Management of Type 3 Acromioclavicular Joint Dislocations
Current Controversies

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Abstract

AC (acromioclavicular) joint dislocations are a common injury seen by physicians. Symptoms range from minor discomfort with activity to complete disability of the extremity. Although most orthopaedic surgeons agree on how to treat either mild (type 1-2) or severe (type 4-6) injuries, there is no consensus for treatment of type 3 injuries. This article reviews the relevant literature pertaining to the anatomy of the injury, evaluation of the patient, pertinent imaging as well as the controversial management of type 3 AC joint dislocations. With improvement in surgical techniques over the past 30 years, there have been many published studies evaluating both operative and non-operative care. Surgery has shown dramatic improvement in patient-rated outcomes; however, it is not always without complications. These risks in some patients may not be worth the potential surgical benefits. In type 3 AC joint injuries each patient and pathology must be carefully analyzed to ensure that the correct treatment option is chosen.

Acromioclavicular (AC) joint injuries are a common injury seen in athletes and represent 9% to 12% of all shoulder injuries. These injuries have a wide range of severity, from sprains of the acromioclavicular and coracoclavicular ligaments to complete dislocation of the AC joint. The classification of this injury pattern is well documented and used among orthopaedic surgeons. It is generally accepted that type 1 and 2 injuries are treated non-operatively with a short period of immobilization with early range of motion and strengthening. In contrast, type 4, 5, and 6 injuries are more severe with significant displacement and morbidity; therefore, the recommended treatment is usually surgical. Currently, there is no consensus on treating type 3 injuries. Many studies report on non-operative treatment; however, long-term studies show that it can lead to chronic pain and degeneration. Operative treatment of the type 3 injury lacks a “gold standard” procedure and has the potential for multiple complications. The purpose of this article is to review the relevant anatomy, biomechanics, clinical evaluation, classification, and treatment options for AC joint dislocations as well as examine the controversy that exists for treatment of type 3 injuries.

Anatomy

The AC joint is a diarthrodial joint with an intra-articular meniscus and a surrounding joint capsule. The static stabilizers of the joint include the acromioclavicular (AC) ligament and coracoclavicular (CC) ligaments. The AC ligament controls horizontal stability in the anterior-posterior plane, and the superior and posterior portions of the ligament are the strongest. The CC ligaments, which consist of the conoid and trapezoid ligaments, serve as the main control vertical stability. The conoid portion of this ligament attaches posterior and medial on the clavicle while the trapezoid portion attaches anterior and lateral. Furthermore, the trapezius and deltoid muscles have also been shown to function as dynamic stabilizers of the AC joint.

Biomechanics

The AC joint is a part of the suspensory unit of the upper extremity. Bearn stated that “the only connection between the upper extremity and the axial skeleton is through the clav-
cular articulations at the AC and sternoclavicular joints.\textsuperscript{7} Motion at the clavicle assists in maintaining scapulothoracic movement and functionality of the shoulder. The clavicle rotates on its own axis through both the sternoclavicular (SC) and AC joints. The rotation of the clavicle is \(40^\circ\) to \(50^\circ\) with only \(5^\circ\) to \(8^\circ\) of that motion arising from the acromioclavicular joint with forward elevation and abduction of the arm to \(180^\circ\) because of the corresponding SC joint motion.\textsuperscript{8} The motion of the clavicle is closely coupled with that of the scapula; therefore, rigid fixation of the AC joint may lead to decreased motion of hardware failure.

The mechanism of injury to the AC joint can be either direct or indirect. Direct impact can be caused by collision or fall onto the shoulder with the arm in an adducted position. Although the indirect injuries are less common, they can occur after a fall onto an outstretched arm. In most indirect injuries, the AC ligament is more commonly affected than the CC ligaments.\textsuperscript{9} Interestingly, Mazzocca and coworkers performed a biomechanical study that elegantly illustrated that the sequence of disruption begins with the AC ligament, followed by the conoid, and finally the trapezoid ligament for cases of complete AC joint dislocation.\textsuperscript{10}

**Patient Evaluation**

AC joint injuries are often diagnosed by history and physical exam. The examiner must appreciate any visual deformity, swelling or ecchymosis, and palpate for tenderness over the AC joint and lateral clavicle. Range of motion of the shoulder may be limited to pain and suggest injury. The examiner must determine if there is instability in the vertical or horizontal planes. On the physical exam, the “piano key” sign, which is considered positive when the distal clavicle appears mobile to axial pressure, can be a useful adjunct to other testing.\textsuperscript{4} Provocative testing for this injury includes the use of the cross arm adduction of the shoulder, which is done by elevating the arm to \(90^\circ\) and adducting the arm across the chest with the elbow flexed; this will elicit pain with an AC joint injury. Another useful test is the Paxino test, and this is performed by having the examiner place his or her thumb on the posterolateral corner of the acromion and index finger on the mid-superior clavicle and then squeeze. The anterolateral pressure will elicit pain with AC joint injuries.\textsuperscript{11}

**Imaging**

Imaging of the AC joint includes a standard shoulder series of plain films (AP, scapular Y, and axillary views). It should be noted that the standard shoulder series can over-penetrare and obstruct visualization of the AC joint, and the Zanca view of the AC joint is an important part of the imaging studies. This special x-ray is performed by aiming the beam \(10^\circ\) cephalad with 50% less penetration strength (Fig. 1). The axial view of the shoulder series is important to see if there is any anterior or posterior displacement of the clavicle. Some studies have described weighted stress views to differentiate between a type 2 and 3 injury; however, these views are no longer commonly used because of the discomfort it causes the patient, and the fact that the results rarely change the treatment of the injury.\textsuperscript{12} When evaluating radiographic images, the distance between the inferior aspect of the clavicle and the superior aspect of the coracoid should be measured. This distance has been described to range between 1.1 cm and 1.3 cm; however, there are no absolute values. Therefore, it is recommended that a comparison of the coracoclavicular (CC) distance between the injured and contralateral side is performed, and then the percentage of difference between the two is calculated.\textsuperscript{5}

**Classification**

Classification of AC joint injuries is based on the amount of soft tissue injury and displacement as seen on AP and axillary radiographs (Table 1). Tossy and Allman described types 1 to 3, and Rockwood later described types 4 to 6.\textsuperscript{5,8,13}

Type 1 injury: In this injury, there is stretching of the AC ligaments. The radiographs are normal, there is no deformity on inspection, but there is usually tenderness at the joint.

Type 2 injury: There is disruption of the AC ligament and injury to the CC ligament. This presents with slight displacement of the clavicle superiorly but remains in contact with the acromion.
Table 1  Acromioclavicular Injury Classification

<table>
<thead>
<tr>
<th>Type</th>
<th>AC Ligament</th>
<th>CC Ligament</th>
<th>Deltotrapezial Fascia</th>
<th>Radiographic Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sprained</td>
<td>Intact</td>
<td>Intact</td>
<td>Normal</td>
</tr>
<tr>
<td>2</td>
<td>Disrupted</td>
<td>Sprained</td>
<td>Intact</td>
<td>AC joint widening, slight elevation of distal clavicle</td>
</tr>
<tr>
<td>3</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>Insertion intact</td>
<td>CC distance 25% to 100% compared to contralateral</td>
</tr>
<tr>
<td>4</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>CC distance 25% to 100% and posterior displacement of clavicle</td>
</tr>
<tr>
<td>5</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>CC distance 100% to 300%</td>
</tr>
<tr>
<td>6</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>Subacromial or subcoracoid displacement</td>
</tr>
</tbody>
</table>

Type 3 injury: This injury has both AC and CC ligament disruption with displacement of the clavicle up to 100% superior to the acromion. The deltotorapezial fascia insertion remains intact.

Type 4 injury: There is disruption of both the AC and CC ligament. The clavicle displaces posteriorly, and the head of the clavicle penetrates through the trapezius. On AP radiographs, this will show as a widened CC joint, and the axillary view will show posterior displacement.  

Type 5 injury: There is more than 100% displacement of the AC joint, and the deltotorapezial fascia is disrupted.

Type 6 injury: This is a very rare injury where the clavicle displaces inferiorly. This injury is usually associated with a high energy trauma and is due to hyperabduction and external rotation of the arm with retraction of the scapula.

Non-operative Treatment

The goal in treatment of AC injuries is relief of pain coupled with full range of motion and strength. Non-operative treatment is the standard of care for types 1 and 2 but is a contentious area of debate for type 3 injuries.

Non-operative treatment typically consists of initial sling immobilization with early range of motion and rehabilitation programs when pain is tolerable. A specialized AC joint sling, such as the Kenny-Howard brace, has not been found to be necessary due to associated skin breakdown and no long-term clinical difference compared with a regular sling. Rehabilitation involves range of motion and isometric exercises progressing to isotonic exercises. Closed chain exercises should be performed in order to separate scapular movement into individual motions. It also can be more tolerable for the patient because it can unload the weight of the arm, which will decrease joint reactive forces. Overall activity is typically limited during the period of discomfort, which can last up to 6 months. Consideration of range of motion, strength, and pain should assist in determining when the patient may return to unrestricted activity.

Although AC joint injuries treated non-operatively have been shown to heal, it is important to note that there is a potential for residual pain, inflammation, and possible long-term degenerative changes. Mikek studied long-term shoulder function after type 1 and 2 AC joint disruption in 23 patients. At a mean follow-up of 10.2 years, it was found that greater than 50% of type 1 and 2 patients had residual symptoms and differences in shoulder outcome scores compared to their uninjured contralateral shoulder.

Operative Treatment

Surgical intervention is the commonly accepted treatment modality for type 4, 5, and 6 AC joint injuries. However, surgery for type 3 injuries is still very controversial. There are several guiding principles for operative treatment of AC joint injuries as described by Fraser-Moodie and colleagues. First, the AC joint should be accurately reduced, and corrections must be made in the sagittal and coronal planes. Secondly, since the joint is inherently unstable, the disrupted ligaments should either be repaired or reconstructed. Thirdly, the reduction of the joint must have immediate stability to protect either the repair or reconstruction. Lastly, if rigid hardware is used for stabilization, this must be removed once the repair or reconstruction has healed because motion at the joint may cause hardware failure.

A great amount of variability exists in the operative treatment options for AC joint injuries. In order to simplify the large armamentarium of procedures available, we will describe them in generalized categories.

Types of Repair

There are two ways to “repair” the torn CC ligaments. One way is to use fixation to maintain reduction of the coracoid and clavicle to allow time for healing of the native CC ligaments. In the acute setting, the assumption is that when the ligaments heal, they will have the same tensile strength as the native ligaments. If the ligaments do not heal completely, cyclical loading of the joint may cause failure of the fixation and failure of the repair. The second way is to reconstruct the CC ligaments with transfer of local tissues or with free tendon grafts. This method also typically uses an additional form of fixation to maintain reduction so that the reconstructed tissue has time to heal.

Choice of Fixation

The goal of fixation is to maintain reduction, allow for healing of the injured ligaments, and allow for healing of the reconstruction. Since the AC joint has static stabiliza-
tion from both the AC ligament and the CC ligament, the fixation can involve the coracoid-clavicle (CC fixation), the acromion-clavicle (AC fixation), or both.

CC fixation can be accomplished with either a screw or a suture. A commonly used screw is a Bosworth-type screw. Bosworth originally described this screw to be “electrolytically inert material, having a wide-flanged thread of minimal pitch and a broad, flat head.” Typically, a 6.5 mm partially threaded cancellous screw is used. A CC suture can be accomplished with various sutures and implants, such as Mersilene tape, suture anchors, small metallic flip button, and non-absorbable sutures.

AC fixation can also be achieved with numerous techniques. Pins and wires have been used in the past to hold the AC joint reduction; however, due to complications, such as pin migration, this technique has been largely abandoned. A hook plate is another method of fixation; however, this implant typically needs to be removed due to looseness over time.

McConnell and associates performed a cadaveric biomechanical study comparing three different fixation techniques, including the bicortical Bosworth screw (CC fixation), suture with #5 Mersilene tape (CC fixation), and a hook plate (AC fixation) and found that the screw fixation was the stiffest with the highest load to failure while the stiffness of the plate and suture fixations were not significantly different than the intact CC ligament. Complications were noted in both the screw and the plate fixation groups and included screw pull out in 4 out of 5 specimens, with one of the screws failing by fracture of coracoid. Similarly the plate had a high failure rate with 4 of 5 plates failing by plate slippage from beneath the acromion.

Choice of Reconstruction
There are many procedures in use today for reconstruction of the AC joint, and these can be differentiated based on whether they are “anatomic” or non-anatomic.

Non-anatomic
The Weaver Dunn procedure is the traditional non-anatomic technique for stabilization and was first described in 1972. This approach transfers the proximal portion of the CA ligament to the distal end of the clavicle. Recently, there has been a gradual shift in technique to augment the original Weaver-Dunn procedure to improve the strength of the reconstruction. CC fixation using suture cerclage, screw, tape, or suture anchors have been used to supplement the Weaver Dunn procedure. Deshmukh and coworkers performed a biomechanical cadaveric study to compare the Weaver Dunn procedure with various methods of augmentation.

The augmentations used included suture cerclage with #5 Ethibond (CC fixation), Arthrex corkscrew suture anchor (CC fixation), Linvatec Ultrafix suture anchor (CC fixation), Mitek GII Superanchor (CC fixation), and Innovasive AC joint anchor (AC fixation). Interestingly, all of the fixation methods had higher failure load than the Weaver Dunn procedure alone, which provides support or augmenting the Weaver Dunn procedure.

Anatomic
Anatomic reconstruction techniques use a free tendon graft to reconstruct the CC ligaments in their native locations. Anatomic studies looking at the average location of the attachments of each ligament have shown that the conoid ligament is approximately 45 mm from the distal end of the clavicle in the posterior half of the clavicle while the trapezoid ligament is approximately 15 mm distal from the center of the conoid ligament and along the center of the clavicle. Common free tendon grafts for reconstruction of the conoid and trapezoid include semitendinosus, gracilis, toe extensors, palmaris longus, and flexor carpi radialis. Fixation of the tendon graft can be accomplished using a screw and washer, looping the tendon to itself, using an interference screw, or a luggage tag technique.

Several studies have been performed to evaluate the biomechanical performance of non-anatomic compared to anatomic reconstructions. Grutter and coworkers tested a modified Weaver Dunn with a #5 Ethibond suture sling, anatomic reconstruction with palmaris longus (PL) graft, and anatomic reconstruction with flexor carpi radialis (FCR) graft. They found that the anatomic reconstruction with the FCR graft had similar tensile strength compared to the native AC joint complex, whereas the modified Weaver Dunn and anatomic reconstruction with PL graft had significantly less strength.

Thomas and colleagues performed a cadaveric study testing the load to failure of the modified Weaver Dunn, anatomic reconstruction with allograft (semitendinosus), and a non-anatomic reconstruction with allograft (semitendinosus) and Arthrex GraftRope. They found that only the anatomic reconstruction with allograft had a statistically higher load to failure than the other reconstructions, and that this load to failure that was similar to the control (native AC joint).

Lee and colleagues tested the performance of non-anatomic (Weaver Dunn and modified Weaver Dunn) versus anatomic (semitendinosus allograft) reconstructions on cadavers. Each repair was cyclical loaded at 40 N to 80 N for 2,500 cycles, then 40 N to 210 N for 2,500 cycles, and then loaded to failure. The Weaver Dunn failed with the first set of cyclical loading, while the modified Weaver Dunn failed with the second set of cyclical loading. The anatomic reconstruction with allograft survived both loading conditions, and the mean load to failure was found to be 523 N ± 28 N, which when compared to findings from another study by Lee and colleagues, the ultimate tensile strength of this repair after a total of 5,000 cycles decreased by 16%.

There are few clinical studies comparing non-anatomic and anatomic studies. Tauber and coworkers had a prospective case series on 24 patients with chronic type 3 to 5 AC joint dislocations. A modified Weaver Dunn was performed...
on 12 patients, and the other 12 patients had anatomic reconstructions with autograft semitendinosus tendon. At a mean follow-up of 37 months, the Constant Scores and American Shoulder and Elbow Surgeons (ASES) scores were both significantly better in the semitendinosus group.

Fraschini and associates\(^4\) reported a retrospective series of 90 patients. Group 1 had 30 patients who underwent a non-anatomic sling repair with a Dacron vascular prosthesis. Group 2 had 30 patients treated with an anatomic repair utilizing LARS artificial ligament. Group 3 was the control group treated non-operatively. At a mean follow-up of 15 months, the University of California Los Angeles (UCLA) scores were significantly better in the two surgical groups compared to the non-operative group. The anatomic reconstruction with LARS artificial ligament had a satisfactory outcome in 93% of patients. It should be noted that the non-anatomic procedure had a high complication rate.

**Postoperative Rehabilitation**

Postoperative rehabilitation after acute or chronic reconstruction should consist of sling use for 6 to 8 weeks while beginning gentle range of motion in weeks 1 to 3. Isometric strengthening exercises can be started after 4 weeks while the patient is in the sling as well as after the sling is discontinued; emphasis should be placed on strengthening the scapula stabilizers. Six weeks is the earliest time point that unsupported arm range of motion should be performed in order to allow biological healing.\(^3\) Full strengthening can begin approximately 12 weeks postoperatively, and the patient may return to all activities at 4 to 6 months.

The time period for returning to sports is a common concern for many patients with AC joint injuries and varies based on both patient and injury characteristics. Patients with lower grade injuries generally are faster to return to play and contact sport athletes should wait longer. Also consider the use of the involved extremity in the sport, any associated soft tissue injury and the athlete’s motivation, and pain tolerance. There is no set of guidelines for the time required in a sling and return to sports for these patients. If pain is diminished and full or near full strength and range of motion is achieved, it is reasonable for the practitioner to consider letting the patient return to play. Additionally, one can also consider administering a local injection around the AC joint for a return to play in the acute or semi-acute time period in patients who have met all rehabilitation criteria.

**Complications**

Complications from non-operative treatment include skin breakdown from harness type devices, tenting of the skin from significant displacement (usually type 4 or 5), late osteolysis of the distal clavicle, and post-traumatic osteoarthritis of the AC joint.\(^1\) A common operative complication is loss of reduction, which can occur by loss of fixation, fracture of the coracoid or clavicle, biologic failure as the graft construct gradually stretches, failure of the hardware device, erosions through the clavicle and fracture through coracoid with no-absorbable tape or suture used as augmentation, and migration of pins and wires used to transfix the construct. Other operative complications include tunnel osteolysis, infection, ossification of CC or AC ligament, and osteoarthritis of the AC joint.\(^3,4,12\)

**Type 3 Controversy**

There is significant controversy over the proper treatment of type 3 AC injuries, and this topic has been extensively debated in the literature. Although non-operative treatment does not restore anatomic alignment of the AC joint, this treatment facilitates early rehabilitation. While operative treatment, on the other hand, attempts to restore the anatomy, this treatment can be associated with a variety of complications.

Despite the large volume of studies on acromioclavicular injuries, there still remains a lack of high quality studies to provide level 1 evidence. In 1998, Phillips and coworkers\(^45\) performed a literature review to address this controversy. A total of 24 studies were included, and the only inclusion criteria were articles which “describe severely displaced dislocations.” These articles were of varying levels of evidence and grades of injury. The relevant articles totaled 1,172 patients treated. They found that satisfactory outcomes had been observed in both operative (88%) and non-operative (87%) treatments. In 2011, Smith and colleagues\(^44\) published a systematic review on the topic. The inclusion criteria were studies that compared non-operative and operative type 3 AC joint injuries. The primary outcome of interest was the Constant score. There were a total of six studies included, and all were retrospective case series. A total of 380 patients were included in the review. The operative procedure in the studies included screw fixation, hook plate, Weaver Dunn, and suture sling. Although the primary outcome was the Constant score, only two studies used that as one of its outcome measures. The significant findings were that operative treatment had greater cosmetic benefit, but the time of sick leave was longer than non-operative treatment.

A Cochrane review was performed on the topic of non-operative versus operative treatment for type 3 injuries. The inclusion criteria were all randomized or nonrandomized trials that compared non-operative and operative treatment in adult patients.\(^46\) Three studies were included in the Cochrane review are particularly illuminating.

In 1975, Imatani and associates\(^46\) performed a prospective nonrandomized study including 23 patients with “acute, complete acromioclavicular separation” at the Naval Regional Medical Center San Diego. The operative group included 11 patients treated with either AC joint fixation with Steinmann pins or with CC fixation with a Bosworth screw. There was a 12-month minimum follow-up, and patients were assessed for pain, function, and movement with the use of a non-validated point system (40 pain, 30 function, and 30 motion). There was no difference found between the
non-operative and operative groups.

In 1986, Larsen and colleagues performed a prospective randomized study in Denmark with a total of 84 patients. The inclusion criteria were AC joint displacement of 75% or more of the width of the clavicle. The non-operative group had 43 patients treated with a sling and swathe, while the 41 patients in the operative group were treated with a modified Phemister procedure. The Phemister procedure used AC joint fixation with Kirschner wires and a direct repair of the AC and CC ligaments. At an average follow-up of 13 months patients were assessed for pain, movement, and strength using a non-validated 12 point system (4 pain, 4 motion, and 4 strength). Similar to the other prospective study above, no significant difference in outcome was found between the non-operative and operative groups.

In 1989, Bannister and coworkers performed a prospective randomized study on acute acromioclavicular dislocations. The study included 60 patients, with 33 treated non-operatively with a sling and 27 treated surgically with screw CC fixation. They evaluated outcomes for pain, function, and movement with a non-validated 100 point system (40 pain, 30 function, and 30 motion). At 1-year follow-up, 88% of the non-operative group and 77% of the operative group had good or excellent clinical outcome. At 4 year follow-up, there was 100% satisfaction in the non-operative group but only 74% for the surgical patients.

The three included trials totaled 174 patients treated with a variety of procedures. They found insufficient evidence from randomized controlled trials to determine if surgical treatment is indicated for type 3 AC joint dislocations in adults in the current literature. Of note, all of the trials included were done many years ago, and none of the recent advancements in anatomic reconstructive techniques were used. Also, all of the clinical outcome measurements were done with non-validated point system scores. Based on this limited data, it is difficult to make definitive recommendations on non-operative versus operative management of these injuries.

There are several reasons supporting non-operative treatment of type 3 injuries. The primary reason is that operative procedures for these injuries have high (59%) complication rates including hardware failure, deformity, infection, need for further surgery, and osteolysis of the clavicle. When the patient is indicated for operative intervention, it is difficult to know which procedure to choose. There is no “gold standard,” and the literature has over 30 described types of procedures. Finally, delayed reconstruction is always an option, so conservative management is thought to be the more reasonable first choice.

Special exemptions exist to the initial conservative management of type 3 AC joint injuries, and operative intervention is a stronger consideration as the first line treatment for high-level athletes. McFarland and coworkers surveyed 42 orthopaedic surgeons who were team physicians for major league baseball athletes with type 3 AC joint injuries. The survey presented a hypothetical scenario of a starting pitcher who sustained a grade 3 AC joint injury. Among the physicians, 69% stated they would treat non-operatively and 31% operatively. There were 25 physicians who had actually treated a pitcher with a type 3 injury in the throwing arm. They reported that among the non-operative patients, 80% had normal function, no pain, and 90% return of normal range of motion.

The UConn Mazzocca algorithm for these type 3 injuries is a helpful approach toward deciding whether to operate or not. In season grade 3 injury in athletes should be treated with anesthetic injection for immediate return to sport and scapular kinetic chain exercises. Out of season, the athlete should have functional rehab and return to sport in 6 to 12 months. If the athlete has residual pain, loss of function, or the inability to perform at his or her previous level of activity, then surgery should be performed. If not, then they may return to full activity.

Non-operative treatment involves a brief period of immobilization and then progression to rehabilitation. Physical therapy should focus on scapulothoracic strengthening to maintain stabilization of the scapula since there is a disruption of the suspensory unit of the shoulder. The AC joint is never “reduced” with non-operative treatment, and theoretically the joint is at risk for chronic pain and degeneration. Taft and coworkers reported a case series of 127 patients. Operative intervention with either a Steinmann pin or Bosworth screw was used in 52 patients. There were 63 patients who were treated non-operatively. A control group of 12 patients that were not diagnosed until after their symptoms subsided were included in the series to study the natural history of the injury. The average follow up of non-operative patients was 10.8 years, operative patients was 9.5 years, and the control group was 13 years. Radiographic evaluations were performed on 93 patients (73%). The clinical ratings (pain, stiffness, range of motion, and strength) were not found to be different between the non-operative and operative groups. The control group did not have any difference in clinical ratings compared to the other two groups; however, there was more evidence of degenerative changes on radiograph.

What do surgeons think about this controversy? Nissen and colleagues surveyed 577 American Orthopaedic Society for Sports Medicine (AOSSM) members, and 81% indicated they preferred non-operative treatment for uncomplicated type 3 injuries. When performing surgery for type 3 injuries, 69% recommended reconstruction of the coracoclavicular ligaments.

**Conclusion**

AC joint dislocations are a relatively common injury in the general population. Although standards are well defined for treatment of mild and severe injuries, there is no consensus for treatment of type 3 injuries. Surgical methods have advanced a great deal over the past 30 years; however, there
has been no established “gold standard” procedure. Surgical treatment also has risks of complications, which may not outweigh the benefits in some patients. The treating physician must address each AC joint injury individually and decide treatment specifically tailored to the type of injury, the patient involved, and the expectations after recovery. Future research should be conducted to better define which patients with type 3 injuries benefit most from operative treatment.

**Disclosure Statement**

None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

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