

# Open Capsulorrhaphy for Recurrent Multidirectional Instability of the Shoulder

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**Background:** The management of multidirectional instability (MDI) of the shoulder remains challenging, especially in athletes who participate in sports and may require multiple surgical procedures to achieve shoulder stabilization. Open or arthroscopic procedures can be performed to address shoulder MDI.

**Indications:** Open capsulorrhaphy is preferred in patients with underlying tissue hyperlaxity and who had 1 or more, previously failed, arthroscopic shoulder stabilization procedures.

**Technique Description:** With the patient in the beach-chair position (45°), tissue dissection is performed to the level of subscapularis tendon via the deltopectoral approach. The subscapularis tenotomy is performed in an L-shaped fashion, and the subscapularis tendon is tagged with multiple sutures and mobilized. Careful separation of the subscapularis tendon from the underlying capsular tissue is critical. Capsulotomy is performed, consisting of a vertical limb and an inferior limb that extends to the 5 o'clock position on the humeral neck (right shoulder). After evaluating the integrity of the labrum, the capsule is shifted superiorly and laterally, and repaired using 4 to 5 suture anchors. The redundant capsule is excised, and the subscapularis tendon is repaired in a side-to-side fashion, augmented by transosseous equivalent repair using the capsular sutures.

**Results:** Adequate shoulder stabilization was achieved following open capsulorrhaphy in a young female athlete with tissue hyperlaxity and history of a previously failed arthroscopic soft tissue stabilization surgery of the shoulder. The athlete returned to sport at 6 months postoperatively and did not experience recurrent shoulder instability episodes at midterm follow-up.

**Discussion/Conclusion:** Based on the existing literature, 82% to 97% of patients who underwent open capsulorrhaphy for MDI had no recurrent shoulder instability episodes at midterm follow-up. One study reported 64% return-to-sport rate following open capsulorrhaphy in 15 adolescent athletes with Ehlers-Danlos syndrome, but more research is necessary to better define the indications and outcomes of this procedure in physically active patients.

**Keywords:** capsulorrhaphy; capsular shift; MDI; shoulder; instability; recurrent

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Submitted March 11, 2021; accepted March 12, 2021.

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One or more of the authors has declared the following potential conflict of interest or source of funding: F.A.P. receives consulting and hospitality fees from Zimmer Biomet and Stryker, honoraria from Fidia Pharma and the Musculoskeletal Transplant Foundation, education fees from Arthrex, and consulting fees from Flexion Therapeutics and Exactech. AOSSM checks author disclosures against the Open Payments Database (OPD). AOSSM has not conducted an independent investigation on the OPD and disclaims any liability or responsibility relating thereto.

Video Journal of Sports Medicine, 1(3), 26350254211007142

DOI: 10.1177/26350254211007142

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## VIDEO TRANSCRIPT

This is a case of a young athlete with a diagnosis of multidirectional instability (MDI) of the shoulder who had failed a previous surgery and underwent an open capsulorrhaphy for right shoulder instability. She is a 23-year-old woman; she has recurrent MDI with a previously failed arthroscopic stabilization procedure. She currently had progressive, atraumatic shoulder instability. On examination, she had full range of motion and strength with positive apprehension and Jerk test. Load and shift test with 2 + anteriorly, posteriorly, and inferiorly with a sulcus sign. Imaging is consistent with capsular redundancy and shows previous evidence of an anterior and posterior labral repair, consistent with her diagnosis of MDI status post arthroscopic soft tissue stabilization. Our plan for her is an open capsulorrhaphy with inferior-to-superior lateral shift. Our preference is to use multiple suture anchors



for fixation of our capsular shift. In a study published in the *Journal of Bone and Joint Surgery* in August 2000, a group compared open capsular shift with arthroscopic Bankart repair in 63 patients. Those who underwent an arthroscopic Bankart repair presented with only anterior translation and a discrete Bankart lesion, whereas those who underwent open capsular shift had anterior and inferior translation with additional capsular laxity on examination. Of these patients, the open capsular shift group reported 91% of patients who reported good-to-excellent surgical outcomes, whereas the arthroscopic Bankart repair only reported 84% of patients with good-to-excellent outcome. Seventy-five percent of these patients did return to sport. The patient is in a beach-chair position at a 45° angle in a standard bed, and a scapular bump was used. The examination under anesthesia was consistent with our preoperative examination, showing both an anterior and posterior shift with significant sulcus sign. The incision begins at the inferior border of the coracoid and extends inferiorly to the superior axillary fold. We incise through the soft tissue and dissect through the standard deltopectoral interval. We are able to identify the bicipital groove, the lesser tuberosity, and the tendon of the subscapularis as it inserts on the tuberosity. Our tenotomy of the subscapularis is taken at the midpoint of the lesser tuberosity insertion and the musculotendinous border. Our tenotomy is made in an L-fashion, and the subscapularis tendon is tagged with multiple Ethibond (J&J Medical Devices) sutures. We then placed the suture at the superior aspect of our tenotomy to mark it for future repair. The subscapularis is then separated off of the capsule, using a Cobb elevator and completely mobilized from the underlying capsular tissue. The capsule is then incised in a vertical fashion, and the medial capsule is tagged with multiple Ethibond sutures. Once the medial capsule is tagged and placed on tension, the inferior portion of the capsulotomy is extended to the 5 o'clock position on the humeral neck. This allows for adequate capsule immobilization for our shift. The inferior capsule is also tagged with Ethibond suture. The anterior labrum in this case was examined and found to be intact with successful repair. At this time, the capsule is mobile, and we are ready for our shift. A bony bed is prepared on the humerus and 4 knotless suture anchors are placed; these sutures are passed through the capsule to superiorly and laterally shift it. We preferred to use a simple inferior capsular tensioning technique with the shoulder in 10° to 20° of flexion, 30° to 45° of abduction, and 30° to 45° of external rotation. The arm positioning for this case was based on the paper by Warner et al in the *Journal of Shoulder and Elbow Surgery*.

The excess capsular redundancy is excised, and the sutures are tied. At this time, the tied sutures are passed through the subscapularis tendon for future repair. The subscapularis tenotomy is repaired in a side-to-side fashion using Fiberwire (Arthrex) sutures and then the previously passed medial sutures from our capsular repair are put into knotless anchors on the lateral border of the lesser tuberosity for a transosseous equivalent repair of our subscapularis tendon. A biomechanical study published in 2013 looked at a chronic rotator cuff tear model and the various repair techniques for the subscapularis including

single row repair, double row repair, and transosseous equivalent repair in a rabbit model. These were tested biomechanically with outcomes including cyclic loading and load to failure after the cuff was allowed to heal. The transosseous equivalent was biomechanically superior compared with single-row and double-row techniques based on the yield load, energy absorbed, and ultimate load. The subscapularis repair is shown here under dynamic examination. The wound is then closed in a layered fashion. It is important to avoid complications during a surgery like this, and we examined the axillary nerve by palpation throughout the surgery. You can avoid subscapularis repair failure by using a transosseous repair. Recurrent instability is avoided by using adequate postoperative rehabilitation. For capsular shift, this included sling immobilization for approximately 2 weeks with slow progression to full range of motion and strength at 12 weeks postoperatively. Return to sport is generally expected at about 6 months after surgery and return to sport is allowed when the patient has full range of motion and strength compared with the contralateral side. Multiple studies have looked at the outcome of open capsulorrhaphy in patients with MDI of the shoulder. In 1980, Neer et al reported on 36 patients with MDI of the shoulder that were treated with inferior capsular shift. Only 3% of these patients were reported to have recurrent MDI after their recovery. Cooper et al, in 1992, reported treatment of 38 patients with MDI that were also treated with inferior capsular shift through an anterior approach. At 2-year follow-up, 91% of these shoulders had no MDI recurrence. Van Tankeren et al, in 2002, reported 17 patients with MDI that were again treated with open anterior-inferior capsular shift. After 39 months of follow-up, 82% of these patients achieved excellent outcomes based on the Rowe and Constant scores and the 12-item questionnaire of Dawson. Vavken et al, in 2016, reported on 15 adolescent patients with MDI and Ehlers-Danlos syndrome or generalized hyperlaxity that were treated with inferior capsular shift. At a mean follow-up of 7.5 years, 87% of these patients were satisfied.

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