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SHOULDER

A new technique to improve tissue grip and contact force in arthroscopic capsulolabral repair: the MIBA stitch

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Abstract The success of anatomic repair of Bankart lesion diminishes in the presence of a capsule stretching and/or attenuation is reported in a variable percentage of patients with a chronic gleno-humeral instability. We introduce a new arthroscopic stitch, the MIBA stitch, designed with a twofold aim: to improve tissue grip to reduce the risk of soft tissue tear, particularly cutting through capsular–labral tissue, to and address capsule-labral detachment and capsular attenuation using a double loaded suture anchor. This stitch is a combination of horizontal mattress stitch passing through the capsular–labral complex in a "south-to-north" direction and an overlapping single vertical suture passing through the capsule and labrum in a "east-to-west" direction. The mattress stitch is tied before the vertical stitch in order to reinforce the simple vertical stitch, improving grip and contact force between capsular–labral tissue and glenoid bone.

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Introduction

Anterior recurrent shoulder instability is a disabling condition associated with a Bankart lesion in 85% of the patients [1]. Surgical approach, either open or arthroscopic, is aimed to the solid fixation of the detached capsulolabral complex in order to restore the normal functional anatomy of the gleno-humeral joint [2].

The success of this anatomic repair, however, diminishes in the presence of a capsule stretching and/or attenuation, reported in a variable percentage of patients with a chronic gleno-humeral instability [3–6].

Spatschil et al. [7] noted that recurrence after primary post-traumatic shoulder dislocation causes an increasing ligamentous damage with a consequent deficiency of anatomic restraints to instability.

The Gleno-humeral capsular attenuation with soft tissue insufficiency can be found in case of chronic recurrent instability or of previously failed instability surgery; however, it can occur without a previous surgery and to be related to a congenital alteration of the capsular ultrastructure [8]. This soft tissue insufficiency may alone be a cause of surgery failure. We have observed some failures, after arthroscopic Bankart repair, related to re-tear of the capsule-labral complex due to the suture cutting through the soft tissue with an intact anchor and an intact suture loop.

The purpose of our paper is to introduce a new arthroscopic technique, the MIBA stitch, designed with a twofold aim: improve tissue grip to reduce the risk of soft tissue tear, particularly cutting through capsular–labral tissue, and

address capsule-labral detachment and capsular attenuation using a double loaded suture anchor.

This stitch is a combination of horizontal mattress stitch passing through the capsular–labral complex in a "south-to-north" direction and an overlapping single vertical suture passing through the capsule and labrum in a "east-to-west" direction. The mattress stitch is tied before the vertical stitch in order to reinforce the simple vertical stitch, improving grip and contact force between capsular–labral tissue and glenoid bone.

Surgical technique

We perform arthroscopic shoulder procedure in the lateral decubitus position, with the affected arm placed in a traction sleeve at 70° abduction and 10° forward flexion. A standard posterior arthroscopic portal (PP) is established at first and a high anterior-superior portal (ASP) using an inside-out technique. An anterior mid-glenoid operating portal (AMGP) using an outside-in technique is created, with particular care to be placed as close as possible to the free edge of the superior border of the subscapularis tendon for optimal access to the anterior-inferior capsule-labral complex. This mid-glenoid portal should be placed relatively lateral to achieve a 45° angle of approach to the glenoid surface.

After an accurate diagnostic evaluation, we usually position the scope in the ASP to complete the diagnostic protocol and to get the best visualization and access of the anterior-inferior capsular–labral tear.

Once the capsular–labral detachment is identified, soft tissue liberator and radiofrequency are used to mobilize the involved area of anterior labrum from the glenoid. Anterior edge of glenoid and capsular–labral tissue are debrided using the AMGP. At this point, capsule-labral tissue is grasped to ensure that it can be shifted superiorly in a south-to-north direction without tension. Adequate mobilization is achieved when the underlying subscapularis muscle fibers can be seen.

A double loaded anchor suture is inserted, through the AMGP, on the face of the glenoid 1–2 mm from the glenoid rim at average 8 o'clock position for a left shoulder, with the couple of sutures aligned in the direction of the anterior-inferior ligament (Fig. 1). This placement assures that the capsule-labral complex will be appropriately advanced up onto the glenoid rim. A grasping forcep through the PP is used to retrieve one strand of the lower sutures. Attention must be paid to have the grasper passing inferior to the anchor to ensure that the sutures do not cross. A curved 45° needle, Spectrum hook (Conmed-Linvatec Inc., Largo, FL) is passed from the midglenoid portal perpendicularly through the capsule, 1–2 cm lateral and 1–2 cm below the anchor, in order to obtain a south-to-north capsular shift; a

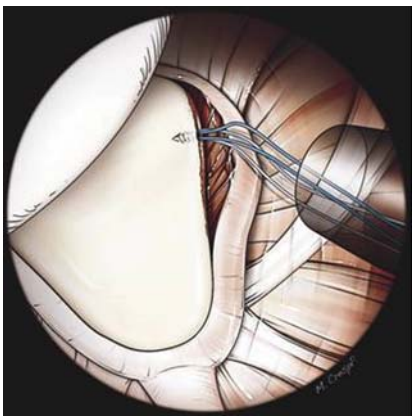

Fig. 1 Schematic drawing showing a Bankart lesion of a left shoulder as viewed from anterior-superior portal. A double loaded anchor suture is inserted through the anterior-midglenoid portal at average 8 o'clock position

Shuttle-Relay (Conmed-Linvatec Inc., Largo, FL) or a Prolene number 0 suture is advanced in the hook and used as shuttle for the definitive suture (Fig. 2); the Shuttle is retrieved with a grasper from the PP. Outside the PP the definitive suture is loaded into the shuttle, and carried back, under the labrum and through the capsule pulling the shuttle outside the AMGP portal. We repeat the passage with the other strand of the same suture, but in a more proximal point (Fig. 3). In this manner we have passed both the strands through the capsule and then through the labrum to obtain a capsular shift and a labrum mattress suture.

At this point, using the grasping forceps through the PP we retrieve one strand of the other suture loaded in the anchor (they can be easily identified because of the different colour).

The 45° needle, Spectrum hook (Conmed-Linvatec Inc., Largo, FL) bites the capsule 1–2 cm lateral and 1 cm below the anchor, and then the labrum, passing between the two strands of the previous passed mattress suture (Fig. 4).

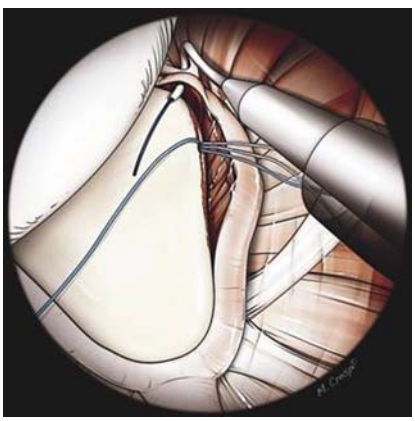

Fig. 2 Schematic drawing showing the first passage of 45° Spectrum hook (Conmed-Linvatec Inc., Largo, FL) taking capsule-labral tissue to obtain a south-to-north capsular shift of the mattress stitch

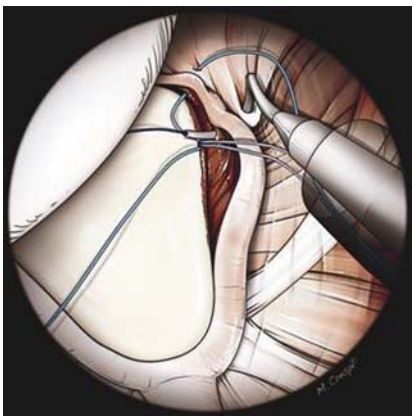

Fig. 3 Schematic drawing showing the second passage of 45° Spectrum hook (Conmed-Linvatec Inc., Largo, FL) for the mattress stitch, performing a south-to-north capsule-labral shift, in a more proximal direction

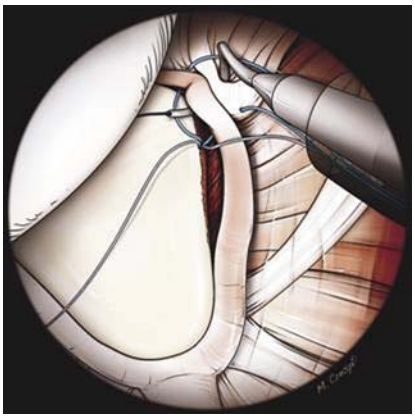

Fig. 4 The same left shoulder as in Fig. 3 showing the 45° Spectrum hook (Conmed-Linvatec Inc., Largo, FL) which bites the capsule 1–2 cm lateral and 1 cm below the anchor, and then the labrum performing an "east-to-west" shift. This suture passes between the two strands of mattress suture and represents the vertical limb of stitch

Shuttle is retrieved with a grasper from the PP, then definitive suture is loaded into the shuttle, and carry it back outside the AMGP portal. This stitch is a simple vertical stitch.

Using a grasping forcep through the PP, both strands of the proximal suture (vertical stitch) are retrieved and stocked outside the PP. Mattress stitch is tied and knot technique is performed based on the surgeon's preference (Fig. 5). Once the suture tails cut, the proximal couple of sutures, previously stocked outside the PP, can be retrieved using grasping forceps through the AMGP. The two suture strands of the vertical stitch can be tied together carefully observing that the knot is perpendicular and over to the previous mattress stitch in order to emphasize the strength grip of the attenuated capsular–labral tissue, reduce the risk of pull-through of suture, and increase the contact force between capsular–labral tissue and glenoid bone (Fig. 6).

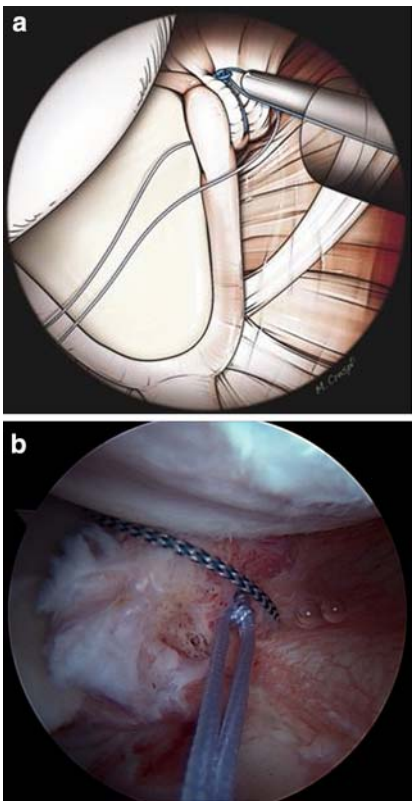

Fig. 5 **a** The mattress stitch is tied at the first, whether the two limbs of the vertical stitch are stored outside the Posterior Portal. **b** Arthroscopic view of the same left shoulder viewing from anterior-superior-portal; note the significant "south-to-north" shift performed with the mattress stitch and as the labrum is bring back at the level of the glenoid bone

The anterior capsule-labral reconstruction can be completed using other suture anchors, as needed, depending from the extension of lesion.

Clinical experience

Starting from September 2006, we have used this technique in 21 young patients suffering from traumatic recurrent shoulder instability.

In particular, we use this technique when capsular tissue appears very attenuated and/or thin during arthroscopic testing with probe or grasping forceps. Surgical time was not increased using this type of technique; as there were no intra-operative or immediate postoperative complications.

We do not have preliminary results, because the follow-up is very short, but our impression is that at the end of repair this stitch shows a very nice grip and strength with a good capsular–labral shift.

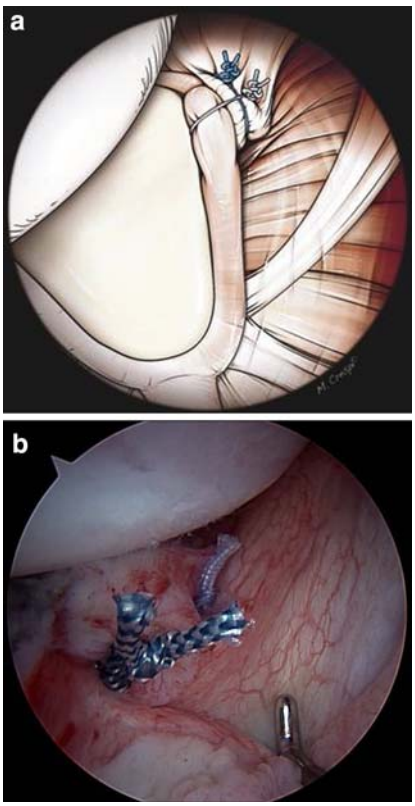

Fig. 6 **a** Schematic drawing showing capsulolabral repair performed with MIBA stitch. **b** Arthroscopic view of the same left shoulder viewed from anterior-superior-portal; note the good retensioning of the capsulolabral complex and very good contact between capsular–labral tissue and glenoid bone

Discussion

Anterior gleno-humeral instability is a very disabling pathology especially in young active people, and, many procedures have been introduced to address this pathology: the classical Bankart lesion with the detachment of the capsule-labral complex has been considered for a long time the primary cause of instability [1, 9]. Surgical approach, open or arthroscopic, with the fixation of the detached capsule-labral complex, in order to restore the normal functional anatomy of the gleno-humeral joint has been considered the gold standard. However, there are several instances in which good anatomic repair consisting of anterior capsule-labral reconstruction fail to address the recurrence of the instability: Most of these cases are related to significant bone loss of anterior glenoid rim, a large posterior humeral head defect and the bad quality of capsule-labral tissue [2].

However, several reports have demonstrated the importance of capsular failure on the shoulder instability: Townley described capsular stretch injury as a component of shoulder instability [10]; Bigliani et al. in 1992 [3] found that the ligament underwent a significant stretch before failure, and in 1994 Speer et al. [11] demonstrated that the dislocation requires not only the Bankart lesion but a plastic permanent deformation of the capsular-ligamentous structure.

Repair of labrum and restoration of capsular tension should be done together so as to perform a more anatomic procedure and reduce the recurrence rate [4, 12].

In this way, the introduction of arthroscopic surgery has been an extremely valuable tool to better identify the pathoanatomy involved in shoulder instability, and to treat with less morbidity all the injuried structures responsible for instability.

In our experience, according to other authors [7, 8, 13, 14], during shoulder arthroscopy for instability in some patients we observed not only a detensioning of capsular–labral tissue but also an attenuation or deficiency of this tissue, that sometimes can appear very thin and inconsistent. When we are facing these conditions, a simple tensioning of this tissue may not be enough to avoid failure. In fact, during revision surgery of some of these cases we noticed that the failure happened at the suture–tissue interface, with the suture that has cutting through the capsule-labral tissue.

In these cases showing a capsular–labral tissue attenuation related to chronic recurrent instability, or to a previous failed instability surgery, or to idiopathic conditions responsible of a bad connective tissue we think that the MIBA stitch can represent a viable option to restore good tone in the capsular tissue, rebuild the labrum on the face of the glenoid and improve the grip of the stitch in the attenuated capsular–labral tissue.

In this way, we expect to have a lower risk of recurrence also in this particular group of patients and the only contraindication to an arthroscopic procedure should be a significant bony defects of the humeral head or glenoid requiring a more extensive intervention.

Clinical studies with a case control perspective series is warranted to give definitive conclusions about benefit of this new technique on the recurrence rate.

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