At 3-, 5-, 7-, and 10-year follow-up, the patient did not report changes from 1 year. The radiographic findings at the 10-year follow-up indicated mild degenerative joint disease in both AC joints and mild elevation of the distal clavicle on the right.

Intervention and Outcome: The patient received chiropractic care to control for pain, swelling, and loss of ROM. The patient received acupuncture, joint mobilizations, palliative adhesive taping of the AC joint, Active Release Technique, and progressive resisted exercises. Radiographic study was done at the time of the injury and at 10 years to observe for any osseous changes in the AC joint.

Conclusion: The patient yielded excellent results from conservative chiropractic management that was reflected in a prompt return to work 19 days after the injury. Follow-up at 1, 3, 5, 7, and 10 years exhibited absence of residual deficits in ROM and function. The “step deformity” was still present after the injury on the right.

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Introduction

Acromioclavicular (AC) joint separations are disruptions of the AC ligament, coracoclavicular ligament, and/or deltopectoral fascia. Separations are described based upon the degree of articular disruption between the distal clavicle and the acromion process. The most common mechanism for an AC separation is with the arm in internal rotation and full abduction and/or falling directly onto the superior aspect of the shoulder. The most common separation is type II of the Rockwood classification (Fig 1). The sports with the highest incidence of AC joint dislocation are bicycling (29%) and skiing/snowboarding (10%), which are associated with falls onto the shoulder.¹

Among professional performers and dancers, the career prevalence of injury ranges from 40% to 84%, with lower extremity and low back injuries being the most commonly reported.² Shoulder injuries are considered uncommon among professional performers. As such, the importance of recognizing the interplay of aesthetics and athletic demands imposed on the performer is critical. Impairments can negatively affect show productions and careers if shoulder injuries are not appropriately addressed. Furthermore, injury surveillance and injury management among dancers and performers have been limited.² This case report attempts to provide insight into a rare injury occurring in a dance performer that can be managed conservatively for return to a performing career.

Type III AC separations pose a controversial course of therapeutic management.³ The management for this injury has typically been surgical⁴; however, there is a growing consensus for conservative management, which is argued to be as effective for allowing expeditious entrance to physical rehabilitation and subsequent return to activity.⁵ The basis for surgical intervention is the premature onset of degenerative processes to the AC joint and associated limitations in range of motion (ROM), strength, and upper extremity function. Conservative strategies involving wearing a sling, modalities, and progressive rehabilitation have demonstrated minimal dysfunction and minimal evidence for degeneration. The literature does not support superiority of either method for the management of a type III separation.

The purpose of this report is to describe the case of a performer who fell on his shoulder with his arm overhead in an outstretched position. He was treated conservatively and had a successful clinical result at 1 year posttherapy. This case illustrates the initial conservative management for this injury with a prompt

return to activity. Secondly, this case demonstrated with long-term follow-up (10 years) the sustained functional outcome yielded without the negative consequences for electing for conservative management of a type III AC separation.

Case

History

A 26-year-old, right-hand-dominant, male dance performer fell onto his right shoulder in an overhead and outstretched position while diving forward. This injury occurred the day before presenting to the clinic. The patient gave consent to have personal health information published without divulging personal identifiers. The pain was the primary complaint and was localized to the right AC joint with associated stiffness across the shoulder and base of the neck. Pain was initially described as being sharp at the onset of the injury and progressed to a constant ache and throbbing sensation. Pain was verbally rated an 8 out of 10 (0 being no pain and 10 denoting the worst pain as described with testicular torsion from a previous injury). Right shoulder pain was reported with all active movements; however, lifting the right arm in an outstretched position (vs with the elbow bent) was noted as being the most bothersome. The patient attended the local hospital the same day of the injury; was prescribed naproxen, acetaminophen, and codeine; and was equipped with an arm sling for right shoulder immobility for which he found relief. The arm sling placed the affected right shoulder in an adducted and internally rotated position. Numbness, tingling, and weakness were not reported into the right arm, forearm, and hand at any time since the onset of the injury. The patient was concerned with his inability to perform in a local stage production where he was the main actor. The main duties were to include climbing, wrestling, and lifting overhead other actors in the production. The patient denies any previous injury to the affected shoulder. His medical history was noncontributory to the presenting injury.

Physical examination

The patient was noted to be in mild distress as a result of the right shoulder pain. Upon inspection of the right shoulder, there were signs of ecchymosis, local soft tissue swelling (fountain sign), and a mild abrasion

Fig 1. Graphic illustrations for classification of AC joint injury types according to Rockwood and Young. (Reprinted with permission from Beim G.¹⁰)

over the right AC joint. The neurological and vascular status of the upper extremity was normal bilaterally. Postural examination revealed an elevated right shoulder with the neck laterally flexed to the right. A “step deformity” (Fig 2A-C) was observed over the right AC joint that signified a superiorly displaced distal clavicle over the acromion. All active ranges of motion (AROMs) were restricted by 75%, by visual estimations, because of pain in the right shoulder. Passive ROM of the right shoulder was full, by visual estimations, and absent of pain with achievable “end-range feel” with overpressure except for horizontal adduction and abduction due to pain at the right AC joint and guarding at these end ranges.

Direct palpation over the right AC joint was pain provoking and reproduced the chief complaint. Joint play assessment of the right distal clavicle was performed to evaluate for horizontal and vertical instability. Testing exhibited hypermobility and pain in all directions (inferior-to-superior anterior-to-posterior translations). Palpatory findings of the cervical and upper thoracic spine revealed bilateral joint restrictions

in rotation with marked tenderness of the paraspinals in the surrounding cervicothoracic region. Muscular palpation on the right exposed local tenderness in the acromial insertion of the deltoid, pectoralis insertion at the humerus, the superior fibers of the trapezius, from the proximal insertion site at the occiput to the superior angle of the scapula to the insertion at the distal clavicle, posterior scalene, levator scapulae proximal insertion at the upper cervical transverse processes, and the insertion of the infraspinatus and supraspinatus muscles at the greater trochanter. Palliative maneuvering to the right AC joint was performed while applying an inferiorly direct pressure over the distal clavicle, which reduced the separation, alleviated the chief complaint, and permitted an increase in pain-free AROM with reduced pain (from 8/10 to 5/10).

Orthopedic examination findings for pain provocation of the right AC joint included the following: drop arm (arm at 90° of abduction and patient slowly lowers the arm), Neer test (patient’s arm is passively forced into full vertical abduction while in scaption with glenohumeral internal rotation), spring test (clinician places a direct inferior force over the distal clavicle reducing the separation followed by release of this contact), crossover test (patient’s arm is placed into full horizontal adduction from 90° of vertical abduction), the sulcus test (with patient’s arm at his side, the clinician grasps the forearm distal to the elbow joint and induces a distal distraction to the glenohumeral joint), and the compression test (with the patient sitting upright, the clinician places one hand on the anterior, middle one third of the clavicle and the other hand on the spine of the scapula—opposing forces (anterior and posterior) are applied to induce a shearing force through the AC joint). Right-sided Kemp testing (passive lateral flexion and extension of the cervical spine with overpressure at the forehead) of the cervical spine produced local pain in the cervicothoracic junction.

Full AROM was performed on the third visit when pain had diminished (previously was 8/10, now 3/10), which allowed for a thorough orthopedic examination for concomitant injuries that was unattainable because of painful restriction in ROM. Examination to rule out, on the right, the suspicion of either a subscapularis or a supraspinatus tear was absent with 5 out of 5 rating on resisted manual muscle testing protocol for each muscle, respectively. Results of examination for the presence of a superior labral anterior to posterior lesion and posterior labral lesions were unremarkable for pain, clunking, and instability on the right. Instability testing result was negative in the right glenohumeral joint.

Fig 2. A, Step deformity at the right distal AC joint with a left comparison. Notice the elevation of the distal right clavicle (arrow) in comparison to the left AC joint. B, Step defect at the right AC joint with a lateral profile graph (C). Notice the prominence of the distal clavicle. (Color version of figure is available online.)

Diagnostic imaging

Radiographic examination of the right AC joint and clavicle (Fig 3) was performed at the emergency department the day of the incident. The results demonstrated, from anteroposterior view with 10° to 15° of cephalic tilt, absence of fracture and glenohumeral joint dislocation, but a significant widening of the AC joint (15 mm) without fragmentation and sagittal displacement. The coracoclavicular space was measured as 23 mm. This injury is consistent with a complete disruption of the AC and coracoclavicular (conoid and trapezoid) ligaments and irritation of the deltotracheal aponeurosis. The radiographic findings concur with the patient's presentation of ecchymosis, muscle palpation, and superior displacement of the distal clavicle.

Diagnosis

The patient was diagnosed with a right-sided incomplete grade III AC joint separation with associated soft tissue swelling, ecchymosis, and loss of AROM. Initially, the patient was immobilized and had 25% AROM in all directions for the right shoulder with verbal rating of pain of 8 out of 10. No concomitant intra-articular injuries were evident on orthopedic examination.

Therapy

The management for the right AC joint separation consisted of acute management followed by subacute

Fig 3. Radiograph of the right AC joint at the time of the injury in 1999. Taken at the emergency department. Because of the conversion of this radiograph for digital formatting, outlines have been used. The results demonstrate the absence of fracture and glenohumeral dislocation. There is significant widening of the AC joint space (15 mm) without fragmentation and sagittal displacement. The coracoclavicular space measured 23 mm. The diagnosis of a grade III AC joint separation. Taken September 6, 1999. (Color version of figure is available online.)

Fig 4. Palliative maneuver using Leukotape to reduce the AC separation. The asterisks landmark the AC joint. Each strip of Leukotape crosses the AC joint from posterior to anterior (1-3). This is to reduce the separation and permit healing to occur without mechanical irritation. (Color version of figure is available online.)

care and return to activity programming. Acute management consisted of therapy for 3 consecutive days involving electroacupuncture (EA), spinal manipulative therapy (SMT), Active Release Technique (ART) soft tissue therapy, prophylactic taping, and immobilization. The objective of this management was for pain modulation, to control swelling, and restrict mobility that would provide an opportunity to perform an orthopedic examination to rule out concomitant injuries in the right shoulder.

Modulation of pain was conducted using EA targeting both systemic points (LI 4, ST 36, ST 38) and local points surrounding the AC joint (tender points in the deltoid, trapezius, supraspinatus, and pectoral musculature). High-frequency stimulation (150 Hz) on continuous setting was administered to facilitate pain modulation for bouts of 20 minutes.

Active Release Technique was used to alleviate muscular tension in the affected muscles in the right region that included the trapezius, levator scapulae, subclavius, deltoid, posterior rotator cuff complex, and scalenes. Spinal manipulative therapy was used to reduce joint restrictions in the cervicothoracic spine using high-velocity, low-amplitude forces. Application of Leukotape over the AC joint was performed (Fig 4) to reduce the upward translation of the clavicle to decrease irritation and facilitate healing in the surrounding area of the right shoulder. A cloth sling was worn, keeping the shoulder in an internally rotated position with support against gravity for the first week. The patient remained on

Table 1 Rehabilitative exercises for type III AC separation

Exercise	Days 1-3	Days 4-6	Days 6-19	Maintenance
	Sets × Repetitions	Sets × Repetitions	Sets × Repetitions	Sets × Repetitions
AROM				
Scapular retractions	2 × 25	2 × 25	2 × 25	
Scapular clock		1 × 20	2 × 15	
AAROM (towel)				
Shoulder lateral raise	1 × 15	2 × 15		
Shoulder front raise	1 × 15	2 × 15		
Shoulder adduction	1 × 15	2 × 15		
Wall climbs	1 × 15	2 × 15		
Codman pendulum	1 × 15	2 × 15		
Shoulder isometrics				
External rotation 0° ABD		2 × 10 × 7 s		
Internal rotation 0° ABD		2 × 10 × 7 s		
Flexion		2 × 10 × 7 s		
Extension		2 × 10 × 7 s		
Abduction (ABD)		2 × 10 × 7 s		
Adduction (ADD)		2 × 10 × 7 s		
Scapular protractions		2 × 10 × 7 s		
Scapular retractions		2 × 10 × 7 s		
Shoulder depression		2 × 10 × 7 s		
AROM				
ER at 0° ABD			Red 1 × 8	Blue 3 × 10
ER at 90° ABD			Red 1 × 8	Blue 3 × 10
IR at 0° ABD			Red 1 × 8	Blue 3 × 10
IR at 90° ABD			Red 1 × 8	Blue 3 × 10
Shoulder lateral raise			Red 1 × 8	Blue 3 × 10
Shoulder front raise			Red 1 × 8	Blue 3 × 10
Shoulder posterior raise			Red 1 × 8	Blue 3 × 10
AROM movement patterns				
Behind back		1 × 20		
Behind head		1 × 20		
Wall angel		1 × 20		
D1 movement pattern		1 × 20		
D2 movement pattern		1 × 20		
Proprioception				
Body blade circles		1 × 10 × 10 s	2 × 10 × 10 s	
Body blade alphabet		1 × 26 letters	2 × 26 letters	
Push-ups on BOSU			1 × 8	3 × 10
General conditioning				
Push-up plus				4 × 10
Lat pull-down 100 lb				4 × 10
Seated rows 100 lb				4 × 10
Shoulder ant. raises 5 lb				4 × 10
Shoulder lateral raises 5 lb				4 × 10
Prone shoulder raise 5 lb				4 × 10
Elbow flexion 25 lb				4 × 10
Elbow extensions 50 lb				4 × 10
Plyometrics ^a				
Push-up with clap				4 × 6
Medicine ball toss 8 lb				4 × 6
Medicine ball throws 8 lb				4 × 6

AAROM, active assisted range of motion; *ABD*, abduction; *ER*, glenohumeral external rotation; *IR*, glenohumeral internal rotation; *BOSU*, both sides up device.

^a Tempo is explosive with rest of 3 to 5 minutes between sets.

naproxen, and acetaminophen and codeine, as prescribed by the emergency physician.

At the end of the third session, the patient reported reduction in pain (from 8/10 to 3/10) and reduced swelling over the AC joint, and did not require the use of the arm sling. As a result of the improvements noted, the subacute management was commenced. This phase consisted of continued modalities (EA, SMT, and ART) before progressive resistive exercises across a 3-week period (2 sessions per week). The objective was to reestablish and promote proper motor patterning, strengthening, and function of the shoulder complex. Rehabilitation included cardiovascular training (60%-75% maximum oxygen consumption) on a cycle ergometer (20 minutes, 75 revolutions per minute, resistance level 6), active cervical ROM exercises, active assisted glenohumeral joint exercises using a towel with the unaffected arm, Codman shoulder mobilization protocol, and isometric periscapular muscle exercises.

During the fourth visit, isometric shoulder exercises were added (flexion, extension, internal and external rotation, vertical abduction), as the patient reported being relatively pain free (1/10). Isometric exercise resistance was performed by the clinician to the patient's tolerance for 1 set of 10 repetitions held for 10 seconds. Isometric exercises were progressed to isotonic exercises (on the sixth visit) with the weight of the arm against gravity and progressed to a light handheld weight (5 lb) and then to elastic tubing (Table 1). The isotonic exercises progressed from 1 set of 8 repetitions to 3 sets of 10 repetitions with improving strength and pain reduction through pain-free ROM from sessions 5 to 9. Proprioceptive exercises involved the body blade. The body blade (5-6 www.bodyblade.com) is held in the right hand and shaken, causing the blade to bow back and forth. The shaking is performed in the frontal, transverse, and sagittal planes. The bowing of the blade forces the musculature of the shoulder to contract and relax at the frequency of the bowing. The body blade exercise was performed for 3 sets of 20 seconds in each plane. The list of exercises and progression are listed in Table 1. At the end of each rehabilitation session, cryotherapy was applied to the right AC joint for 10 minutes twice and then for another 10 minutes after a 10-minute break.

At the end of this 3-week period, there was pain-free (0/10) AROM, complete resolution of swelling and ecchymosis, complete acquisition of strength of the shoulder complex (5/5), return to modified work duties (exclusion of overhead and climb maneuvers), and commencement of a strength and conditioning program to permit full return to work duties.

The patient received 3 additional treatments over the course of 3 weeks, consisting of ART, SMT, and review of exercises to ensure and maintain proper biomechanical function. At the last session (12th session), a 6-week upper extremity strengthening program was recommended, which included push-ups, medicine ball plyometric exercises (ie, wall throws), and dumbbell exercises (ie, pressing, raises, rows, curls, elbow extensions). At this session, the patient continued to be pain free and possessed full function in the right shoulder.

Clinical follow-up

At follow-up 1 year posttherapy, the patient exhibited a residual deformity of the right AC joint (elevated distal clavicle), full AROM, and sustained strength ratings (5/5). Measurement tools used included manual muscle testing of the shoulder complex; AROM measurements; push-up endurance test; and the Disability of the Arm, Shoulder, and Hand questionnaire (DASH). Active ranges of motion were symmetric, and muscle testing was equivalent with the unaffected shoulder (5/5 rating). Push-up testing demonstrated no difference in strength from side-to-side while performing more than 45 repetitions in 60 seconds. According to the Canadian Society for Exercise Physiology guidelines, this number of push-ups demonstrated an excellent rating for a male 20 to 29 years of age.⁶ The push-up has been demonstrated to be reliable ($r = 0.98$) protocol for pre- to posttesting across time.⁷

The DASH questionnaire exhibited no disability (score of 0) with work or activities of daily living. Of importance, the DASH questionnaire was not administered on the first initial visit or first year (1999) because of its uncommon practice utilization in the clinical setting as a result of its early development without rigorous investigation for reliability and validity. Since 2001, the DASH has been demonstrated to be a valid ($r = 0.77$) and reliable ($r = 0.94$) clinimetrically to measure shoulder disability.⁸ When the DASH was compared with other questionnaires, the Shoulder Pain and Disability Index and the American Standardized Shoulder Assessment Form, for clinimetric quality, the DASH was identified as possessing the highest quality to measure shoulder disability.⁹ Implementation of the DASH reflected greater clinical prudent practice with evolving evidence to monitor injuries.

Subsequent follow-ups at years 3, 5, 7, and 10 were conducted for physical fitness screening before new productions and for any maintenance care required. The DASH score continued to be zero; push-up scores were

40, 43, 47, and 50 at each respective follow-up; there was full AROM; and a 5 out of 5 rating for strength testing for the muscles of the shoulder complex was achieved. The only reported symptom to the right shoulder was transient discomfort to the AC joint and surrounding area with excessive work (physically demanding acting-dancing roles). No limitation on work performance was noted by the patient.

Radiographs at 10-year follow-up (Fig 5) demonstrated mild sclerosis in both AC joints with greater amounts observed in the right than the left. There was no obvious widening of the AC joint space. Abnormalities in the soft tissue and glenohumeral joint were not detected. The distal clavicle demonstrated cortical thickening inferiorly at the site of the coracoclavicular ligament attachment and was elevated 5.4 mm, whereas the coracoclavicular space was measured at 19.5 mm. As can be seen in Figs 3 and 4, there is a difference in measurement in both clavicular elevation (5.4 mm at 10 years and 15 mm at initial onset) and coracoclavicular space (19.5 mm at 10 years and 23 mm at initial onset) that can be attributed to distal cortical clavicular thickening, particularly at the location of the coracoclavicular ligaments. The changes over a 10-year span did not demonstrate significant degeneration to the AC joint or deterioration of the shoulder complex. The patient provided consent for this report to be published.

Discussion

Injuries to the AC joint require careful understanding of both the detailed anatomy and pathomechanics associated with classifying a true grade of injury. This understanding will provide a basis for determining what mode of management is necessary: conservative or surgical. To assume that all separations are treated alike while yielding similar outcomes by one treatment method is erroneous reasoning.³ Commonly, the AC joint is injured by a direct blow to the superior shoulder (acromion) in an internally rotated and fully abducted position. The severity of the AC injury is associated with the greater force of magnitude from the blow. Illustrations depicting the types of separations as described by Rockwood are found in Fig 5.

The AC joint is a resilient joint that can resist significant amounts of force before disruption. Adults in their 20s suffer most AC joint injuries (43%).¹⁰ Men are most commonly dislocating the AC joint compared with women (ratio 5:1). Of the injuries to the shoulder girdle, 9% involve the AC joint.¹¹ Intraarticular injuries

Fig 5. Radiographic depiction of the AC separation at 10-year follow-up. A, Left AC joint with minimal degenerative joint disease. B, Right AC joint separated 10 years previously. There is mild sclerosis in both AC joints, with more on the left than right. Note that there was no obvious widening of the AC joint space; abnormalities in the soft tissue and glenohumeral joint were detected. There are mild degenerative joint disease (arrow) and cortical thickening of the inferior distal clavicle (arrow-head) at the site of the coracoclavicular ligament attachment with elevation (5.4 mm) and coracoclavicular joint space width of 19.5 mm. Taken March 18, 2010.

were found in 18% of AC joints dislocations, with superior labrum anterior to posterior lesions the most commonly observed with AC joint dislocations.¹² Other concomitant injuries commonly prevalent with AC joint dislocations greater than type III include isolated subscapularis tears, combined subscapularis and supraspinatus tears, and partial articular supraspinatus tendon avulsion.¹²

A type III AC separation can be a diagnostic challenge that depends on the soft tissues injured. A complete type III separation involves *complete* disruptions of the deltatrapezial aponeurosis, superior and inferior AC ligaments, and the coronoid and trapezoid ligament complex. This magnitude of tissue disruption would result in a hypermobile and superiorly displaced distal clavicle. An incomplete type III separation typically presents with only partial tearing of the deltatrapezial aponeurosis in association with complete disruption of AC and coracoclavicular ligaments, and mild hypermobility and displacement of the clavicle in a superior direction. A complete type III separation requires greater immobilization (4-6 weeks) to permit

soft tissue healing, and return to activity or play is 8 to 10 weeks.³ A relatively stable type III separation can present with incomplete soft tissue disruption (ie, deltotracheal aponeurosis) and mild (~1 cm) displacement of the distal clavicle superiorly without compromise of the neurovascular bundle of the brachial plexus; and evident palliative maneuvers with reduction of the distal clavicle (ie, taping to reduce the upward displacement) are attained, suggesting that conservative management could be effective.¹³ Surgical management is typically reserved for restoration of painless function if soft tissues (muscle, neurovascular bundles, and aponeurosis) are compromised and subsequent dysfunction and/or disability are evident with or without a trial of conservative management. This case report demonstrated an incomplete type III separation as evidenced by the prompt return to painless function, although diagnostic ultrasound would be required to be definitive to establish the completeness of the aponeurotic tear.

Previous work¹⁴ has suggested that conservative management for type III separations is deemed ineffective compared with surgical management. Factors such as persistent deformity, AC arthritis, and muscle weakness were considered indicators of inadequate treatment.¹⁵ However, studies lacking a prospective design, inadequate baseline strength data, lack of distinction of the categorization of type III AC separation, and difficulties with group comparisons for multiple methods of treatment have reported the inferiority of conservative management for type III separations.

Schlegel et al¹⁶ prospectively investigated the natural history of type III AC separations when given a sling for up to 2 weeks, course of early ROM, and pain medication among 20 active subjects. The authors concluded that, at 1-year follow-up, 80% of the cases had a satisfactory result, 14 of 16 subjects did not experience pain related to the injury when engaging in strenuous physical activity, and only 3 subjects reported weakness with overhead activities and bench press activities if done in a repetitious fashion; 88% reported a residual deformity. Ranges of motion were symmetrical when compared with the unaffected shoulder. The only strength deficit noted was with bench press, which exhibited a 17% difference in strength, whereas all other isokinetic strength measures were equivocal to the unaffected shoulder. Strength outcomes from this study are consistent with Walsh et al⁵ who concluded no strength deficit with isokinetic muscle testing among subjects treated conservatively (sling or physical therapy) at 2-year follow-up. Walsh et al⁵ also

concluded that, at 2-year follow-up, subjects surgically treated had a strength deficit in horizontal abduction at fast speeds.

The research conducted by Phillips et al¹⁷ and Spencer¹⁸ both comparing the effectiveness between surgical and conservative management of type III AC separations shared similar results. Both studies concluded that conservative management had similar results when compared with surgical management. Conservative management ranged from nonsteroidal anti-inflammatory drugs to rehabilitation and to a sling. The surgical management was associated with greater complications including infection, increased convalescence, and increased time away from work and sport. Strength and ROM outcomes were not significantly different between both surgical and conservative management.¹⁴ Phillips et al¹⁷ concluded that 88% of surgically treated and 87% of nonsurgically treated patients had a satisfactory outcome. Both studies also concluded that there was no significant benefit from surgery; and thus, the authors concluded that there is no reason to recommend surgery over nonsurgical management for grade III AC separation.

Conservative management for type III AC separation does not have a “gold standard” of exercises, application of electrophysiological modalities (ie, interferential current, low-frequency ultrasound), and return to work-play guidelines. Clinical judgment and understanding of the principles of rehabilitation are required.¹⁹ In the acute phase, control of pain and swelling and early immobilization to restrict motion of the joint are necessary. Entering the subacute phase, early mobilization of the glenohumeral and distal clavicle to prevent excessive arthrofibrosis and maintenance of joint mobility within a free ROM are required. Once full ROM is achieved within a pain-free state, progressive resistive exercises are prescribed (isometrics, isokinetic exercises, and sport/activity specific exercises). In the later phases of the healing process, maintenance and prophylactic techniques may be of use with return to sport/activity (ie, adhesive taping of the AC joint); in addition, a general strength and conditioning regimen for the upper extremity is critical.²⁰

Radiographic findings are variable when comparing surgically reconstructed and conservatively managed AC joints. Mulier et al²¹ investigated the long-term results of conservatively managed type III AC separations. These researchers concluded that the most common radiographic findings included persistent dislocation, persistent subluxation, joint instability on stress radiographs, calcification, and AC arthritis. However, more than 75% of the subjects with type III

AC separation reported very good to excellent function and satisfactory results 6 years after completion of conservative management. The 10-year follow-up radiographs from this case demonstrated that minimal degenerative changes occurred at the AC joint, which is consistent with previous literature stating that gross and accelerated degeneration does not necessarily occur without surgical intervention.

Limitations

The limitations of this case report are those inherent with the type of study design.²² This study lacked consistent use of valid and reliable outcome measures, which warrants caution when interpreting clinical results. The subjectivity of identifying ROM was not incorrect, as visual estimations are often used in clinical setting and found to be reliable; however, accuracy is questioned. The use of a verbal rating scale to identify pain is a simplistic method of assessing pain; however, valid and reliable methods are suggested (ie, pressure algometry). Future reporting requires clinimetrically reliable and valid instruments to assess the outcome of therapy. In this case, the use of a goniometer to measure AROM, the use of the numeric pain rating scale to assess patient-perceived pain levels, and the necessity to consistently use such outcome measures throughout of the duration of the case are suggested. As a result of the multimodal approach, it is difficult to ascertain the contributions each therapy mode would have on the early recovery. The natural history of the injury cannot be ruled out as a possible explanation for the resolution of symptomatology.

In summary, the literature does not support the superiority of either form of management for a type III AC separation. The decision for surgery is commonly performed for cosmetic reasons to reduce the deformity and for those patients who deem conservative management to be unsatisfactory or among young athletic populations. With conservative management, a residual deformity is maintained; however, resultant dysfunction and limitation are not observed. The decision for management is made on a case-by-case basis with an understanding of the tissues implicated with the injury and accuracy of the separation classification. Consideration of the adverse events associated with surgery becomes critical when the long-term results are unequivocal with those of conservative management. The literature does not suggest surgical management to have greater efficacy in treating type III separations when conservative management outcomes are very

comparable in the long term for function, patient satisfaction with care, and prompt return to activity.

Conclusion

This case of an incomplete type III AC separation treated conservatively yielding excellent functional and clinical outcomes is reported over 12 treatment sessions. The decision to treat conservatively requires the clinician to specifically identify the tissues that are implicated and the presence of AC joint stability. Comprehensive conservative care addressed the pathomechanics of pain, use of manual techniques to alleviate pain, control for inflammation, reacquisition of AROM, utilization of palliative techniques to optimize mobility and minimize tissue irritation, structured and individually prescribed strengthening of the shoulder girdle to attain preinjury functional status, and prophylaxis from degenerative changes to the AC joint.

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