Utilization of a Next Generation Decellularized Dermal Allograft to Augment a Pediatric Open Gastrocnemius Recession and Z-Plasty for Achilles Tendon Lengthening Right Lower Leg

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Surgical Summary

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Clinical Presentation:

- A 7-year-old male presented to the clinic with his mother, she was worried about him constantly toe-walking on both feet. She reported that this has been ongoing for two years but has worsened. The patient had tried physical therapy, an equinus splint, and lower extremity massages. Patient exhausted all conservative care and wanted to proceed with surgery.
- Musculoskeletal exam revealed: equinus tip-toe gait both feet; pain upon palpation with range of motion (ROM) in right foot at Achilles tendon insertion; right foot was straight with knee extended and flexed; unable to bring right foot flat or rectus; right ankle dorsiflexion was less than -18 degrees with knee extended and flexed; right ankle plantar flexion was increased with pain noted; right ankle eversion was decreased.
- Neurovascular exam revealed: symmetrical deep tendon reflexes graded 2/4 in both lower extremities; plantar reflex (Babinski): toes on both feet were down going with no ankle clonus; sensory testing for sharp/dull sensation (position, vibration, monofilament) was intact in both lower extremities; no evidence of posterior tibial, superficial peroneal, or sural nerve pathology bilaterally. Palpable dorsalis pedis and posterior artery bilaterally.
- The exam results were consistent with gastroc-soleus equinus and Achilles tendonitis of the right lower extremity.
- Surgical plan: Left Achilles tendon lengthening reconstruction followed by the right with open gastrocnemius recession and z-plasty Achilles tendon lengthening (ATL), augmented with DermaPure® decellularized dermal allograft. Successful left ATL reconstruction completed. This case study focuses on the right open gastrocnemius recession and z-plasty ATL procedure.

Intraoperative Findings:

- The right Achilles tendon width measured 16.0 cm in length. The width measured 5.0 cm proximally, and 1.5 cm distally at the calcaneal insertion site. The right ankle dorsiflexion was -18 degrees.

Figure 1.

Figure 2.

Figure 3.

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Surgical Procedure:

- A 10 cm midline incision was made over the Achilles tendon. The incision was deepened to the myotendinous junction of the gastrocnemius. Using a #15 blade a medial to lateral incision was made at the aponeurosis, for gastroc recession (Figure 1).
- Dissection was done distally at the same plane as the fascia of the gastrocnemius until the entire Achilles tendon was visualized. A malleable retractor was placed underneath the tendon to separate the tendon from the underlying tissue. Using a #15 blade a z-plasty ATL technique was performed (Figure 2). The Achilles tendon was reapproximated with the appropriate length and sutured in a Krackow stitch pattern, and a running interlocking stitch pattern across the proximal and distal edges of the tendon (Figure 3).
- A 4 cm x 6 cm DermaPure® decellularized dermal allograft was wrapped around the gastrocnemius recession and z- plasty ATL in a "burrito" fashion and sutured to the tendon using 2-0 Vicryl® (Figures 4, 5, 6). Excellent ROM with free gliding noted. The subcutaneous and subcuticular tissue were reapproximated using2-0 Vicryl®, and the skin was reapproximated with 3-0 Nylon.
- The surgical site was dressed with xeroform gauze, Kerlix®, abdominal pad, and cast padding.
- The patient's right lower extremity was placed in a non-weightbearing (NWB) fiberglass cast splint, with the ankle joint set at 90 degrees.

Figure 4.

Figure 5.

Figure 6.

DermaPure® Implantation
4 cm X 6 cm
Basement Membrane Outer-Most

Figure 7.

Post-Operative Notes:

- Status post one week: -5 degrees dorsiflexion, 25 degrees plantarflexion, strength 3/5.
- Status post two weeks: 0 degrees dorsiflexion, 30 degrees plantarflexion, strength 3/5.
- Status post four weeks: 10 degrees dorsiflexion, 30 degrees plantarflexion, strength 5/5 (Figure 7).
- Status post 12 weeks: 10 degrees dorsiflexion, 30 degrees plantarflexion, strength 5/5, running and jumping.

Surgeon Perspective:

"In *this pediatric Achilles tendon reconstruction surgery, the graft was safe and dependable. The patient had no signs of inflammation."*

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