J Shoulder Elbow Surg (2017) ■■, ■■–■■

ELSEVIER

Journal of Shoulder and Elbow Surgery

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ORIGINAL ARTICLE

Refuting the lipstick sign

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Background: Arthroscopic examination of the tendon has been described as the "gold standard" for diagnosis of tendinitis of the long head of the biceps (LHB). An arthroscopic finding of an inflamed and hyperemic LHB within the bicipital groove has been described as the "lipstick sign." Studies evaluating direct visualization in diagnosis of LHB tendinitis are lacking.

Methods: During a 1-year period, 363 arthroscopic shoulder procedures were performed, with 16 and 39 patients prospectively selected as positive cases and negative controls, respectively. All positive controls had groove tenderness, positive Speed maneuver, and diagnostic ultrasound-guided bicipital injection. Negative controls had none of these findings. Six surgeons reviewed randomized deidentified arthroscopic pictures of enrolled patients The surgeons were asked whether the images demonstrated LHB tendinitis and if the lipstick sign was present.

Results: Overall sensitivity and specificity were 49% and 66%, respectively, for detecting LHB tendinitis and 64% and 31%, respectively, for erythema. The nonweighted κ score for interobserver reliability ranged from 0.042 to 0.419 (mean, 0.215 ± 0.116) for tendinitis and from 0.486 to 0.835 (mean, 0.680 ± 0.102) for erythema. The nonweighted κ score for intraobserver reliability ranged from 0.264 to 0.854 (mean, 0.615) for tendinitis and from 0.641 to 0.951 (mean, 0.783) for erythema.

Conclusions: The presence of the lipstick sign performed only moderately well in a rigorously designed level III study to evaluate its sensitivity and specificity. There is only fair agreement among participating surgeons in diagnosing LHB tendinitis arthroscopically. Consequently, LHB tendinitis requiring tenodesis remains a clinical diagnosis that should be made before arthroscopic examination.

Level of evidence: Level III; Nonconsecutive Series of Patients; Diagnosis Study

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Keywords: Lipstick; sign; bicipital; tendinopathy; arthroscopic; evaluation

Tendinopathy of the long head of the biceps (LHB) is an inflammatory tenosynovitis that occurs as the tendon runs superiorly through the bicipital groove on the humerus.[1,13] Patients with LHB tendinopathy present with anterior shoulder pain, and the condition is commonly associated with other shoulder disease, including impingement, rotator cuff disorders, and superior labrum anterior-posterior (SLAP) lesions.[10,15]

Madigan Army Medical Center Institutional Review Board approved this study: No. 216005.

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1058-2746/$ - see front matter Published by Elsevier Inc. on behalf of Journal of Shoulder and Elbow Surgery Board of Trustees.
http://dx.doi.org/10.1016/j.jse.2017.01.009

Diagnosis of LHB tendinopathy involves clinical history, physical examination, and various imaging studies. Clinical history typically includes complaints of anteromedial shoulder pain at the bicipital groove. Multiple physical examination findings have been described, including the Speed examination, which is generally considered specific but not sensitive.[5] Magnetic resonance imaging is typically the modality of imaging, but this has poor sensitivity for identifying LHB tendinopathy.[9] Ultrasound-guided bicipital sheath injections are often used for diagnostic and therapeutic effect. Local anesthetics with or without steroid medications are infiltrated around the tendon without injecting the tendon itself; however, there are concerns that steroid injections may predispose the patient to tendon rupture.[17]

Because of the limitations with these diagnostic methods, arthroscopic examination of the tendon has been described as the "gold standard" for identification of patients with LHB tendinopathy.[5,6,8,9,12] An arthroscopic description of LHB tendinopathy has been described as a "lipstick" appearance or sign consistent with symptomatic synovitis affecting the portion of the biceps tendon in the bicipital groove.[11] The examination has also been described as performed with the absence of pump pressure to minimize suppression of the underlying vascular synovitis of the tendon, although a precise definition of the "lipstick sign" has never been described.[8]

Despite the breadth of studies supporting arthroscopic examination as the gold standard for diagnosis of bicipital tendinopathy, some literature has emerged to question this conclusion. At least 2 separate studies looking at cadaveric and in vivo arthroscopic visualization of the tendon determined that only one-third of the tendon can be visualized with arthroscopic methods.[3,4] Furthermore, studies evaluating and validating the arthroscopic examination in successfully identifying LHB tendinopathy compared with comprehensive diagnostic criteria are lacking.

The purpose of this study was to determine the sensitivity and specificity of arthroscopic examination in identifying symptomatic LHB tendinopathy requiring tenodesis or tenotomy. Our hypothesis was that arthroscopic examination of the LHB tendon, including the presence of the lipstick sign, is neither specific nor diagnostic of symptomatic bicipital tendinopathy and therefore is not a reliable method to determine the presence or absence of true bicipital tendinopathy.

Methods

Patients undergoing arthroscopic shoulder examination during a 1-year period were prospectively screened for inclusion in the study. Inclusion criteria were skeletally mature adults with anterior shoulder pain, bicipital groove tenderness, positive Speed maneuver on examination, and transient, substantial relief resulting from an ultrasound-guided bicipital sheath injection with local anesthetic and cortisone. A positive response was defined as relief of >50% of preoperative pain during the lidocaine portion of the injection. Patients with all findings who subsequently experienced failure of nonoperative management and underwent surgery for an isolated biceps tenodesis were considered the positive gold standard cases. All ultrasound injections were performed by a senior physician assistant with 5 years of clinical experience performing 700 ultrasound-guided injections annually. Diagnostic injections were performed with 1 mL of 1% lidocaine, 1 mL of 0.5% bupivacaine (Marcaine), and 1 mL of 40 mg/mL triamcinolone acetonide (Kenalog) into the soft tissues adjacent to the LHB tendon within the bicipital groove on the anterior aspect of the humerus.

Negative controls were patients with either anterior instability or acromioclavicular disease with an absence of complaints of anteromedial shoulder pain, absence of tenderness to palpation along the bicipital groove on examination, negative result of the Speed examination, and absence of LHB tendinopathy findings on magnetic resonance imaging. Because of the association between LHB tendinopathy, LHB instability, and rotator cuff tears, all rotator cuff tears were excluded from the study.[3] In addition, the presence of SLAP lesions has been varyingly associated with bicipital tendinopathy and bicipital pain. Because the presence of a SLAP lesion represented a potential source of variability in the appearance of the LHB, all patients with radiographic SLAP lesions as well as those patients who received surgical treatment for a SLAP tear were excluded. Cases demonstrating biceps instability were also excluded from analysis. Final exclusion criteria included any skeletally immature patients or anyone declining to participate in the study.

Arthroscopic examination was performed in an identical fashion for each group. A standard posterior portal was established with a 30° arthroscope. An anterior portal was immediately established to allow the introduction of a probe into the shoulder. The biceps tendon and anchor were then immediately examined with the aid of the probe, with 2 high-definition pictures taken with a Stryker (Kalamazoo, MI, USA) arthroscopic camera. The first picture was taken of the intra-articular portion of the tendon to include the biceps anchor (Figs. 1, *A* and 2, *A*). The second picture was taken of the tendon while using the probe to draw the tendon into the glenohumeral joint (Figs. 1, *B* and 2, *B*). The picture was oriented to maximize the appearance of any erythema or inflammation on the tendon, with the maximum portion available of the tendon drawn into the joint to maximize tendinopathic findings. All pictures were taken under dry conditions or with the arthroscopic pump turned off and pressure released to ensure that there was no pump pressure causing "washing out" of the tendon inflammation.[8] Each arthroscopic picture was printed on a single sheet of picture-quality paper with a color high-resolution printer at the end of the case. The same method for obtaining pictures was used for both positive and negative controls.

All arthroscopic images were stored and prepared by a resident author who did not participate in the review of the images. All pictures were prepared by removing all identifying information as to the nature, timing, and surgeon involved in the case. The images were randomized by the resident author and numbered, creating 2 packets, packets A and B, for 2 separate reviews at 2 separate time points by surgeon evaluators. The 2 image packets were similarly prepared in a different random order and numbering sequence. A minimum of 3 months passed between the arthroscopic examinations and the review of the images to ensure that the reviewing surgeons could not identify any cases they performed. The blinding of cases, the separation of the reviewers from the packet, and not revealing the number of cases with actual bicipital cases to the reviewers represent stringent methods to eliminate bias.

Six surgeons, including 2 fellowship-trained surgeons (sports medicine and shoulder and elbow), 2 sports-certified but non–fellowship-trained surgeons, and 2 recent graduate general orthopedists without