Video Article

Arthroscopic biceps tenodesis using the knotless lasso technique

Kevin Parvaresh, MD,1, a, Amar S. Vadhera, BS,b William Cregar, MD,b Bhargavi Maheshwar, MD,b Eric Azua, BS,b Jorge Chahla, MD, PhD, b, Nikhil Verma, MDb

a Division of Sports Medicine, Orthopaedic Specialty Institute, Medical Group of Orange County, Orange, CA, USA
b Division of Sports Medicine, Midwest Orthopaedics at Rush, Rush University Medical Center, Chicago, IL, USA

ARTICLE INFO

Keywords:
Shoulder
Arthroscopy
Biceps tenodesis
Knotless

ABSTRACT

Long head biceps tendinopathy can be a significant pain generator, often presenting with pain localised to the anterior shoulder. Biceps tenodesis, both open and arthroscopic, is a well-established treatment for long head biceps pathology. In this presentation, we describe a novel arthroscopic onlay technique for long head biceps tenodesis using a lasso configuration with two knotless suture anchors that provide an efficient, low-profile construct to limit scarring and adhesions while providing circumferential fixation. We use this technique for the following surgical indications: severe tendinosis refractory to non-operative management, unable superior labral anterior to posterior (SLAP) tears, biceps instability and partial or complete tearing. The procedure is performed using standard shoulder arthroscopy portals with the addition of an anterolateral biceps portal located 2 cm inferior and 2 cm lateral to the anterior rotator interval portal. Novel advantages of this technique include a low-profile knotless construct, efficient suture passage and circumferential two-point fixation while maintaining anatomic biceps tensioning. Technical pearls including visualisation, release of the biceps tendon from the groove and location of two point tenodesis fixation are all critical to a good outcome.

Technique structure

Outline of the problem

Pathology of the long head biceps (LHB) tendon is a known pain generator of the shoulder, frequently presenting with anterior based pain [1]. LHB tendon pathology can occur in isolation but more commonly occurs in conjunction with other shoulder issues, including rotator cuff disorders, impingement syndrome and SLAP tears [2].

Arthroscopic biceps tenodesis using the knotless lasso technique

• Beach chair position
• Surgical extremity positioned in 60 degrees of forward flexion, 40° abduction, 10° internal rotation
• Standard lateral viewing portal and anterolateral biceps portal located 2 cm inferior and 2 cm lateral to the anterior rotator interval portal
• Biceps sheath opened with 11-blade knife longitudinally
• Tendon removed from the sheath and tensioned using a grasper from the posterior portal
• Bicipital groove cleaned with a radiofrequency ablation device and burr
• First knotless all-suture anchor placed just distal to fibrocartilage in bicipital groove
• A lasso stitch is placed with appropriate biceps tension and then passed through the knotless anchor
• The second knotless all-suture anchor is placed just proximal to the first in the bicipital groove
• A lasso stitch is placed with appropriate tension and then passed through the knotless anchor
• The proximal tendon stump is removed with a radiofrequency device just above the most proximal suture anchor

Novelty

• Knotless constructs are low profile to limit scarring and abrasion
• Lasso provides circumferential compression while allowing anatomic length tensioning
• Surgical technique is efficient and facile

1 This is a video-based article. The related video(s) can be viewed here: https://doi.org/10.1016/j.jisako.2022.03.004
2 Corresponding author. 280 S. Main Street, Suite 200, Orange, CA, USA.
E-mail address: kcparvaresh@gmail.com (K. Parvaresh).

https://doi.org/10.1016/j.jisako.2022.03.004
Received 4 January 2022; Received in revised form 15 March 2022; Accepted 22 March 2022
Available online 31 March 2022
2059-7754/© 2022 The Authors. Published by Elsevier Inc. on behalf of International Society of Arthroscopy, Knee Surgery and Orthopedic Sports Medicine. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
Treatment options

LHB tendinopathy can be managed both conservatively and surgically. Non-operative management is typically the first line treatment modality aimed at decreasing inflammation with rest, activity modification, anti-inflammatory medications and physical therapy rehabilitation. If these modalities are unsuccessful, localised corticosteroid injections can be used to address concomitant shoulder pathology, the LHB tendon or both [2]. Surgical treatment options to address LHB tendon pathology include tenotomy versus tenodesis, with some controversy existing as to which modality provides better outcomes [3]. Despite being technically easier and quicker, tenotomy has several disadvantages, including cosmetic issues related to the Popeye deformity in addition to quicker fatigue and cramping pain with use [4]. Tenodesis is technically more challenging with multiple different techniques, including both open and arthroscopic, and many different fixation methods described [5]. Advantages include maintenance of the LHB length–tension relationship with the goal of preserving strength and cosmesis [4].

Surgical indications and contraindications

Indications for this technique include significant pathology to the LHB tendon that has failed non-operative treatment including tendinopathy, instability, impingement, significant inflammatory changes seen at the time of arthroscopy and certain Type II or IV SLAP tears [6]. Contraindications include severe glenohumeral arthritis, rotator cuff arthropathy, suspected significant tendinopathy within the pectoral portion of the LHB and chronic LHB tendon tears that have retracted subpectoral.

Surgical techniques

Common fixation techniques used in LHB tenodesis include interference screws, cortical buttons, hard body suture anchors and more recently all-suture anchors [6]. Recently, two suture anchor fixation has been shown to be biomechanically superior to interference screw fixation commonly used in open subpectoral biceps tenodesis [7]. Numerous studies have compared open approaches to all-arthroscopic approaches for biceps tenodesis with no significant differences seen in outcomes long-term [8,9]. Advantages to an all-arthroscopic suprapectoral technique include the minimization of surgical dissection and scar formation, decreased the risk of iatrogenic brachial plexus injury, increased the biomechanical strength of two-point fixation and decreased the risk of iatrogenic proximal humerus fracture [10]. Forsythe et al. performed a large retrospective database study finding no significant difference in revision rates between arthroscopic and open techniques for proximal biceps tenodesis [11]. Similarly, Werner et al. demonstrated no difference in either outcome scores or complication rates between open subpectoral and arthroscopic suprapectoral biceps tenodesis [12]. Despite multiple techniques described, there remains sparse literature in the way of comparing outcomes following various surgical techniques for arthroscopic suprapectoral biceps tenodesis.

Novelty

Currently published arthroscopic techniques do not take the advantage of newer, lower-profile knotless anchors. Instead, the current knotted construct is relatively inefficient and can result in mechanical symptoms postoperatively. In this technique video, we describe an arthroscopic suprapectoral onlay proximal LHB tenodesis using a double lasso configuration with knotless anchor fixation. The advantages of this technique include a low-profile construct, efficient suture passage and circumferential two-point fixation while preserving anatomic biceps tensioning. Possible disadvantages include technical issues with anchor tensioning or suture placement, fixation failure and residual distal bicipital groove pain.

Outcomes of this novel technique case series

A retrospective review of patients who underwent this novel technique at a single institution by the senior author was performed after obtaining Institutional Review Board approval. Inclusion criteria were patients over 18 years old treated surgically with arthroscopic biceps tenodesis using the knotless double lasso technique between October 2018 and January 2019 with a minimum of 12 months of postoperative follow-up data. Data assessed included demographic (age, sex), clinical (pop-eye deformity), patient-reported outcomes (PROs; American Shoulder and Elbow Score [ASES], Single Assessment Numeric Evaluation [SANE]) and whether or not revision surgery was performed. A total of six patients met inclusion criteria with a mean age of 58 years, three female and three male and an average follow-up time of 15 months. Five of the six underwent concomitant rotator cuff repair and three underwent distal clavicle excision. No patients exhibited a Popeye deformity at final follow-up. The PROs improved from pre-to post-operatively for both the ASES (46.2 to 69.2) and SANE score (42.9 to 67.2). No patients had undergone revision surgery at the time of final follow-up.

Conclusions and future perspective

Although more technically challenging, arthroscopic suprapectoral biceps tenodesis using two-point all-soft suture fixation provides many advantages over traditional open techniques and should be considered in the armamentarium of all shoulder surgeons to address LHB tendon pathology. Future studies will expand on biomechanical and outcomes research to determine optimal construct configuration and identify factors promoting optimal results.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jsa.2022.03.004.

References