

Arthroscopic Techniques

Quadrupod arthroscopic-assisted all-suture acromioclavicular joint fixation

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ABSTRACT

Acromioclavicular (AC) joint injuries require surgical intervention in select cases. Fixation methods have varied from open to arthroscopic. However, most of the methods described have utilized hardware such as hook plates, adjustable suspensory devices, or screws. We describe an all suture arthroscopic-assisted reconstruction that uses only sutures tapes with no other hardware. The suture tapes stabilized both the AC and coracoclavicular (CC) joints without drilling through the coracoid. The advantage of this technique is that it is more anatomic, stabilizing both the AC and CC ligaments, and uses no hardware or grafts to fix the joint. It utilizes a smaller incision for the procedure. Suture tapes are stronger than normal sutures and hence provide better stability.

Keywords: Shoulder instability, Acromioclavicular joint fixation, Acromioclavicular joint fixation, All-suture acromioclavicular joint fixation, Implantless acromioclavicular joint fixation

INTRODUCTION

The acromioclavicular (AC) joint is a diarthrodial stabilized by the coracoclavicular (CC) and AC ligaments. Rockwood Type I and II injuries are usually managed conservatively. Type III injuries can be managed either ways depending on the activity levels of the patient, whereas Type IV-VI is managed surgically.^[1,2] Stabilization of the joint in a superoinferior and anteroposterior plane is important and hence stabilizing both the CC and AC ligaments is imperative. Previously described techniques have utilized some type of hardware to fix these injuries.^[3,4] We describe an all-suture tape arthroscopic-assisted technique to repair both these ligaments in an acute setting.

SURGICAL TECHNIQUE

The patient is positioned in the beach chair position on a standard operating table.

A posterior viewing portal is made 2 cm inferior and medial to the angle of the acromion with a No. 11 blade and the arthroscope is introduced (Portal A).

The biceps tendon is visualized and an anterior portal is made under vision using an 18 G lumbar puncture needle to localize it just anterior to the biceps tendon. A Wissinger rod is introduced over which a 5 mm cannula is applied (Portal B).

A radiofrequency device is introduced through the cannula and the inferior aspect of the coracoid is exposed from posterior to anterior. Under vision, another portal is made in front of

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the clavicle and just posterior to the coracoid (Portal C). A curved mixtard is then introduced through this portal it is glided along the superior surface of the coracoid and brought in front of the coracoid. The instrument is then curved so that the jaws face posteriorly and can be seen. A grasper carrying a 2-0 FiberWire (Arthrex, Naples, Florida, USA) is then introduced through Portal B and the 2-0 FiberWire is grasped with the mixtard [Figure 1a]. The mixtard is then withdrawn taking one end of the suture with it. A grasper is then introduced through Portal C to grab the end that is in Portal B [Figure 1b]. One end of the FiberWire is knotted twice over two suture tapes. The other end of the FiberWire is then pulled so as to shuttle the suture tapes (Arthrex, Naples, Florida, USA) under the coracoid [Figure 2a, Video1].

The arthroscope is then introduced into the subacromial space through a lateral portal 1 cm distal to the lateral end of the acromion in, 2 cm anterior to the angle of the acromion (Portal D). A working portal is made about 3 cm distal to the acromion and just posterior to the anterior border of the acromion (Portal E). A 8 mm cannula is introduced through it. The AC joint is identified arthroscopically and position confirmed over the skin. About 1 cm behind the AC joint and just lateral to it, the acromion is drilled with a guide wire and then a 4.5 mm drill bit from outside in [Figure 2b]. A Beath pin carrying a No. 5 Ethibond (Johnson & Johnson New Jersey, USA) loop is introduced through the hole, and one

end of the loop grabbed with a suture manipulator through Portal D. About a cm lateral to this hole another 4.5 mm hole is drilled and another Ethibond suture delivered similarly through Portal E.

A 2.5 cm longitudinal incision is then made over the lateral end of the clavicle, 1 cm medial to the AC joint. The wound is dissected down to the bone. A guide pin followed by a 4.5 mm drill bit is used to drill into the lateral end of the clavicle 2.5 cm medial to it. Two Beath pins carrying a No. 5 Ethibond loop are the individually introduced through the hole. One loop is used to shuttle the two ends of the suture tapes around the coracoid after delivering them from under the anterior deltoid muscle fibers [Figure 3].

The two ethibonds through the acromion are used to shuttle two suture tapes individually through the drill holes in the acromion. The superior ends of the suture tape are delivered into the 2.5 cm incision subcutaneously. The lower ends are delivered to the joint using a knot pusher carrying the individual suture tapes from Portal D into the AC joint. The two lower ends are then identified and withdrawn through the AC joint. They are shuttled through the drill hole in the clavicle using the other Ethibond loop. The AC joint is then reduced using an impactor and held anatomically by the assistant. The tapes through the coracoclavicular portions are first tied followed by the acromioclavicular portion individually [Figure 4a]. Once done, the reduction is

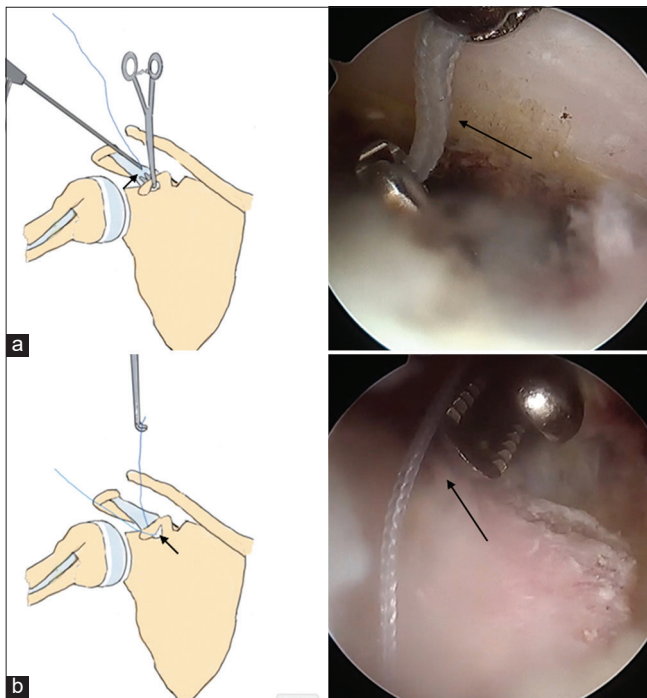


Figure 1: (a) Grasper through Portal B carrying the 2-0 FiberWire and feeding it into the jaws of the mixtard that is around the coracoid, (b) Grasper through Portal C retrieving the other end of the 2-0 FiberWire.

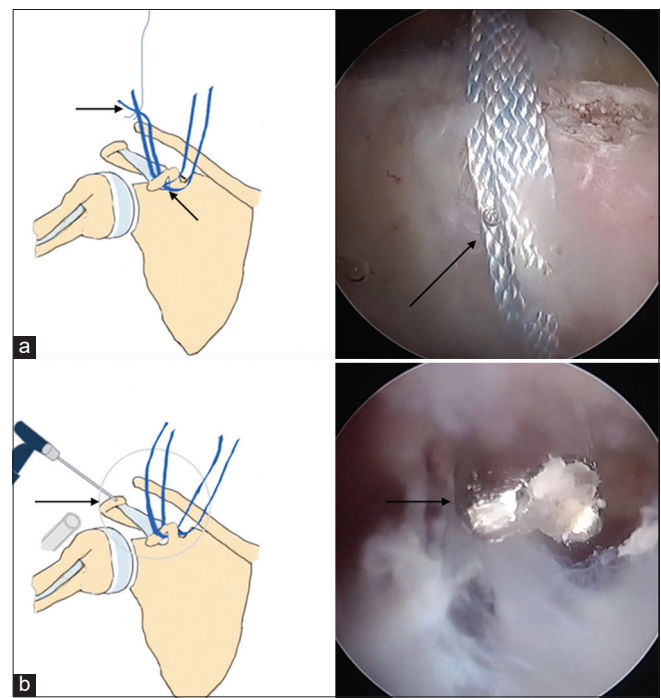


Figure 2: (a) 2-0 FiberWire tied around two suture tapes and shuttling them around the coracoid through Portal C, (b) drilling of the first hole through the acromion 1 cm behind the acromioclavicular joint and just lateral to it.



Video 1: Introduction of the technique and arthroscopic passage of suture tapes around the coracoid.

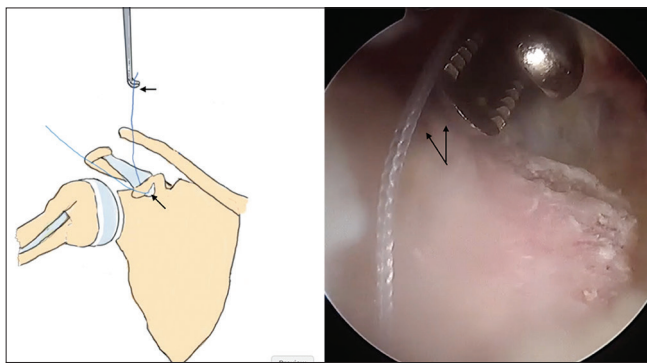


Figure 3: One end each from the suture tape around the coracoid shuttled through the drill hole in the clavicle.

confirmed and the deltatrapezial fascia is sutured over the AC joint and wounds closed [Figure 4b]. X-ray done immediately post-operative shows reduced AC joint [Figure 5a]. X-ray of both AC joints done at 6 months shows anatomic reduction bilaterally [Figure 5b, Video 2].

DISCUSSION

Around 150 arthroscopic as well as open techniques have been described to stabilize the AC joint in an acute setting. Most arthroscopic techniques described stabilize only the CC ligaments using an adjustable suspensory device by drilling through the coracoid and clavicle. Popular open techniques described use hardware such as the hook plate, screws with washers, and suspensory loop devices. Complications associated with these techniques vary from button irritation, fractures around the implant, fractures of the coracoid while drilling through it, and loss of reduction.^[2,3,5] The coracoid being a small bone, drilling through its center it can be technically challenging, that may lead to its fracture. Loss of reduction is a possibility when only the CC ligament is stabilized and not the AC, as both ligaments provide stability to the AC joint. The tunnel on the clavicle was drilled at 2.5 cm, which was midway to the approximate

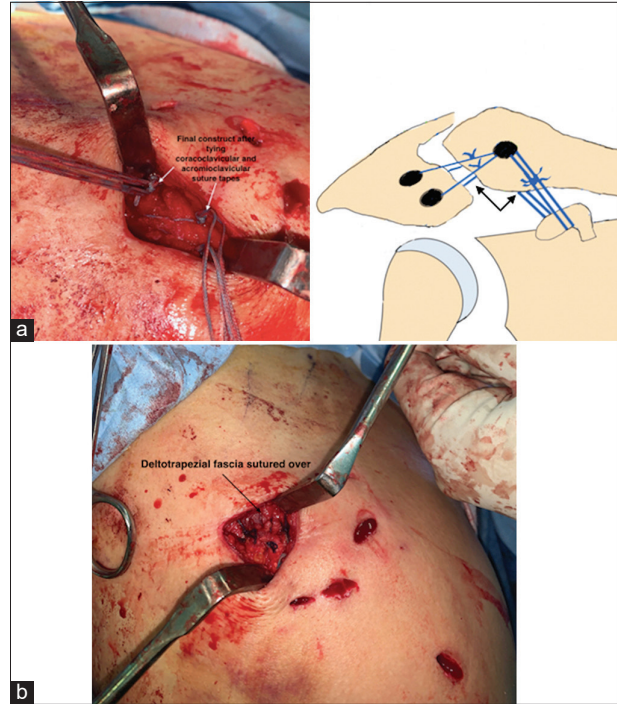


Figure 4: (a) Coracoclavicular and acromioclavicular suture tapes tied after reducing the acromioclavicular (AC) joint anatomically using an impactor, (b) deltatrapezial fascia sutured over the AC joint.

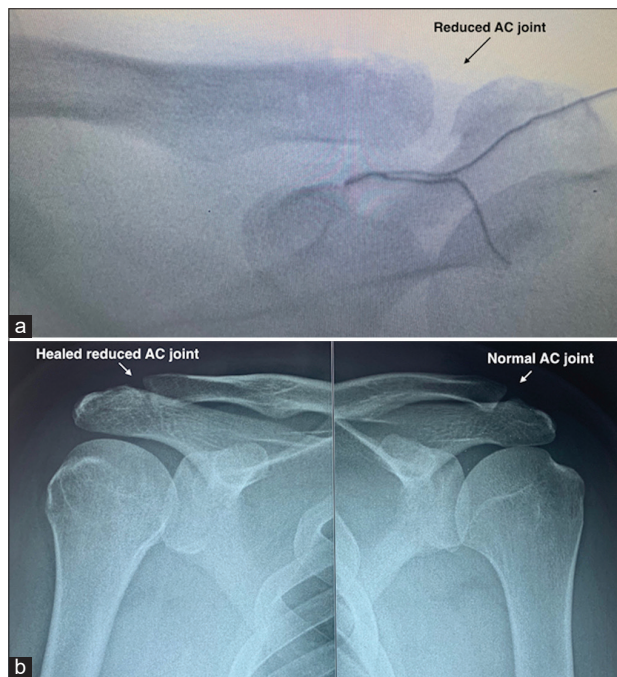
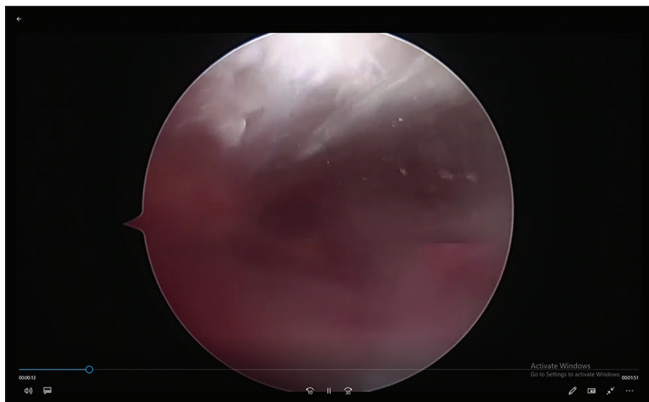


Figure 5: (a) Immediate post-operative acromioclavicular (AC) joint AP X-ray showing a reduced joint space, (b) 6-month post-operative X-ray of bilateral AC joint showing anatomical reduction of the repaired AC joint.

insertion of both the conoid and trapezoid portions of the coracoclavicular ligaments.^[6] The role of the suture tapes



Video 2: Arthroscopic drilling of the acromion and mini open tying of the coracoclavicular and acromioclavicular suture tapes as well as post-operative rehabilitation and imaging.

was not only to be used as an internal brace but also to primarily reduce the coracoclavicular distance to normal. Suture tapes give us the distinct advantage of being stronger than conventional sutures. They are flat and hence have a less cheese grating effect on the coracoid. Using two suture tapes give added stability to the fixation. When compared to using autografts, this has the distinct advantage of not using any graft taken from the body and hence reducing complications associated with graft harvest. In an acute setting, the intention of stabilizing the coracoclavicular and acromioclavicular distance is so that the ligaments can heal. The potential to heal is better in an acute setting. Suture tapes just act as a temporary primary stabilizer till the ligaments heal up. After that they can continue acting as a secondary stabilizer when the ligaments heal up. This technique has distinct advantages, as it does not use any hardware, the coracoid is not violated and is stable and more anatomic as it stabilizes both the ligaments of the AC joint.

CONCLUSION

Arthroscopic assisted AC joint and CC joint fixation using only suture tapes is a stable and convenient alternative to

open and arthroscopic techniques using hardware for AC joint fixation.

Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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