Artelon® FLEXIBLE HEALING

CLINICAL CASE STUDY

CHRONIC BICEPS TENDON TEAR REPAIR UTILIZING ARTELON® FLEXBAND™ MATRIX

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TECHNOLOGY OVERVIEW

FLEXBAND is a Dynamic Matrix™ for tendon and ligament reconstruction. It mimics the body's natural healing matrices to create repairs that are both strong and highly elastic.[1] These features have been proven[2,3,4] to:

- **Restore** kinematics
- **Resist** failure from necrosis
- **Regenerate** native tissue through load sharing

FLEXBAND is extremely inert, and proven less reactive than common biomaterials such as titanium, polystyrene and resorbable suture.[5] It integrates into the repair site and scaffolds new tissue growth. Its high compliance permits load sharing, which stimulates rapid tissue remodeling through mechanotransduction.[6] FLEXBAND maintains its properties for five years, then dissolves in water and is eliminated from the body.

The current case involves a patient with a chronic distal biceps tendon tear.

CLINICAL HISTORY

A 46-year-old right-hand-dominant healthy male presented 7 months after rupturing his right biceps tendon while lifting a table and feeling a pop. MRI was obtained that demonstrated a chronic distal biceps tendon tear with 7cm retraction (Figure 1). He had done physical therapy and been back to the gym but had residual weakness. He presented with elbow flexion and supination weakness as compared to his contralateral arm. The patient wished to proceed with surgery due to the weakness in his dominant arm.

INTRAOPERATIVE FINDINGS:

Intraoperatively, the distal biceps tendon stump had retracted to the distal aspect of the humerus. There was significant scar tissue that was released manually circumferentially around the biceps to free up the tendon. Once released, the tendon was found to be short with significant tissue degradation. The biceps tendon was unable to be fully seated in the radial tuberosity. There was approximately a 3 cm defect of tissue. Due to the shortening of distal biceps tendon and size of the defect, primary repair was difficult. Therefore, augmentation of the tendon reconstruction was determined to be necessary (Figure 2). An Artelon FlexBand dynamic matrix was chosen to augment the repair due to its elastic and tensile properties. This matrix allowed for a secondary repair of the biceps tendon without requiring an allograft tendon.

FIGURE 1: Distal Biceps rupture with 7cm retraction

FIGURE 2: Incisions made for the recovery of the tendon and then repair with Artelon FlexBand matrix

References
1. Data on File
2. Gretzer et al, J. Biomater. Sci. Polymer Edn, Vol. 17, No. 6, pp. 669-687 (2006)
3. Galloway et al, J Bone Joint Surg Am. 2013;95:1620-8
4. Data on File
5. Liljensten et al, J. Biomater. Sci: Materials in Medicine 13 (2002) 351-359

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SURGICAL INTERVENTION

The patient was placed supine on the table with an arm board. A sterile tourniquet was placed on the arm. An S-shaped incision was made along the anterior flexion crease. Due to the level of retraction of the tendon, a separate longitudinal incision was made proximally to help free up the adhesions along the distal biceps tendon. This was then tunneled to the second incision and the radial tuberosity was exposed. The scar was removed off the distal biceps tendon stump with a scalpel. After determining the proper length of the biceps tendon, the Artelon FlexBand was onlayed over the biceps stump. A 0.5 x 16 cm FlexBand was attached from the proximal portion of the biceps tendon and extended distally to make up the 3 cm gap. This was initially secured using an 0-vicryl suture. The remaining FlexBand was folded on itself to make a more robust tendon to insert in the radial tuberosity and brought up again proximally along the posterior aspect of the distal biceps tendon in a "sandwich" fashion (Figure 3). A braided ultra-high molecular weight polyethylene suture was used to place a Krackow stitch into the distal biceps tendon stump and the remaining Artelon FlexBand matrix. A pilot hole was drilled in the radial tuberosity and confirmed under fluoroscopy. The proximal cortex was reamed to 7.5mm tunnel. Next, a suture button was attached to the distal suture and inserted in the tunnel. With the elbow at 30 degrees of flexion, the Artelon FlexBand was pulled into approximately 10-20% tension and secured with a tenodesis screw (Figures 4-5). Following final closure, the elbow was splinted in supination and flexion.

FIGURE 3:
Artelon FlexBand "sandwich" around distal biceps tendon stump.

FIGURE 4:
Tensioning distal biceps tendon with Artelon FlexBand.

FIGURE 5:
Final repair of distal biceps tendon.

FIGURE 6 & 7:
6 wk full extention and 3 mos post-op muscle mass.

FOLLOW UP

Immediately post-op, the patient was placed in a posterior mold splint at 30 degrees of flexion. Splint was removed at 1 wk and patient began gentle active range of motion exercises + physical therapy. At 6 wks, patient had full extension and was lifting a gallon of milk (Figure 6). At 2 months, patient was able to curl 30 lbs, as well as assisted dips, pull-ups, and inclined push-ups. At 3 months post-op, patient was pain free, curling 30 lb dumbbells and doing 150 lb chest press (Figure 7). He graduated therapy at this time and returned to normal activities.

CONCLUSION

This 46-yr-old right-hand dominant healthy male with a 7-month chronic distal biceps tendon tear underwent a successful tendon reconstruction augmented with Artelon's FlexBand matrix. Through intervention, we achieved a strong and reliable repair that allowed him an early return to activity. Tendon reconstruction supported by Artelon's dynamic matrix is a safe and effective solution for a secondary repair and augmentation for chronic tendon injuries.

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