

One-year Follow-up Results of Subpectoral Biceps Tenodesis in 22 patients using the TenoLok™ Tenodesis Anchor

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Methods: We interviewed and examined 21 patients with a minimum of 1-year follow up who underwent mini-open subpectoral biceps tenodesis using the TenoLok™ 6mm implant. 16 of the 21 patients had a concomitant rotator cuff repair. The remaining 5 patients had only biceps pathology in the form of a SLAP lesion, failed SLAP repair or chronic biceps tendonitis. **Results:** Patients were seen at a minimum 1-year follow-up, which included a physical exam with UCLA and Dash scoring. Elbow flexion strength was normal in all patients. Supination strength was normal in 18/21. There was 1 patient with a clinically failed tenodesis (a popeye deformity). None of the patients had pectoral or subpectoral pain. 18/21 patients scored as Excellent on the modified UCLA score (35-40 on 40 point scale). 3 patients scored as poor (<25 points). All of the patients with a poor result were workers compensation or liability cases. None of the patients with a poor result had a failed biceps repair. **Conclusions:** The TenoLok anchor is a reliable and secure solution for biceps tenodesis.

BACKGROUND

We perform biceps tenodesis to treat proximal biceps pathology that does not respond to non-operative treatment. This includes partial or complete biceps tears, biceps instability, biceps tendonitis or most commonly biceps pain in association with rotator cuff tears. We also prefer tenodesis to primary repair of SLAP lesions in patients over 40, especially those with any preoperative stiffness. Our younger patients (under 65) universally prefer biceps tenodesis to avoid the potential for a biceps deformity (i.e. “popeye”) after a tenotomy.

In the past, we have employed various methods for biceps tenodesis, most commonly performing an arthroscopic tenodesis at the top of the bicipital groove. We have found this procedure to be technically difficult to perform and, although rare, have experienced problems due to persistent anterior shoulder pain and complete repair failure. Since 2013, we have transitioned to a mini-open subpectoral repair in an effort to reduce these problems.

One of the differences with subpectoral repair is that the bone in this area is diaphyseal so that threaded anchors often twist and/or damage the tendon during insertion because the bone is more dense. The TenoLok™ Tenodesis Anchor is a dual-expanding push-in style anchor that does not cause tendon twisting or damage. It requires only a unicortical hole in the humerus. It includes a tendon grasping loop that allows adjustment of tendon length without the need of trimming and suturing the tendon.

METHODS

All surgeries begin with a diagnostic arthroscopy with the patient in the lateral decubitus position. After biceps pathology is confirmed, an arthroscopic biceps tenotomy is performed. Associated pathology is treated first, most commonly an arthroscopic rotator cuff repair. To perform the tenodesis, the arm is left in

the shoulder holder in 45 degrees of abduction and neutral flexion/extension. The inferior border of the pectoralis major is palpated and marked. A 3 cm vertical incision is made centered on the mark. After identifying the pectoralis tendon's inferior border, the fascia over the biceps is opened distally. Blunt dissection is used to open the interval between the short and long heads of the biceps (Fig 1). The long head tendon can be palpated laterally in the inferior groove and delivered into the wound with an Allis clamp (Fig 2).



Figure 1: Blunt dissection of interval between short and long head of biceps tendon.



Figure 2: Long head of biceps is palpated laterally in the inferior groove and delivered into the wound with an Alice clamp.



Figure 3: With the biceps tendon secured to the distal tip of the TenoLok, the anchor and tendon are inserted into the hole.

Small Hohman retractors are placed laterally to retract the pectoralis tendon and medially to retract the short head of the biceps in order to expose the inferior bicipital groove on the humeral shaft. A guide wire is drilled through the anterior cortex only, approximately 1cm above the inferior border of the pectoralis tendon. This is followed by an 8mm drill, again through the anterior cortex only, stopping at the lateral wall of the humeral shaft. (Although not included in the group of patients, the TenoLok is now available in a 5mm implant which requires a smaller 6.5 or 7mm hole.) The biceps tendon is pulled through the suture loop on the TenoLok anchor and the loop is tightened around the tendon approximately 1.5cm from the musculotendinous junction. Biceps tensioning can be rehearsed at this point and the position of the tendon in the loop can be adjusted as necessary for anatomic length. The anchor and the tendon are inserted into the hole (Fig 3). Light taps with a small mallet are usually necessary to seat the anchor and tendon. The TenoLok is deployed by turning the black knob on the end of the device clockwise until an audible “pop” is heard. The suture is uncleated and removed. Excess biceps tendon is trimmed with a knife or small scissor. The wound is closed subcutaneously with 2-0 monofilament suture and skin glue.

Post operatively, patients are permitted immediate active ROM of the elbow but no lifting over 1 pound (0.45 kg) for 8 weeks, at which time slowly progressive biceps strengthening is permitted.

RESULTS

Patients were seen at a minimum 1-year follow-up, which included a physical exam with UCLA and Dash scoring. Elbow flexion strength was normal in all patients. Supination strength was normal in 18/21. There was one patient with a clinically failed tenodesis (a popeye deformity). None of the patients had pectoral or subpectoral pain. 18/21 patients scored as Excellent on the modified UCLA score (35-40 on 40

point scale). Three patients scored as poor (<25 points). All of those with a poor result were workers compensation or liability cases. None of the patients with a poor result had a failed biceps repair.

Scoring System	Pre-Operative Score	Post-Operative Score
DASH	53	10
Modified UCLA	18	35

DISCUSSION

We prefer subpectoral biceps tenodesis because it is a minimally invasive, technically simple and reliable technique. With subpec tenodesis we know that all areas of long head biceps pathology have been addressed and that anatomic length and function is reliably preserved. We specifically prefer the TenoLok anchor because it provides strong fixation with a unicortical hole in the humerus. The suture loop on the end of the device allows for length adjustment with no need for precise tendon trimming or sutures (Fig 4).



Figure 4: TenoLok 6mm (undeployed) with suture loop on distal tip.



Figure 5: TenoLok deployed showing dual-expansion feature.

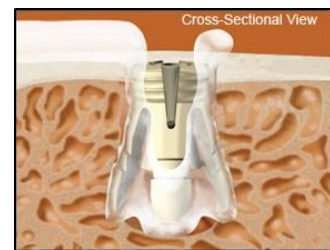


Figure 6: Biceps tendon secured with TenoLok anchor.

In the subpectoral area, we have found that the bone is too dense for threaded anchors which we have found to twist and damage tendons and lead to failures of fixation. An expanding anchor such as the TenoLok (Fig 5) has much less potential to cause tendon damage and failures (Fig 6).

CONCLUSION

With this initial group of patients, there has been a very low rate of failure and a high rate of excellent clinical results. The TenoLok Tenodesis Anchor is a reliable and secure solution for biceps tenodesis.