

Type III Acromioclavicular Separation: Results of a Recent Survey on Its Management

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Abstract

The issue of managing type III acromioclavicular (AC) separations remains controversial, and decisions about using operative versus conservative management have undergone many distinct changes over the years.

To review current management preferences within the orthopedic community, we sent a mail-in survey to all members of the American Orthopaedic Society for Sports Medicine (AOSSM) and approved Accreditation Council for Graduate Medical Education (ACGME) orthopedic program residency directors. Of the 664 respondents (577 AOSSM members, 87 directors), 81% (71/87 AOSSM members) to 86% (502/577 directors) continue to treat uncomplicated type III AC separations conservatively. Providing a sling for comfort remains the preferred type of conservative management (AOSSM members, 91% [456/502];

directors, 89% [63/71]). For surgical management, respondents recommended resection of the distal clavicle slightly more often than not (AOSSM members, 57% [42/74]; directors, 59% [319/538]) and rigid stabilization of the AC joint during early postoperative rehabilitation (AOSSM members, 80% [444/555]; directors, 82% [61/74]). Finally, most recommended reconstructing either the coracoclavicular ligaments (69% [330/476] and 61% [33/54], respectively) or both the coracoclavicular ligaments and the AC ligaments (27% [130/476] and 33% [18/54]) when addressing this problem.

Since the early 1990s, there has been little change in initial conservative management of type III AC separations. Furthermore, the surgical approach to reconstruction, when necessary, has also undergone relatively few changes, with the exception of an increased preference for primary distal clavicle excision.

for this injury; of the 126 respondents preferring surgical treatment, 60% advocated fixation across the AC joint, and only 0.8% recommended immediate excision of the distal clavicle.

In 1992, choice of treatment methods for AC injuries was the subject of another survey, by Cox.⁵ Cox used the Rockwood and Green classification⁶ to describe the AC dislocation. The type III AC dislocation involves a complete rupture of the AC ligaments, the coracoclavicular ligaments, and the joint capsule. Cox received 187 responses from orthopedic program residency directors and 51 from orthopedic surgeons active in sports medicine and responsible for the care of collegiate and professional athletes. Results showed a dramatic reversal in treatment choices for type III AC injuries. Of the surveyed directors and surgeons, 72.2% and 86.4%, respectively, advocated nonoperative treatment of the type III AC separation. Regarding nonoperative approaches, 28.1% of directors said they would use manual reduction and an AC immobilizer; the other 71.9% of directors advocated symptomatic treatment. Similarly, 33.3% of surgeons preferred manual reduction with an AC immobilizer; the other 66.7% chose symptomatic treatment. For required surgery, 27.7% of directors advocated fixation across the AC joint; the other 72.3% of directors preferred fixation across the coracoclavicular space. Only 1 (3.6%) of 28 surgeons preferred fixation across the AC joint; the other 27 (96.4%) advocated fixation between the coracoid and the clavicle. Last, 21.8% of directors and 33.9% of surgeons advocated primary excision of the distal clavicle for a type III AC dislocation.

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A cromioclavicular (AC) injuries have been documented as far back as 460 to 377 BC, when Hippocrates acknowledged the difficulties and common misdiagnosis involving AC dislocation treatment.¹ Operative repair of AC dislocations was recorded beginning in 1861.²

In 1974, Powers and Bach³ described a complete AC dislocation as a rupture of the coracoclavicular ligaments, the AC ligaments, the joint capsule, and the fibers of the deltoid and trapezius aponeurosis. Powers and Bach used the injury classification of Tossy and colleagues⁴ in a survey of orthopedic chairpersons. Of the respondents, only 9.5% preferred a nonoperative approach as treatment



Figure. Type III acromioclavicular separation. A = acromion; C, clavicle; CC, coracoid; S, scapula; X, disrupted coracoclavicular ligaments. Illustration by Chris Creed.

Comparing the survey results of Powers and Bach³ and Cox⁵ reveals a significant swing of the pendulum from a preference for surgical treatment for type III AC injuries in 1974 to a preference for nonoperative treatment in 1992. In addition, for cases treated surgically, the preferred fixation method also changed: Fixation

in the Cox survey (directors, 72.2%; surgeons, 86.4%) may reflect the fact that McFarland and colleagues surveyed orthopedists representing 28 baseball teams (much depends on a quick return to the sport).

CLASSIFICATION OF AC INJURIES

Tossy and colleagues⁴ in 1963 and Allman⁸ in 1967 classified AC joints into types I, II, and III. In 1984, Rockwood and Green⁶ added types IV, V, and VI.

Type I injury involves a sprain of the AC ligaments, which remain intact. The coracoclavicular ligaments are unharmed, as are the deltoid and trapezius muscles, and the AC joint remains intact.

Type II injury involves a more significant force to the shoulder. The AC joint is disrupted, and the AC ligaments are torn. The coracoclavicular ligaments are sprained but remain intact, as do the deltoid and trapezius muscles.

Type III injury (Figure) usually occurs when a severe blow to the shoulder causes a rupture of AC ligaments (capsule) and coracoclavicular ligaments. The AC joint is dislocated, and the shoulder complex is displaced

clavicle is displaced inferior to the acromion or the coracoid process of the scapula. The AC ligaments, capsule, and coracoclavicular ligaments are disrupted.

MATERIALS AND METHODS

To investigate the current preferred method of treatment of type III AC dislocations, we sent a questionnaire to the 152 chairpersons of the orthopedic residency training programs accredited by the Accreditation Council for Graduate Medical Education (ACGME) in North America and to the 1523 orthopedic surgeons in the American Orthopaedic Society for Sports Medicine (AOSSM). The questionnaire described a 21-year-old athlete who fell on a shoulder and sustained a type III AC dislocation (Rockwood and Green classification⁹). The distal clavicle was reducible, and the deltoid and trapezius aponeurosis were not seriously injured. Unstated in the questionnaire were the timing of the injury (acute vs chronic), the sex of the patient, whether the injury occurred on the dominant or nondominant shoulder, whether the patient was a throwing or nonthrowing athlete, and whether or

“[Between 1974 and 1992] Fixation between the coracoid and the clavicle became more accepted than fixation across the AC joint.”

between the coracoid and the clavicle became more accepted than fixation across the AC joint. Last, in 1992 more physicians performed primary excision of the clavicle during the operation to repair the joint.

In 1997, McFarland and colleagues⁷ surveyed 42 sports orthopedists regarding treatment for type III AC dislocations. Of the respondents, 69% preferred a nonoperative approach and 31% advocated immediate surgery. As in the Cox⁵ survey, this type III AC injury was classified according to Rockwood and Green.⁶ The lower preference for nonoperative treatment in the McFarland survey (69%) than

inferiorly. Thus, clinically and radiographically, the clavicle appears displaced more than one clavicle width superior to the acromion.

Type IV injury is similar to type III injury, except that the distal end of the clavicle is posteriorly displaced into or through the fibers of the trapezius.

Type V injury is a severe type III injury. There is a gross disparity between the clavicle and the acromion, and the shoulder complex is severely displaced inferior to its normal position.

Type VI occurs when the AC joint is dislocated and the distal end of the

not a contact sport was being played. Some survey respondents attempted to address these questions. However, the purpose of the survey was to determine what orthopedic program residency directors and orthopedic surgeons involved in the care of athletes were advocating for treatment of the uncomplicated dislocation. The survey asked for the preferred method of initial treatment (operative vs nonoperative), the preferred method of surgical repair, and the preference to primarily excise the distal clavicle when performing surgery. The survey also asked for preferred nonoperative management technique. Respondents

could have chosen symptomatic treatment, which was described as "use of a sling with an early motion and rehabilitation program." In addition, they could also have chosen use of an AC immobilizer, which was described as "manual reduction of the AC dislocation and maintenance of that reduction by an AC immobilizer." In essence, we designed this survey to resemble that of Cox⁵ so we could investigate changes in treatment styles since 1992.

RESULTS

Preferred Initial Treatment (Operative vs Nonoperative)

Eighty-seven of the 152 directors responded to the survey. Seventy-one (81.6%) of these 87 responders preferred initial nonoperative treatment for the type III complete dislocation of the AC joint (Table I). Of these 71 responders, 63 (88.7%) preferred symptomatic treatment; the other 8 (11.3%) preferred using an AC immobilizer.

Five hundred seventy-seven of the 1523 orthopedic surgeons responded to the survey. Five hundred two (86.9%) of these 577 responders preferred initial nonoperative treatment for the type III AC injury (Table I). Of these 502 responders, 456 (90.8%) preferred symptomatic treatment; the other 46 (9.2%) preferred using an AC immobilizer.

Preferred Surgical Treatment Method

Both directors and orthopedic surgeons were asked their preferred method of operative treatment for a type III AC dislocation.

Seventy of the 152 directors responded regarding this preference (Table II). Fifty-nine (84.3%) of these 70 responders indicated they would reconstruct the ligament(s), and 54 of these 59 responders described their reconstruction method: 3 (5.6%) would reconstruct the AC ligament only, 33 (61.1%) would reconstruct the coracoclavicular ligaments, and 18 (33.3%) would reconstruct both the AC and the coracoclavicular ligaments. In addition, 44% (25/57) pre-

Table I. Initial Treatment by Orthopedic Program Residency Directors and AOSSM Members

	Directors (N = 87)		AOSSM Members (N = 577)	
"How would you initially treat this individual?"				
Operatively	16	18.4%	75	13.1%
Nonoperatively	71	81.6%	502	86.9%
Acromioclavicular immobilizer	8	11.3%	46	9.2%
Symptomatically	63	88.7%	456	90.8%

ferred suture for ligament reconstruction, and 23% (13/57) preferred local autogenous tissue (coracoacromial ligament) to reconstruct the coracoclavicular ligament (next in line were free tendon grafts and tapes).

Five hundred forty-nine of the 1523 (36%) orthopedic surgeons responded regarding this preference (Table II). Four hundred eighty-three (87.9%) of these 549 responders indicated they would reconstruct the ligament(s), and 476 of these 483 responders described their reconstruction method: 16 (3.4%) would reconstruct the AC ligament only, 330 (69.3%) would reconstruct the coracoclavicular ligaments, and 130

(27.3%) would reconstruct both the AC and the coracoclavicular ligaments. In addition, 33% (155/476) preferred local autogenous tissue (coracoacromial ligament) for ligament reconstruction, and 31% (146/476) preferred sutures to reconstruct the coracoclavicular ligament (tapes and free tendon grafts were next in line). Several responders who preferred free tendon grafts indicated the type of free tendon they used (ie, semitendinosus, palmaris longus, fascia lata).

Fixation Preferences

Seventy-four of the 152 (49%) directors indicated their fixation

Table II. Ligament Reconstruction by Orthopedic Program Residency Directors and AOSSM Members

	Directors		AOSSM Members	
"Would you reconstruct the ligament(s)?"	N = 70		N = 549	
Yes	59	84.3%	483	87.9%
No	11	15.7%	66	12.1%
"Which ligament(s) would you reconstruct?"	N = 54		N = 476	
Acromioclavicular ligament	3	5.6%	16	3.4%
Coracoclavicular ligaments	33	61.1%	330	69.3%
Both	18	33.3%	130	27.3%
"Material used to reconstruct the ligament(s)?"*	N = 57		N = 476	
Tapes	19.5%		22.2%	
Suture	42.8%		31.1%	
Free tendon graft	14.3%		12.6%	
Local ligament graft	23.4%		32.6%	
Other	0%		1.5%	

*Materials may have been used in combination; thus, more than one material may have been circled in a questionnaire.

Table III. AC Fixation by Orthopedic Program Residency Directors and AOSSM Members

	Directors		AOSSM Members	
“Would you consider fixation?”	N = 74		N = 555	
Yes	61	82.4%	444	80.0%
No	13	17.6%	111	20.0%
“Where would you fixate?”	N = 58		N = 428	
Acromioclavicular joint	6	10.3%	52	12.1%
Coracoclavicular space	52	89.7%	368	86.0%
Both	0	0%	8	1.9%
“Material used for fixation?”*	N = 60		N = 443	
Screw		25.4%		18.2%
Wire		4.5%		7.9%
Tape		26.8%		28.9%
Suture		38.8%		40.5%
Other		4.5%		4.5%

*Materials may have been used in combination; thus, more than one material may have been circled in a questionnaire

preferences (Table III). Of the 61 respondents in favor of using fixation, 58 (95%) indicated where they would fixate. Six (10.3%) of these 58 respondents indicated they would transversally fixate across the AC joint, and the other 52 (89.7%) would vertically fixate across the coracoclavicular space. The most popular fixation material was suture (38%, 26/60), then tape, screw, and wire; 1 respondent used the “other” category to specify Wolter plate.

Five hundred fifty-five of the 1523 (36%) orthopedic surgeons indicated their fixation preferences (Table III). Of the 444 respondents in favor of using fixation, 428 (96%) indicated where they would fixate. Fifty-two (12.1%) of these 428 respondents indicated they would transversally fixate across the AC joint, 368 (86.0%) would vertically fixate across the coracoclavicular space, and 8 (1.9%) would fixate both across the AC joint and the coracoclavicular space. The most popular material fixation material was suture (41%, 180/444), then tape, screw, and wire; several respondents used the “other” category to specify pins, and 1 specified Wolter plate.

Preference to Excise the Distal Clavicle During Surgery

Forty-two (56.8%) of 74 directors and 319 (59.3%) of 538 orthopedic surgeons advocated primary excision of the distal clavicle (Table IV).

DISCUSSION

In the 1970s, surgery was the preferred initial treatment for complete separation injuries of the AC joint. Then, in 1992, Cox³ found a reversal: Most orthopedic surgeons preferred initial nonoperative treatment for type III AC separations. We conducted our survey to document whether the pendulum had swung back in favor of surgery as initial treatment for type III AC injuries. In addition, in surveying orthopedic program residency directors and orthopedic surgeons separately, we wanted to show potential group differences in managing type III AC separations.

Our results show that the percentages of directors and orthopedic surgeons favoring initial nonoperative treatment for a type III AC injury are similar to what they were in the 1990s. The pendulum still favors initial nonoperative treatment. Although a larger percentage of directors preferred the nonoperative approach now (81.6%) than in the 1992 survey by Cox⁵ (72.2%), the percentages were closer for surgeons now (86.9%) and then (86.4%). Of note, more than half of the directors and surgeons in our survey preferred initial excision of the outer clavicle—a proportion drastically different from the 0.8% found for orthopedic programs advocating primary excision of the distal clavicle in the 1970s³ and the 21.8% found for orthopedic residency directors and the 33.9% found for orthopedic sports doctors in the 1990s (Cox⁵). Here we see a further shift in the pendulum in favor of primary distal clavicle excision as initial treatment for a type III AC injury.

According to our survey, directors and surgeons differed little with respect to managing type III AC separations. Both groups preferred an initial nonoperative approach involving symptomatic treatment with a sling and physical therapy. In addition, a similar majority from both groups preferred reconstructing the coracoclavicular ligaments when surgery was required, and, when using fixation, a similar majority of both groups preferred fixation across the coracoclavicular space.

What is striking about these survey results is the variety of surgical techniques used to reconstruct or fixate type III AC injuries. Local ligament graft (coracoacromial ligament) and suture seemed to be popular among directors and surgeons performing reconstruction. Popular fixation materials among both groups were suture

Table IV. Distal Clavicle Approach by Orthopedic Program Residency Directors and AOSSM Members

	Directors (N = 74)		AOSSM Members (N = 538)	
“Would you perform a primary excision of the distal clavicle?”				
Yes	42	56.8%	319	59.3%
No	32	43.2%	219	40.7%

and tape. Results from recent comparisons⁹⁻¹¹ of graft material strengths may influence which reconstruction materials are preferred in the future. New surveys regarding preferences for reconstruction materials might very well see a swing toward one type of material (eg, free tendon graft) versus local ligament graft if superiority is demonstrated both in laboratory and clinical research.

Weaknesses in this survey include the overall response rate. Eighty-seven (57.2%) of the 152 directors and 577 (37.9%) of the 1523 orthopedic surgeons responded. Although

lete and whether it was a contact sport. Some respondents wanted clarification on the acuity of the injury, others on the sex of the athlete. Some respondents were even more specific in advocating early operative treatment in patients who use their arms in repeated overhead activities (eg, pitchers, quarterbacks). However, as we aimed to present a clinical scenario similar to that used in the 1992 survey by Cox⁵ and did not specify the acuity of the injury or the sport played by the athlete, we cannot extrapolate the popular-

primary distal clavicle excision in type III AC injuries. More than half of surveyed orthopedic surgeons indicated that, when surgery was required, they would excise the distal clavicle.

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“What is new since the 1970s is the increasing trend in favor of primary distal clavicle excision in type III AC injuries.”

these percentages might seem low, our results can be generalized well, because they represent the views of more than half the residency directors of ACGME-sponsored orthopedic programs and of more than 500 orthopedic surgeons interested in sports medicine who are geographically and institutionally distributed throughout the United States. Thus, we believe that our survey responses are appropriate subsets of the general beliefs of the orthopedic population.

Another weakness, which 3 respondents pointed out, was lack of ligament repair as a survey option. Rather than indicating they would reconstruct the ligaments of the AC joint, these respondents crossed out reconstruct and wrote repair on the survey—which suggests the possibility that several other respondents might also repair (vs reconstruct) the AC and/or coracoclavicular ligaments.

Most of the respondents' feedback consisted of attempts to clarify the scenario presented—that of a 21-year-old athlete who fell on a shoulder. Several respondents wanted to know the dominant shoulder of the athlete or the particular sport played by the ath-

ity of initial operative treatment within the orthopedic community for such athletes who have a type III AC separation. As mentioned earlier, we replicated Cox's clinical scenario so we could analyze similarities and differences in initial treatment plans for type III AC separations between the 1990s and the present. In addition, we wanted to determine the overall principles that residency program directors and orthopedic surgeons interested in sports medicine were advocating for treatment of the uncomplicated dislocation.

CONCLUSIONS

The preferred treatment for uncomplicated type III AC separations is nonoperative treatment. Most orthopedic surgeons prefer initial symptomatic treatment, and this plan has not changed over the past decade. As was the case in the 1990s, most orthopedic surgeons now advocate reconstruction of the ligaments of the AC area and/or fixation between the coracoid and the clavicle when surgery is needed. What is new since the 1970s is the increasing trend in favor of

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