

Biceps Tenotomy Versus Tenodesis Scientific Update



Galdi B,
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Ahmad CS

The biceps tendon is a common cause of pain in the shoulder. There are several controversies regarding the biceps tendon, one of which is when to treat with tenotomy or tenodesis. Tenotomy is the quickest and lowest cost approach. Tenodesis aims to maintain function and cosmesis. This controversy can be explored via three outcomes: patient preferences, the presence of a postoperative Popeye deformity, and functional outcome.

Patient Preferences and Popeye Deformity

An important factor in comparing biceps tenotomy to tenodesis is patient preference. Unlike the rotator cuff, the biceps tendon has strong societal associations. Moreover, its visibility often lends itself to serving as a reflection of the overall quality of surgery to the patient. Surveys examining patient preferences have shown that regardless of age, patients prefer tenodesis over tenotomy. As expected, a postoperative Popeye deformity is much more common following tenotomy procedures.

Patients have strong preferences and perceptions for biceps tenotomy versus tenodesis.

Arthroscopy. 2016;32(12):2444-2450. doi:10.1016/j.arthro.2016.04.022

- In this study, 100 patients with a mean age of 49 years (range 19 to 79 years) were surveyed regarding preferences for biceps tenotomy or tenodesis.
 - Patients were told that tenotomy would lead to quicker recovery but a higher incidence of a popeye deformity and temporary cramping
 - Strength, motion, and pain relief were presented as being similar
- 64% of patients stated they would prefer a tenodesis.
- Women were more likely to prefer tenodesis.
- Age was NOT predictive of preference.

Takeaways

- **The majority of patients preferred tenodesis over tenotomy regardless of age.**
- **Women are more likely to prefer tenodesis.**

Hong CK,
Chang CH,
Hsu KL,
Kuan FC,
Wang PH,
Su WR

[Patients older than 55 years prefer biceps tenodesis over tenotomy to the same degree as young patients.](#) *J Orthop Sci.* 2020;25(3):416-422. doi:10.1016/j.jos.2019.05.007

- In this study, 135 patients with a mean age of 56 years were surveyed about biceps preferences using the same questionnaire as used by Galdi et al.
 - Taiwanese population of patients actually undergoing surgery.
- Again, 64% stated they would prefer tenodesis.
 - No difference in preference comparing patients older or younger than 55 years of age.
- The most important reason for selecting tenodesis was the avoidance of a Popeye deformity.
- The most important reason for selecting tenotomy was shorter rehabilitation.
- Greater number of hours of exercise per week was associated with a preference for tenodesis.

Takeaways

- **From the studies above, one can infer that patients still have strong preferences for tenodesis over tenotomy, regardless of age.**
- **Shorter rehab is the most important factor for patients to prefer tenotomy. It is important to consider that most biceps procedures are done in conjunction with rotator cuff repair, and rehab will be dictated by the rotator cuff and thus not shortened in that setting.**

Slenker NR,
Lawson K,
Ciccotti MG,
Dodson CC,
Cohen SB

[Biceps tenotomy versus tenodesis: clinical outcomes.](#) *Arthroscopy.* 2012;28(4):576-582. doi:10.1016/j.arthro.2011.10.017

- This was a systematic review of 433 tenodeses and 699 tenotomies.
- Level of evidence: IV.
- Popeye deformity:
 - 43% of tenotomy.
 - 8% of tenodesis.
- **Takeaway: Postoperative Popeye deformity is 5 times higher (43% compared to 8%) following tenotomy compared to tenodesis.**



Functional Outcome

Functional outcome is often reported to be no different between tenodesis and tenotomy. It is important, however, to note that this statement is typically based on the use of functional outcome scores, such as the ASES or SANE score, which are not specific to the biceps. A close inspection of the data reveals differences in symptoms and strength between tenotomy and tenodesis.

Mirzayan R,
McCrum C,
Butler RK,
Alluri RK

[Risk factors and complications following arthroscopic tenotomy of the long head of the biceps tendon.](#) *Orthop J Sports Med.* 2020;8(2):2325967120904361. doi:10.1177/2325967120904361

- In this study, 192 patients who underwent tenotomy were retrospectively reviewed in the Kaiser Health System.
 - 72% had a concomitant rotator cuff repair.
- Level of evidence: III
- The overall complication rate was 37%.
 - Popeye deformity 14%
 - Subjective weakness 10%
 - Cramping 10%
- Male patients had 3.9 times the odds of developing a cosmetic Popeye deformity.
- 4% of patients had a revision of their tenotomy to an open tenodesis.
- **Takeaway: In the largest series of biceps tenotomy reported, complications following tenotomy are common, including reoperation for subjective symptoms.**

García-Rellán JE,
Sánchez-Alepuz E,
Mudarra-García J

[Increased fatigue of the biceps after tenotomy of the long head of biceps tendon.](#) *Knee Surg Sports Traumatol Arthrosc.* 2018;26(12):3826-3831. doi:10.1007/s00167-018-5007-2

- Strength and fatigue were evaluated in 26 patients who underwent tenotomy.
- Level of evidence: III.
- Tests were performed preoperatively and postoperatively 1 year after surgery and compared to the opposite side.
- Postoperatively, a Popeye deformity was observed in 58%.
- Maximum strength improved after tenotomy but remained lower than the opposite side (252 N compared to 280 N; $P < .001$).
- Time to fatigue decreased after surgery by nearly 50% (quicker onset of fatigue) from 142 seconds to 94 seconds ($P < .01$).

Takeaways

- **Arm flexion strength after tenotomy is decreased compared to the contralateral arm.**
- **Flexion endurance decreases after tenotomy.**



Wittstein JR,
Queen R,
Abbey A,
Toth A,
Moorman CT 3rd

Isokinetic strength, endurance, and subjective outcomes after biceps tenotomy versus tenodesis: a postoperative study. *Am J Sports Med.* 2011;39(4):857-865. doi:10.1177/0363546510387512

- This is a retrospective review of 19 tenotomies and 16 tenodeses evaluated 2 years postoperative.
- Level of evidence: III
- ASES and SANE functional scores were recorded. Flexion and supination strength were measured with dynamometer and compared to the contralateral side.
- Results:
 - No difference in functional scores
 - Tenotomy led to 20% decrease in supination strength
 - Tenodesis led to 22% increase in supination strength

Takeaways:

- **There is no difference in postoperative ASES or SANE scores following tenotomy or tenodesis.**
- **Supination strength decreases after tenotomy and may increase after tenodesis. In this study, the difference was 40% between procedures (-20 compared to + 22%).**

Lee HJ,
Jeong JY,
Kim CK,
Kim YS

Surgical treatment of lesions of the long head of the biceps brachii tendon with rotator cuff tear: a prospective randomized clinical trial comparing the clinical results of tenotomy and tenodesis. *J Shoulder Elbow Surg.* 2016;25(7):1107-1114. doi:10.1016/j.jse.2016.02.006

- This is a prospective randomized controlled trial of 128 patients undergoing tenotomy or tenodesis in conjunction with rotator cuff repair.
 - Tenodesis was performed with an interference screw technique
- Level of evidence: I
- No differences noted in functional outcome according to ASES or Constant scores.
- Popeye deformity 3 times higher in tenotomy group (20% compared to 6%; $P = .04$).
- No differences in elbow flexion strength.
- Supination strength higher in the tenodesis group.

Takeaways:

- **Level 1 evidence indicates that functional outcome of the shoulder based on ASES and constant scores are not different after tenotomy or tenodesis.**
- **However, forearm supination strength is lower after tenotomy.**



Aflatooni JO,
Meeks BD,
Froehle AW,
Bonner KF

[Biceps tenotomy versus tenodesis: patient-reported outcomes and satisfaction.](#) *J Orthop Surg Res.* 2020;15(1):56. doi:10.1186/s13018-020-1581-3

- This retrospective comparative study examines the outcomes and satisfaction with tenodesis compared to tenotomy.
 - 111 arthroscopic tenodeses with interference screw
 - 104 tenotomies
- Level of evidence: III
- Satisfaction was similar overall
 - 88% tenodeses “very satisfied”
 - 75% tenotomies “very satisfied”
- Subjective complaints
 - 59% of tenotomies have at least one complaint compared to 37% of tenodeses ($P < .01$)
 - Tenotomies were twice as likely to have multiple complaints (31% compared to 16%)
 - Spasms/cramping 2.5 times more common with tenotomy
 - Shoulder pain 1.9 times more common with tenotomy

Takeaways

- **Tenodesis trends toward higher patient satisfaction.**
- **Tenodesis is associated with fewer postoperative problems, such as cramping and shoulder pain.**