CHAPTER

ACROMIOCLAVICULAR JOINT RECONSTRUCTION

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cromioclavicular (AC) joint injuries account for 9% to 12% of all shoulder injuries and are grouped according to the Rockwood classification system. Grades I and II injuries represent strain and partial tearing of supporting ligaments and are treated conservatively with excellent results. Surgical management is typically indicated for patients with grades IV to VI AC joint injuries. For patients with grade III injuries, controversy still exists regarding the optimal treatment strategy. In addition to patients with failed conservative treatment, some surgeons advocate early operative management for high-level athletes and manual laborers. However, complication rates of AC joint reconstruction have been reported to be as high as 80%, including hardware failure, graft ruptures, coracoid and clavicle fractures, adhesive capsulitis, and damage to the brachial plexus and axillary nerve.

A large variety of stabilization methods have been introduced for the AC joint, with 162 techniques described in 120 studies, including K-wire transfixation, hook plates, arthroscopic TightRope (Arthrex, Naples, FL), and suture anchors. No gold standard procedure has been established. The authors' preference is an arthroscopically assisted anatomic coracoclavicular ligament allograft reconstruction.

SURGICAL TECHNIQUE (Video 39-1)

Room Set-Up

- The operating room (OR) table is likely rotated from the initial position to allow ease in accessing the shoulder.
- Fluoroscopy should be positioned over the top and from the cephalad portion of the OR bed. Be sure to confirm that an anteroposterior view and axillary view are possible before draping.

Patient Positioning

- The patient is placed in the modified beach chair position (Fig. 39-1).
- The ipsilateral arm can be positioned in a specialized arm holder.

Prepping and Draping

- The index shoulder is prepped and draped in a sterile fashion.
- Wide draping is used so the distal clavicle and the AC joint area are free and accessible.

Diagnostic Arthroscopy

• The distal clavicle, AC joint, and acromion are palpated. Osseous margins are marked with a sterile pen (Fig. 39-2).

CASE MINIMUM REQUIREMENTS

• There are no ACGME case minimum requirements for acromioclavicular joint reconstruction.

COMMONLY USED CPT CODES

- CPT Code: 23550—Open treatment of acromioclavicular dislocation, acute or chronic.
- CPT Code: 23552—Open treatment of acromioclavicular dislocation, acute or chronic; with fascial graft (includes obtaining graft)

COMMONLY USED ICD9 CODES

• 840.0—Acromioclavicular joint sprain

COMMONLY USED ICD10 CODES

- S43.101 (A,D,S)—Unspecified dislocation of right acromioclavicular joint, initial encounter
- S43.102 (A,D,S)—Unspecified dislocation of left acromioclavicular joint
- S43.109 (A,D,S)—Unspecified dislocation of unspecified acromioclavicular joint
- S43.111 (A,D,S)—Subluxation of right acromioclavicular joint
- S43.112 (A,D,S)—Subluxation of left acromioclavicular joint, initial encounter
- S43.119 (A,D,S)—Subluxation of unspecified acromioclavicular joint
- S43.121 (A,D,S)—Dislocation of right acromioclavicular joint, 100%-200% displacement
- S43.122 (A,D,S)—Dislocation of left acromioclavicular joint, 100%-200% displacement

Continued

- S43.129 (A,D,S)—Dislocation of unspecified acromioclavicular joint, 100%-200% displacement
- S43.131 (A,D,S)—Dislocation of right acromioclavicular joint, greater than 200% displacement
- \$43.132 (A,D,S)—Dislocation of left acromioclavicular joint, greater than 200% displacement
- S43.139 (A,D,S)—Dislocation of unspecified acromioclavicular joint, greater than 200% displacement
- S43.141 (A,D,S)—Inferior dislocation of right acromioclavicular joint
- S43.142 (A,D,S)—Inferior dislocation of left acromioclavicular joint
- S43.149 (A,D,S)—Inferior dislocation of unspecified acromioclavicular joint
- S43.151 (A,D,S)—Posterior dislocation of right acromioclavicular joint
- S43.152 (A,D,S)—Posterior dislocation of left acromioclavicular joint
- S43.159 (A,D,S)—Posterior dislocation of unspecified acromioclavicular joint

- Markings are made at planned portal positions (anterosuperior, anteroinferolateral, and posterior).
- Standard diagnostic arthroscopy is performed to identify and manage concomitant intraarticular injuries. The diagnostic arthroscopy should be performed even if an open reconstruction is planned because up to 30% of patients with AC dislocations have concomitant injuries.

Exposure of Coracoid and Distal Clavicle

- The rotator interval is opened, with care taken to preserve the superior and middle glenohumeral ligaments.
- The coracoid is identified, and its undersurface is débrided to a smooth surface with a radiofrequency ablator.
- An accessory inferolateral portal is established with an 8.25-mm cannula that allows access to the subcoracoid space.
- The distal clavicle is then exposed superiorly. A 2.5-cm inscision is made along Langer's lines and centered over the AC joint (Fig. 39-3).



Figure 39-1 C-arm position for acromioclavicular joint reconstruction surgery.



Figure 39-2 Osseous structures are marked with a sterile marking pen.



Figure 39-3 An incision is made centered over the acromioclavicular joint.

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- Superficial dissection is performed, incising the deltotrapezial fascia in line with its fibers while maintaining hemostasis.
- Subperiosteal dissection is performed to faciliate adequate repair of the deltoid and imbrication of the superior AC joint capsule at the end of the procedures.
- The distal clavicle should be preserved in most cases in light of evidence that suggests improved stability of the distal clavicle after AC reconstruction. However, if posttraumatic osteoarthritis is present, an 8-mm to 10-mm distal clavicle excision should be performed.

Coracoclavicular Ligament Reconstruction

- A drill guide is used to place a 2.4-mm K-wire through the distal clavicle and through the central portion of the coracoid base.
- Fluoroscopy should be used to confirm positioning (Fig. 39-4).
- A cannulated 3.0-mm drill is used to overdrill the final bone tunnels.
- The K-wire is removed, and a passing suture is placed through the cannulation of the drill. The drill then is removed, leaving the passing suture in place.
- With the passing suture, four strands of suture tapes are shuttled through both the clavicle and coracoid bone tunnels from superior to inferior and pulled out the anteroinferolateral portal.
- The first cortical fixation button is threaded onto the suture tapes and pulled into position at the inferior cortex of the coracoid base (Fig. 39-5).
- A previously whipstitched 8-mm allograft is placed such that the medial limb reconstructs the conoid ligament and the lateral limb reconstructs the trapezoid ligament. To facilitate passage of the graft, soft tissue tunnels are created with a switching stick and a soft tissue dilator. The switching stick is guided from posterior to the distal clavicle to the inferomedial border of the coracoid with both arthroscopic and fluoroscopic visualization. An 8-mm cannula dilator is passed over the switching stick until it emerges medial to the coracoid base. The switching stick is removed, and a passing suture is advanced through the cannula dilator. The passing suture is retrieved through the anteroinferolateral portal. A similar procedure is performed to create a soft-tissue tunnel lateral to the coracoid.
- The allograft then is passed posterior to the distal clavicle and through the medial soft-tissue tunnel until it emerges medial to the coracoid base. The allograft then is shuttled inferiorly and around the coracoid and superiorly through the lateral



Figure 39-4 Fluoroscopy is used to confirm positioning during drilling.



Figure 39-5 Arthroscopic view of the button placed on the inferior aspect of the coracoid.

soft-tissue tunnel with the passing suture that was previously placed through the lateral soft tissue tunnel.

Joint Reduction

- The joint then is reduced.
- The second cortical fixation button is threaded down the four stands of suture tapes that were previously placed until the button makes contact with the cortex of the distal clavicle (Fig. 39-6).
- While an assistant manually maintains AC joint reduction, the free ends of the suture tapes are knotted over the button and its remaining limbs are trimmed.
- The allograft then is cycled.
- The free ends of the allograft are looped together in an overhand configuration (Fig. 39-7).
- High-strength sutures are placed through the graft knot and tied for additional security (Fig. 39-8).
- Dynamic and fluoroscopic examination then is performed by observing the final construct while moving the arm through range of motion (Fig. 39-9).



Figure 39-6 A second button is used to maintain reduction.



Figure 39-8 The two ends of the graft are tied together. High-strength sutures are used to reinforce the knot.



Figure 39-7 Acromioclavicular joint reconstruction with suture button fixation and allograft.



Figure 39-9 Fluoroscopic image shows the final construct.

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BRIEF SUMMARY OF SURGICAL STEPS

- Diagnostic arthroscopy
- Débridement of the coracoid
- Exposure of the distal clavicle
- · Bone tunnels drilled through the clavicle and the coracoid
- Cortical fixation button threaded onto suture tapes and pulled into position at the inferior cortex of the coracoid base
- 8-mm allograft used to reconstruct the conoid and trapezoid ligaments
- The allograft is passed posterior to the clavicle and then shuttled around the inferior coracoid base from medial to lateral
- Joint is reduced and second cortical fixation button threaded down the suture tapes
- Allograft tied in knot and high-strength sutures placed through the graft knot for additional security

TECHNICAL PEARLS

- Use a 70-degree arthroscopic camera to look medially from the posterior glenohumeral portal to see the undersurface of the coracoid
- Be sure to make the initial anterior glenohumeral portal slightly lower and more lateral to allow the instruments to more easily reach the undersurface of the coracoid
- Do not disturb the soft tissue distal to the tip of the coracoid; the musculocutaneous nerve pierces the coracobrachialis 3-cm to 8-cm distal to the tip of the coracoid in most people
- Drilling should be performed with arthroscopic and fluoroscopic quidance
- Reduction and initial fixation of the coracoclavicular ligaments should be performed with fluoroscopic guidance
- If the distal clavicle is arthritic or does not reduce properly, 8 to 10 mm of bone can be resected from the distal end
- Use a soft tissue dilator to create space for the allograft before passage around the clavicle
- In situations in which an allograft is not recommended because of lack of availability or patient preference, a hamstring autograft can be used instead

REQUIRED EQUIPMENT

Arthroscopic	equipment:	30-degree	and	70-degree	scope
		0		0	

- 8-mm allograft (either anterior tibialis, posterior tibialis, or semitendinosus)
- Two broad suture buttons for coracoclavicular fixation
- Suture tape for coracoclavicular fixation
- Fluoroscopy
- Arthroscopic mechanical shaver
- Arthroscopic mechanical burr
- Arthroscopic radiofrequency wand

COMMON PITFALLS

(When to call for the attending physician)

- Not using a 70-degree arthroscope to properly visualize coracoid
- Not making the anterior glenohumeral portal lateral enough to allow instruments to reach the undersurface of the coracoid
- Accidentally disturbing the musculocutaneous nerve 3 cm distal to coracoid tip
- · Not properly exposing the undersurface of the coracoid
- Not appropriately reducing the acromioclavicular and coracoclavicular interfaces before fixation
- Failure to appropriately dilate the soft tissue before allograft passage
- Poor exposure of distal clavicle area

POSTOPERATIVE PROTOCOL

An abduction sling is applied immediately after surgery in an effort to reduce tension on the reconstruction. Passive range of motion is allowed at this time. Active and active-assisted range of motion is started at approximately 6 weeks after surgery. Shoulder strengthening exercises are begun at 8 weeks after surgery. Patients are usually cleared for full activities at 16 weeks; however, the rehabilitation period may be longer if concomitant intraarticular injuries were addressed during surgery.

POSTOPERATIVE CLINIC VISIT PROTOCOL

Patients are scheduled to return to the clinic for follow-up visits at 2 weeks, 6 to 8 weeks, and 12 weeks.

SUGGESTED READINGS

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