Obere Extremität 2021 · 16:51–53
<https://doi.org/10.1007/s11678-021-00625-0>
Received: 19 September 2020
Accepted: 3 December 2020
Published online: 22 January 2021
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Arthroscopic Bankart repair with knotless all-suture anchors

Video online

The online version of this article (<https://doi.org/10.1007/s11678-021-00625-0>) contains the video: “Arthroscopic Knotless All-Suture Anchor Bankart Repair for Anterior Instability.” You will find the video at the end of the article as “Supplementary material.” Video by courtesy of A.-K. Tross, P.-C. Nolte, J.J. Ruzbarsky, B.P. Elrick, A.M. Johannsen, and P.J. Millett, The Steadman Clinic and Steadman Philippon Research Institute, Vail, CO, USA; all rights reserved 2020.

Background

Knotless, all-suture anchors are a valuable alternative to solid anchors for arthroscopic Bankart repairs with a strong biomechanical profile and promising clinical short-term results [1, 2, 5]. The benefits of knotless, all-suture anchors include the small size, allowing for more points of fixation per unit area, improved access due to the ability to insert through curved drill guides, artifact-reduced postoperative imaging, bone stock preservation, less risk of erosion of the humeral head or soft tissue such as the rotator cuff, and time efficiency due to the knotless construct [1–5].

Operative technique

The senior author’s preferred technique utilizes the beach chair position, but the lateral decubitus position is also routinely used. Diagnostic arthroscopy is performed through a standard posterior viewing portal to identify the pathology

at the anteroinferior aspect of the glenoid and to address any potential concomitant lesions.

Under direct visualization while utilizing a 30° arthroscope, an anterosuperior portal is created and placed high into the rotator interval. The senior author creates a third portal, the anteroinferior portal, which is established just above the upper border of the subscapularis tendon providing adequate trajectory for later anchor placement and passage of sutures around the labrum and capsule. An 8.25-mm cannula is typically used in this location in order to accommodate 25° and 45° curved suture-passing instruments (■ Fig. 1).

The capsulolabral complex is mobilized with the help of an arthroscopic periosteal elevator. A 70° scope can also be used at this point to help with visualization. Adequate mobilization is achieved when the muscle fibers of the subscapularis are visualized and the resting position of the elevated capsulolabral complex is at the level of the glenoid cartilage. The capsulolabral sleeve can be shifted to assess the desired tension. The glenoid neck is then debrided to a bleeding bony bed with an oscillating arthroscopic burr to promote healing. The cortex is preserved, however, so as not to weaken anchor fixation or increase the risk of postsurgical fracture/erosion. The first anchor is strategically placed at the 5:30-o’clock position in order to shift the inferior capsulolabral complex and to tighten the axillary pouch. A curved drill guide is inserted through the an-

tero-inferior portal to pilot the drill hole at the antero-inferior glenoid rim. The first knotless, all-suture anchor (1.8 mm FiberTak, Arthrex, Naples, FL, USA) is placed through the drill guide into the previously drilled hole, and is then manually provisionally seated, followed by mallet impaction for full seating into the bone. Tension is applied to the anchor sutures in order to allow the anchor to sit beneath the cortex. Once the anchor stability is checked, suture management can be initiated.

There are three suture limbs per anchor: one repair suture (white-blue) and two limbs of the shuttle suture (white-black). The repair suture is separated from the shuttling suture by retrieving it through the anterosuperior portal using an atraumatic arthroscopic grasping instrument (■ Fig. 2). The senior author prefers to use a 25° angulated suture-shuttling device that is passed through the antero-inferior 8.25-mm cannula and then through the desired capsulolabral tissue in order to facilitate a capsular shift from lateral to medial and from inferior to superior. The nitinol wire of the shuttling device is then retrieved through the anterosuperior portal. The repair suture is placed into the loop of the nitinol wire and is shuttled back through the antero-inferior portal, completing the repair suture passage.

The repair suture is now threaded through the loop of the shuttle suture. The non-looped shuttle suture is then pulled gently until the repair suture passes back through the antero-inferior

Fig. 1 ▲ Right shoulder with arthroscopic portals: standard posterior viewing portal, antero-superior portal, and antero-inferior portal

Fig. 2 ▲ Arthroscopic image of a right shoulder. The repair suture (white-blue) is separated from the shuttling suture (white-black) by retrieving it through the anterosuperior portal using an atraumatic arthroscopic grasping instrument

portal and into and through the self-locking mechanism of the anchor. The repair suture is then provisionally tightened. Next, through the anterosuperior portal, an atraumatic arthroscopic grasping device is used to superiorly advance the labral tissue while the repair suture is fully tightened. This facilitates the superior capsulolabral shift. Finally, the repair suture is cut flush. These steps are then repeated for additional anchors according to the pathology that is encountered, typically resulting in a total of four anchors for a standard Bankart repair. More anchors can be used for larger tears or tears that extend superiorly or posteriorly.

Postoperative rehabilitation

An abduction sling is applied 4 four weeks to decrease the tension on the reconstruction, and external rotation is limited to 30°. At 5 weeks, the sling is removed, and full unrestricted passive range of motion is permitted with progression to active range of motion as tolerated. Return to full activity is typically permitted at 4 months.

Discussion

All-suture anchors might have several advantages over traditional polymer- or bioabsorbable-based anchor constructs including the potential for small sizes allowing for bone preservation, reduced

risk of anchor arthropathy, and reduced bone reactions (e.g., osteolysis) around the implant when compared with solid biocomposite anchors [4]. Concerns about limited failure load, anchor displacement, and anchor pull-out were recently addressed by Lacheta et al. [2], who demonstrated high loads to failure for both knotted and knotless all-suture anchor repairs, with superior loop security of knotless repairs. Furthermore, Ntalos et al. [3] postulated that even in the case of pull-out, all-suture anchors may be advantageous over solid suture anchors as there is less potential for articular cartilage damage. All-suture anchors also remain permanently in the bone and soft tissue possibly acting to reinforce the damaged tissues. Clinical outcome studies following all-suture anchor Bankart repairs are still scarce and mostly limited to short-term follow-up; however, early results are promising. Investigating 20 patients following arthroscopic Bankart repair with all-suture anchors at a minimum follow-up of 1 year, Willemot et al. [5] did not observe recurrent instability. Likewise, Gül et al. [1] demonstrated good-to-excellent clinical outcome scores (Rowe and Constant score) in over 90% of 62 patients examined at a minimum follow-up of 24 months.

Practical conclusion

- All-suture anchors for Bankart repair are a valuable alternative to solid suture anchors, with benefits comprising the small size, the ability to be inserted through curved drill guides allowing for more versatile access to the glenoid rim, artifact-reduced postoperative imaging, and bone stock preservation.
- Knotless all-suture anchor constructs potentially reduce operative time as knot-tying is omitted, while decreasing the risk of cartilage abrasion and anchor arthropathy due to knot stacks or proud anchors.
- Early clinical results are promising; however, longer-term follow-up studies, especially for knotless constructs, are needed.

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Compliance with ethical guidelines

Conflict of interest. The position of P.-C. Nolte at the Steadman Philippon Research Institute was supported by Arthrex. P.J. Millett is a consultant for and receives royalties from Arthrex, Medbridge, and Springer; owns stock in VuMedi; receives support from the Steadman Philippon Research Institute and Vail Valley Medical Center; and has corporate sponsorship from the Steadman Philippon Research Institute, Smith & Nephew, Arthrex, Siemens, and Össur. A.-K. Tross, J. Ruzbarsky, B.P. Elrick and A.M. Johannsen declare that they have no competing interests.

For this article no studies with human participants or animals were performed by any of the authors. All studies performed were in accordance with the ethical standards indicated in each case.

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