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Biceps Tenotomy Vs Tenodesis in Patients Younger Than 50, Systematic Review

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Abstract: Purpose: The objective of this meta-analysis was to offer an up-to-date comparison of clinical outcomes of tenotomy and tenodesis in the surgical treatment of LHB tendinopathy in patients under the age of 50.
Methods: A literature search was conducted in EMBASE, PubMed/Medline and the Cochrane database from January 2010 to Dec 2020. All studies that compared the clinical results of LHB tenotomy and tenodesis were included.
Results: The Meta- analysis data were from nine studies that comprised 669 participants who had LHB tenotomy or tenodesis with or without other shoulder surgeries (mainly rotator cuff repairs). There were no clinically significant changes in the Constant score, the American Shoulder and Elbow Society Score, shoulder pain, elbow flexion strength loss, or forearm supination strength when tenodesis and tenotomy were compared in randomized studies. Patients who have tenodesis were less likely to develop a Popeye deformity.
Conclusion: In a meta-analysis, patients who had a tenotomy were more likely to have a Popeye deformity. There is no evidence-based benefit of LHB tenodesis over tenotomy in terms of shoulder function, shoulder discomfort, or biceps-related strength, according to a large number of studies. It's unknown whether LHB tenodesis is beneficial to some patient populations, such as children.
Keywords: Biceps, Tenotomy, Tenodesis, Rotator cuff, Meta-analysis

I. INTRODUCTION

The biceps tendon is a typical source of shoulder pain. The biceps tendon is the subject of various debates, one of which is whether to treat it using tenotomy or tenodesis. Tenotomy is the fastest and least expensive method. The goal of tenodesis is to keep function and cosmesis. Patient preferences, the presence of a postoperative Popeye deformity, and functional result are three outcomes that might be used to investigate this debate. Popeye's Deformity and Patient Preferences Patient preference is a significant consideration when comparing biceps tenotomy and tenodesis.

The biceps tendon, unlike the rotator cuff, has substantial sociocultural connotations [(1)]. Furthermore, because of its prominence, it frequently serves as a reflection of the overall quality of surgery provided to the patient. According to patient preference surveys, patients prefer tenodesis to tenotomy regardless of age. Following tenotomy surgeries, a postoperative Popeye deformity is significantly more prevalent, as one might predict [(2)].

Shoulder arthroscopy is used to repair lesions of the long head of the biceps tendon, which are a common source of shoulder discomfort. Surgical intervention is usually reserved for situations of intractable tenosynovitis or tendinosis, acute or degenerative tearing, or biceps instability [(3)]. Continued discomfort might develop if symptomatic biceps pathology is not addressed during surgery. There is a lot of controversy about whether to use biceps tenodesis or tenotomy at the time of operation. Tenodesis and tenotomy have both been found to have positive clinical outcomes. Tenotomy supporters argue that it is easy, has minimal surgical morbidity, requires little operational time, does not require postoperative rehabilitation, and provides effective, predictable pain management. Tenodesis supporters argue that treatment helps avoid aesthetic deformity, reduces subjective cramping, and improves supination strength [(4)].

Pathology of the proximal long head of the biceps brachii tendon (LHBBT) can arise alone or in conjunction with other shoulder diseases such as impingement and rotator cuff tears. As a result, the biceps tendon is frequently treated intraoperatively during concurrent surgery. Tenotomy and tenodesis are two commonly utilized alternative procedures for treating proximal biceps pathology and superior labrum anteriorposterior (SLAP) rips in the appropriate situation. However, there is disagreement over whether approach produces better surgical outcomes, and studies have failed to show a clear advantage of one procedure over the other [(5)].

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Despite tenotomy and tenodesis have been demonstrated to give positive and comparable results in treating lesions of the long head of the biceps, there is still controversy over the best treatment. According to anecdotal evidence, tenotomy should be saved for elderly, low-demand patients, while tenodesis should be done on younger patients and those who engage in intense labor. Tenotomy supporters argue that it is a technically simple technique that results in easy rehabilitation and a quick return to activity with a low complication and reoperation rate [(6)]. The purpose of this systematic review was to evaluate patient-reported and objective clinical features between tenotomy and tenodesis for the treatment of lesions of the long head of the biceps brachii in patients younger than 50.

II. MATERIALS AND METHODS

A. *Search Strategy*

The original study protocol was a priori registered at the International Prospective Register of Systematic Reviews (PROSPERO) [(7)]. This systematic review was conducted according to the PRISMA guidelines. EMBASE, MEDLINE and Cochrane databases were searched for studies comparing LBH tenodesis with tenotomy, published from January 2010 until Dec 2020. All studies comparing clinical outcomes between LHB tenotomy and tenodesis were included.

B. *Inclusion and Exclusion*

The inclusion criteria were articles evaluating (1) LHB tenodesis, (2) in humans, (3) in a clinical setting, and (4) published in English.

The exclusion criteria were as follows:

(1) Review articles, (2) biomechanical/cadaveric studies, (3) technique-only articles, (4) diagnostic and anatomic articles, and (5) case series with less than ten patients are all acceptable. If either of the reviewers couldn't decide if a study was eligible during screening, it was preserved for full-text review. During the full-text stage, disagreements were settled through a consensus discussion with the senior author. Finally, further relevant researches were hand-searched in the references of each article included in this review.

III. RESULTS

A. *Study Identification*

The initial identifications literature search produced total 130 articles which recorded as following (82 articles from PubMed, 36 articles from embase and 12 articles from cochrane. 75 articles removed from duplicate which screened From it 55 articles. The full articles assessed for eligibility 36 articles. Finally 9 articles include included in qualitative and quantitation (Metal analysis) syntheses as shown in figure (1).

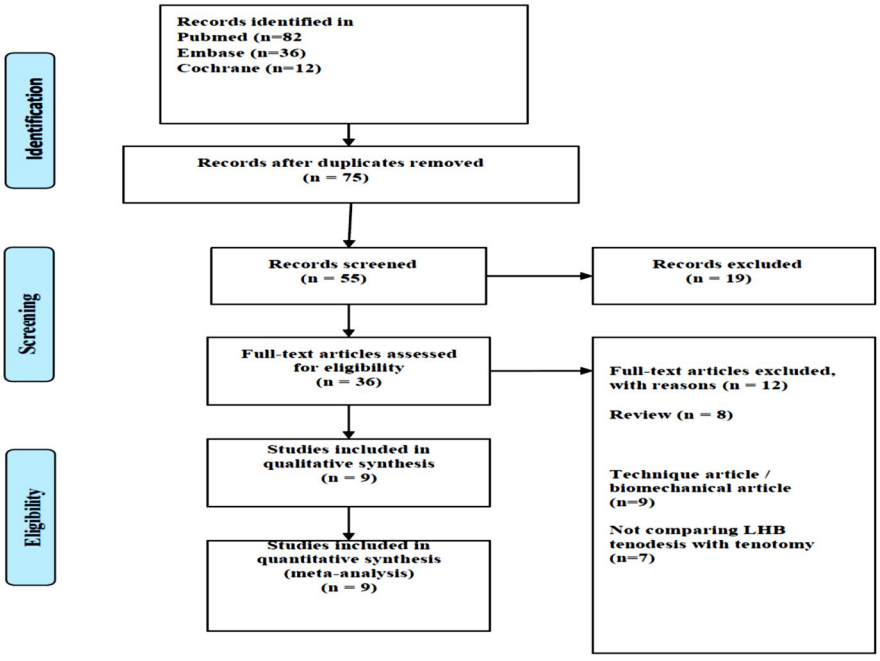


Figure 1. Meta-analysis flow diagram

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B. Included Studies

The characteristics of the studies are summarized in Table 1. Nine studies reporting on 669 participants were included in this meta-analysis.16-41 years Of these, 301 patients were treated with tenodesis (44,9 %), and 413 were treated with tenotomy (54%). The majority of the participants were treated for biceps pathology with concomitant rotator cuff lesions. Three studies included only patients with isolated LHB tendinopathy. In total, patients treated by tenodesis or tenotomy had similar rates of concomitant shoulder procedures. For all patients, follow-up ranged from 10 to 40 years.

Table (1). The characteristics of metal analysis studies

Author	Study type	N	Outcomes	Rate of patients with cointerventions%	Tenodesis type
Belay et al [8].	Randomized controlled triaI, I	34	VAS, ASES, SANE	56	Suprapectoral
Castricini et al [9].	Randomized	55	Constant score, popeye deformity VAS,SF 36, ROM, elbow flexion strength, cramping pain	100	Suprapectoral
Hufeland et al [10].	controlled triaI, I	20	Constant score, flexion strength, and Popeye deformity	0	Suprapectoral
Lee et al [11].	Randomized	128	ROM, VAS, ASES, Constant score, Popeye deformity	100	Suprapectoral
MacDonald et al [12].	controlled triaI, I	114	ASES, WORC, VAS, elbow flexion and supination strength (no comparison with contralateral side), Popeye	100	Suprapectoral
Van Deurzen et al [13].	Randomized	78	Constant sore, ESI, DASH, DOSS, EQ5D, VAS, external rotation, Popeye deformity	100	Intracuff
Zhang et al [14].	controlled triaI, I	97	Surgical time, cost, pain (VAS), Popeye sign, flexion and supination strength and Constant score	100	Suprapectoral
Aflatooni et al [15].	Retrospective cohort study, III	66	Satisfaction, cramping pain, and bicipital pain	100	Suprapectoral
Ikemoto et al [16]	Retrospective cohort study, III I	77	UCLA, ROM and elbow flexion strength, Popeye deformity	100	Intracuff

IV. DISCUSSION

In terms of shoulder function, shoulder discomfort, or biceps-related strength, the current meta-analysis found no clinically meaningful benefit of LHB tenodesis over tenotomy. After tenotomy, patients were more likely to have Popeye deformity and cramping discomfort. In general, the conclusions are comparable to those of earlier meta-analyses that pooled data from nonrandomized trials as well. However, because the meta-analysis included just RCTs, the conclusions had a significantly larger evidence basis. There were 8 new studies and 663 additional patients compared to the last analysis; if these findings are carefully followed, the sole rationale to conduct an LHB tenodesis would be to lessen the risk of a Popeye deformity or cramping bicipital discomfort. In a recent research, the majority of patients chose LHB tenodesis to tenotomy, regardless of their age [17]. The fundamental reason for this desire was apprehension over the look of the upper arm. The autotenodesis of the LHB tendon stump in the intertubercular groove was verified by ultrasound in 26 participants in the same research. These statistics might be utilized in counseling so that patients aren't worried about developing a Popeye deformity [18]. All LHB tenodesis approaches were compared to LHB tenotomy in our study, and we found no clinically significant differences (that is, a difference equal to or larger than the least clinically important differences). Anil and colleagues conducted a network meta-analysis that compared all tenodesis procedures (arthroscopic intracuff tenodesis, arthroscopic suprapectoral tenodesis, and open subpectoral tenodesis) with tenotomy in 22 studies [19]. It was determined that all tenodesis procedures outperform tenotomy in terms of functional results.

However, the clinical relevance of the observed differences might be questioned, and we would be more cautious in our conclusion (i.e., that there is no clinical difference between tenodesis and tenotomy). Importantly, Anil and colleagues discovered a significantly greater rate of chronic bicipital groove discomfort following intra-cuff tenodesis compared to tenotomy, suggesting that this tenodesis procedure should be avoided. Suprapectoral and subpectoral tenodeses both improved clinically, according to a recent focused comparative meta-analysis [20].

In the present review, it's important to note that including or excluding lower-quality studies had no effect on the meta-analysis' conclusions. As a result, the value of nonrandomized research should not be overlooked. Patients with cointerventions should be excluded from future randomized controlled studies including LHB tenotomy and tenodesis, and patient-reported outcomes, such as patient satisfaction, should be included. In this perspective, registry-based research may provide useful study designs for determining which subgroups may benefit from LHB tenodesis. Furthermore, future studies should include a more homogenous age group (for example, only patients younger than 40 years of age) and at least a 2-year follow-up, based on our investigation of heterogeneity [(21)].

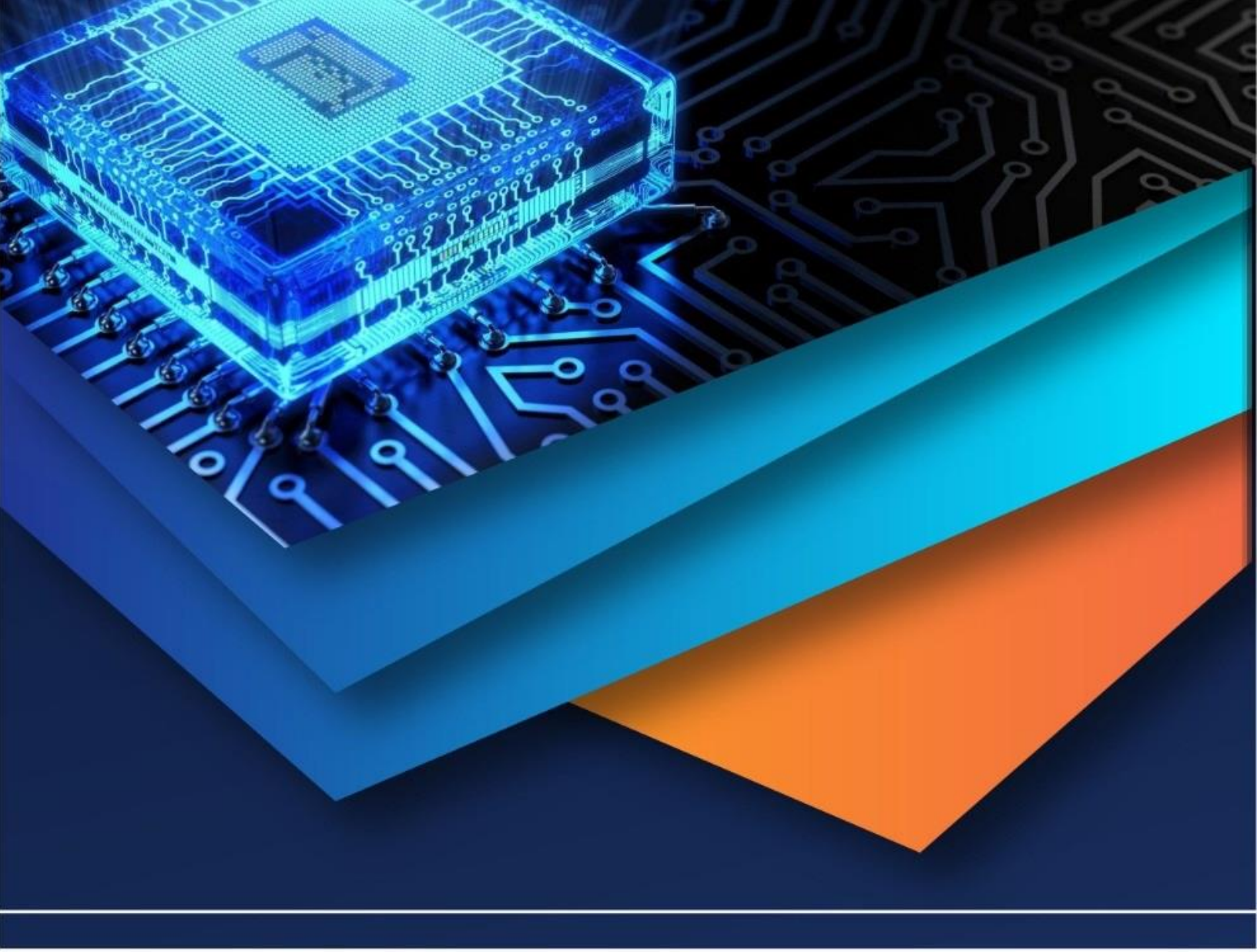
V. CONCLUSION

The Meta analysis indicates that biceps tenotomy and tenodesis are both effective therapies for proximal biceps tendon disease in the setting of concurrent shoulder surgery, with high patient satisfaction. In patients with tenodesis, there was a tendency toward more pleasure and less issues. Despite this, some younger tenodesis patients described adverse side effects. Patients in both groups reported with equal frequency (95%) that they would repeat the procedure.

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