Interference Screw Fixation of a Collagen Matrix Graft to Enhance Repair of Peroneus Brevis Tendon Degeneration

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Abstract
Chronic degeneration of the peroneus brevis tendon (PBT) at its insertion to the base of the fifth metatarsal is most often caused by traumatic injury such as an inversion ankle sprain but can from repetitive use. Tubularization of the peroneus brevis tendon is the mainstay of treatment; however, the repair can result in construct weakness, especially if 50% of the tendon is viable and less than 50% of the tendon is viable. Repair with bone anchors has also been described however, interference screw fixation provides greater strength and less elongation at failure than bone anchors and interference screw fixation should be performed. If less than 50% of the tendon is viable PBT to peroneus longus tendon transfer should be performed. Our technique is the first of its kind to be reported and is a novel technique to preserve the PBT tendon and ultimately decreased bulk once fully incorporated. (Figure 8).

Results continued
Chronic Degeneration of the PBT at its insertion is challenging to reconstruct. Tubularization is the mainstay of treatment however, when the insertion is involved it can weaken the tendon. Many have struggled to treat this challenging pathology especially if 5% metatarsal base ostectomy is required or with other comorbidities such as a severe cavus foot type.

Analysis & Discussion
In the 2 patients that would not recommend the procedure to a friend, I had a severe rigid cavus foot type that in hindsight needed a triple arthrodesis. The foot and ankle surgeon should take note that a severe rigid hindfoot cavus needs to be addressed before or during the procedure otherwise pain will persist despite using this correction. The other unsatisfied patient had muscle strength at 5/5 muscle strength at final clinic visit and their Peroneal construct was strong and intact. They have chronic DDD that is unrelated to their previous deformity making the success of the procedure worthless.

One reason this is such a challenging problem is that it manifests in a difficult to population, ataxic, complex rearfoot deformity. Currently there are no published solutions for PBT insertional degeneration and we present the first of its kind with satisfactory results.

References
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Methodology & Procedures
The secured collagen matrix is then wrapped around the tubularized peroneus brevis tendon at its insertion (See Figures 6,7) and tied down with absorbable suture. This technique allows for a lowprofile closure and ultimately decreased bulk once fully incorporated. (Figure 8). Post operative protocol was similar in each patient with 2 weeks in a cast non-weightbearing, then 4 weeks in a walking cast. Physical therapy in a removable boot is started at 6 weeks. The patient is then transitioned to a lace up ankle brace and supportive shoe at 10-12 weeks. Aggressive exercise is started 4 months.

All procedures were performed by one foot and ankle surgeon the senior author, PH. Degraded collagen PBT was identified through clinical exams and confirmed with Magnetic Resonance Imaging. The operation begins with a small inverted U shaped incision exposing degenerated PBT (Figure 1). The tendon is then debrided and tubularized with strong non-absorbable suture in a buried button stitch fashion (Figure 2). A collagen matrix graft ~2x4 cm is folded to ~4mm width and is then whip stitched with buried baseball stitch fashion (Figure 2). A collagen matrix graft is then wrapped around the tubularized metatarsal (Figure 3). A drill hole is made from dorsal to plantar into the base of the fifth metatarsal and the graft is passed with a suture passer and fixated with an interference screw dorsal to plantar into the base of the fifth metatarsal and the graft base of the 5th metatarsal is required. Repair with bone anchors has also been described however, interference screw fixation provides greater strength and less elongation at failure than bone anchors and interference screw fixation should be performed. If less than 50% of the tendon is viable PBT to peroneus longus tendon transfer should be performed. Our technique is the first of its kind to be reported and is a novel technique to preserve the PBT and alleviate pain.

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Results
10 patients with PBT degeneration that underwent tendon repair augmented with regenerative tissue matrix from 2011-2016 were reviewed. Muscle strength, subjective limitations, and the other patient who reported limitations has severe spinal stenosis and recently had a laminectomy. They had drop foot prior to the procedure and report improvement compared to preoperative level despite limitation that was never going to be completely alleviated.