Case study: Superior Peroneal Retinaculum Reinforcement Artelon® FlexBand®

Presented by: Daniel J. Cuttica, DO Orthopaedic Foot & Ankle Center, Falls Church, VA
Sponsored by Stryker – Dr. Cuttica is a paid-consultant of Stryker

Technology overview

Artelon FlexBand is a degradable synthetic biomaterial that is designed to reinforce soft tissue and serve as a scaffold for connective tissue ingrowth.[1] It is designed to mimic normal tissue elasticity while in the body[2] and is high strength for load sharing.[3] These features are designed to:

- Support motion without constraining it[2]
- Allow for regeneration of natural tissue through load-sharing[1,4]
- Be less inflammatory than titanium and polystyrene[5]

FlexBand shows no evidence of necrotic breakdown.[6] It acts as a scaffold and is capable of integrating with regenerating connective tissue.[1] FlexBand shares the tensile loading to both protect the healing construct and allows mechanical stimulation required for optimal tissue regeneration and remodeling.[7,8] The material gradually degrades through hydrolysis and is fully integrated over 4-6 years.[1,3,9]

Clinical history

A 24-year-old healthy female presented with retromalleolar ankle pain. The patient had a history of 2 prior surgeries for peroneal tendon instability, including a fibula groove deepening 3 years prior. Recently she felt her peroneal tendons dislocate and spontaneously reduce. Physical exam revealed retromalleolar swelling and tenderness to palpation with peroneal subluxation with circumduction. Furthermore, anterior drawer and talar tilt tests revealed solid endpoint without significant laxity and normal alignment was noted with weight-bearing.

Weight-bearing radiographs showed no pathological bone lesions, fractures, or degenerative changes. MRI evaluation revealed a lateral position of the peroneal tendons with tenosynovitis. The patient was initially treated with 6 weeks of casting and several weeks of bracing/physical therapy. However, peroneal instability and pain continued and surgical treatment was recommended.

Intraoperative findings

Examination under anesthesia revealed gross peroneal tendon dislocation with circumduction and when anterior pressure was applied to the tendons in the retromalleolar region. Intraoperatively, the superior peroneal retinaculum (SPR) was avulsed from its fibula attachment. The SPR was thin and attenuated. Due to its poor tissue quality, an Artelon FlexBand was utilized to reinforce the SPR.

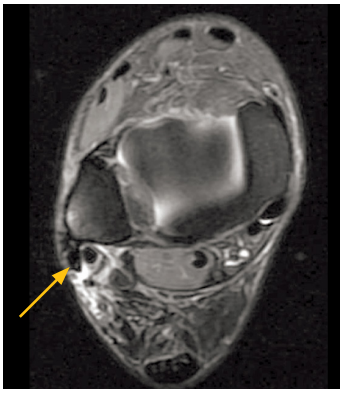

Figure 1: MRI image demonstrating lateral position of peroneal tendons w/ tenosynovitis

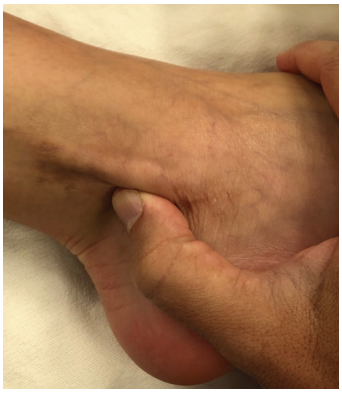

Figure 2: Peroneal dislocation w/ anterior pressure applied to the tendons

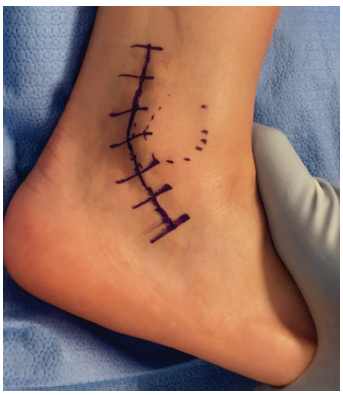

Figure 3: Planned surgical incision along course of peroneal tendons

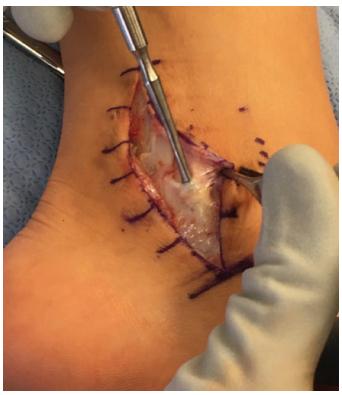

Figure 4: Exposure of the SPR. The SPR was avulsed from its fibula attachment and very thin and attenuated

Surgical intervention

An incision was made in the retromalleolar region over the peroneal tendons and extended distally. **(Figure 3)** The sural nerve was encountered and protected. The SPR was identified and found to be avulsed from its fibula attachment. Its tissue was very thin and attenuated. **(Figure 4)** The SPR was incised and peroneal tendons were identified. No peroneal tear was present. **(Figure 5)** The fibula groove was identified and a revision groove deepening was performed. **(Figure 6)** Finally, the SPR reinforcement was performed. The SPR was repaired back to its fibula attachment with the tendons located. **(Figure 7)** Next, the Artelon FlexBand was utilized. A suture anchor was place into the posterolateral aspect of the fibula at the SPR attachment **(Figure 8)**, and a 0.5 × 8cm FlexBand was attached. **(Figure 9)** A second suture anchor was placed at the calcaneal attachment of the SPR. **(Figure 10)** The unattached end of the Artelon FlexBand was tensioned and secured directly to the lateral calcaneal attachment of the SPR. **(Figure 11)** Incision was closed in a routine manner and the foot was splinted in a neutral position.

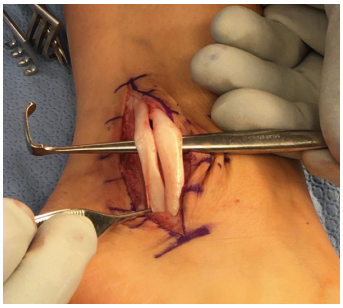

Figure 5: Peroneal tendons were intact without tearing.

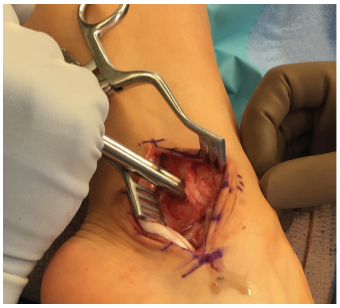

Figure 6: Fibula groove deepening

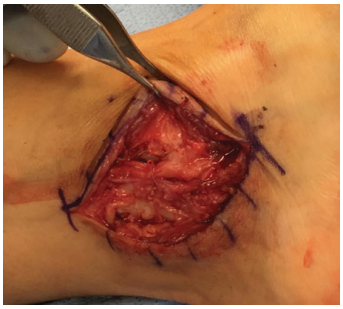

Figure 7: SPR repaired to its fibula attachment

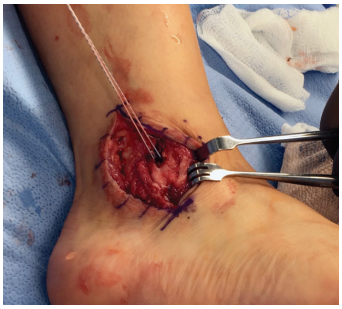

Figure 8: A suture anchor placed into the posterolateral aspect of the fibula at the SRP attachment

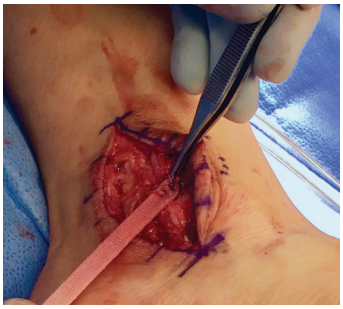

Figure 9: A 0.5 x 8cm FlexBand secured to the fibula

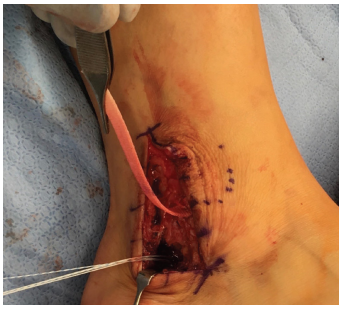

Figure 10: A second suture anchor placed at the calcaneal attachment of the SPR

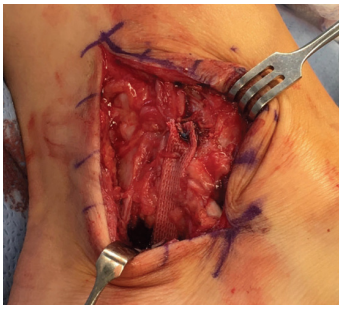

Figure 11: The unattached end of the Artelon FlexBand tensioned and secured directly to the lateral calcaneal attachment of the SPR

Follow-up

The patient's incision healed uneventfully. She was placed in a non-weight-bearing short leg cast at her first postoperative appointment. Weight-bearing in a CAM boot and active dorsiflexion and plantar flexion exercises were initiated at 3 weeks post-op. Formal physical therapy was initiated at 6 weeks post-op. The patient continued to rehab well and was out of the boot at 9 weeks. At 3 months, the patient had minimal swelling along the peroneals, a full range of motion, and no evidence of residual instability. She was released to full activity at that time.

Conclusion

This 24 year-old female with chronic, recurrent peroneal tendon instability underwent a successful SPR reinforcement augmented with Artelon FlexBand device. Through the procedure, we achieved a strong and reliable repair that supported the patient's early to return to activity.

1. Liljensten, E., Gisselfalt, K., Edberg, B., Bertilsson, H., Flodin, P. (2002). J Mater Sci Mater Med, 13, 351-359. Claim based on rabbit and minipig ACL studies. It is unknown how the results from the rabbit and minipig models compare with clinical results in humans. **2.** Kelly , M. J., Dean, D. M., Hussaini, S. H., Neufeld, S. K., Cuttica, D. J. (2024). Foot & Ankle Spec, 17(3), 203-207. **3.** Data on file at Stryker. **4.** Barber, F.A., and Aziz-Jacobo, J. J Arthroscopy (2009) Nov; 25 (11):1233-9 **5.** Gretzer, C., Emanuelsson, L., Liljensten, E., & Thomsen, P. (2006). J Biomater Sci, Polymer Ed, 17(6), 669-687.- Claim based on subcutaneous rat model. It is unknown how results from the rat model compare with clinical results in humans. **6.** Woodruff, M.A., and Hutmacher, D.W. (2010). Progress of Polymer Science, 35, 1217-1256. - Claim based on review of polycaprolactone polymers as biomaterials. **7.** Giza E, Frizzell L, Farac R, Williams J, Kim S. Foot Ankle Int. 2011;32(5): S545-S549. **8.** Sheng, R., Jiang, Y., Backman, L. J., Zhang, W., Chen, J. (2020). Stem Cells Intl, Sept 24, 1-14. **9.** Gisselfalt, K., Edberg, B., Flodin, P. (2002).Biomacromulecules, 3, 951-958

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