Case Report

AMERICAN ORTHOPAEDIC FOOT & ANKLE SOCIETY®

Foot & Ankle Orthopaedics
2019, Vol. 4(3) 1-3

DOI: 10.1177/2473011419852940
journals.sagepub.com/home/fao

Gastrocnemius Recession for the Treatment of Tibialis Anterior Tendinopathy

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Introduction

Although spontaneous or traumatic tibialis anterior (TA) rupture has been well recognized and documented, distal tibialis anterior tendinopathy (DTAT) is an uncommon condition that has not been well studied.

Symptomatic DTAT is a rare overuse condition that is usually seen in 2 distinct populations. Most commonly, it occurs in overweight female patients aged 50 to 70 years, presenting as nocturnal burning over the medial midfoot.[3] DTAT has also been described in younger athletes, such as runners, who develop anterior ankle pain at the level of the extensor retinaculum from overuse.[12] On physical examination, swelling and tenderness over the anterior ankle corresponding to the distal TA insertion may be present.[8] Other findings can include palpable synovitis, swelling, and crepitus over the TA tendon.[12] The tibialis anterior passive stretch (TAPS) test has been described as a useful provocative test for TA pathology. Pain is reproduced when the TA tendon is passively stretched in plantarflexion, hindfoot eversion, midfoot abduction, and pronation.[3] Magnetic resonance imaging (MRI) findings of DTAT include tendon thickening, synovitis, peritendon edema, and possible longitudinal tears as well as abnormal signal in the distal tendon insertion.[7,8]

Initial treatment for DTAT is nonoperative, including nonsteroidal anti-inflammatories, physical therapy, a full length orthosis that supports the medial longitudinal arch, and night splints.[7] Surgery may be considered for patients who have failed an extensive trial of nonoperative modalities. Surgical options for DTAT have only been outlined in a few small case series. Direct debridement and reinforcement of the distal TA insertion with suture, extensor hallucis longus tendon transfer to augment the diseased tendon, and medial cuneiform decompressive exostectomy have been described.[7,8,10]

Gastrocnemius Recession

Several recent studies have described the relationship of gastrocnemius contracture to foot and ankle disorders.[1,2,9,11] This contracture, which prevents the ankle from achieving the required 10 degrees of dorsiflexion at heel-off, stresses several structures of the foot and ankle.[2] Functional lengthening of the gastrocnemius muscle improves foot biomechanics and thereby relieves this excess stress. A growing body of literature has described gastrocnemius recession as a component in the treatment of a variety of these disorders including Achilles tendinitis, plantar fasciitis, plantar fibromatosis, metatarsalgia, hallux valgus, diabetic foot ulcers, and midfoot arthritis.[5,11] Furthermore, tendoachilles lengthening and gastrocnemius recession have both been described as adjuvants to surgical repair of TA tendon rupture to restore dorsiflexion and reduce tension on the TA tendon while it heals.[4,6,12] In the case of tibialis anterior tendinopathy, it is proposed that by functional lengthening of the gastrocnemius, the antagonistic force opposing the TA in dorsiflexion during a functional arc of ankle motion is reduced, thereby minimizing tension on the TA tendon.

There are several described techniques for gastrocnemius recession. Our typical technique is similar to that described by Strayer, in which the gastrocnemius tendon is divided at its confluence with the soleus tendon.[2] The Baumann procedure is a described variant in which the gastrocnemius muscle fascia is incised on the deep surface of the muscle

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between the soleus and gastrocnemius. This preserves the gastrocnemius-soleus tendinous complex, provides better cosmesis, and poses less risk to the sural nerve.[2] Finally, the proximal medial gastrocnemius recession (PMGR) is a procedure in which the aponeurosis of the medial gastrocnemius is divided at its proximal origin.[1] This provides for better cosmesis and in theory preserves calf strength, making it an attractive option in young patients and athletes. In one recent series of 21 consecutive heels treated with PMGR, no subjective or objective weakness without secondary cause was observed.[1]

Here we report on a case of simultaneous bilateral proximal medial gastrocnemius recession to successfully treat recalcitrant distal tibialis anterior tendinopathy. To our knowledge, this is the first published report of gastrocnemius recession for successful treatment of this problem.

Case Report

A 51-year-old, active male patient presented with 9 months of progressive bilateral ankle swelling and pain. He endorsed anterior and medial ankle pain exacerbated by activity, especially ice skating, and was now limiting his participation as an ice hockey referee. On examination, he was noted to have tenderness to palpation at the anterior ankle at the level of the extensor retinaculum bilaterally. A 1-cm nodule was noted on the TA tendon on the right ankle. Pain was reproducible on examination with resisted TA motion. Silfverskiold's test was positive bilaterally, consistent with a gastrocnemius contracture.

He failed an extensive course of nonoperative treatment options. He was prescribed full-length arch supports for use with his hockey skates. He was also referred to physical therapy, emphasizing ankle stretching, eccentric strengthening, and modalities as needed. He returned 5 months later with progressive pain and disability, especially in his right ankle with 8/10 pain with activity. He was immobilized in a walking boot on the right and an MRI was ordered. MRI demonstrated tendinosis of the TA tendon. At this point, the patient was unable to skate and elected to proceed with operative intervention with bilateral proximal medial gastrocnemius recession.

Technique

The patient was placed in prone position under general anesthesia. Bilateral thigh tourniquets were placed and bilateral limbs exsanguinated. A 2-cm transverse incision was made just distal to the flexion crease of the knee centered over the medial head of the gastrocnemius muscle. Blunt dissection was carried out down to the gastrocnemius fascia. The fascia overlying the medial gastrocnemius was then released circumferentially while the ankle was held in dorsiflexion. The muscle belly of the medial head of the gastrocnemius was not released. This resulted in approximately 15 degrees of increased dorsiflexion. The skin was then closed in routine fashion.

Postoperative Course

Following surgery, the patient was allowed to weight-bear as tolerated in a walking boot. Sutures were removed after 2 weeks, at which point he could discontinue the walking boot and progress activity as tolerated. At 8 weeks following surgery, he reported 3/10 pain with activity and had resumed skating. At this point he was progressing well with home exercise and stretching program. Phone follow-up was made at 10 months, at which point he reported nearly complete resolution of his symptoms. He stated that he was "extremely satisfied" with his outcome and would recommend surgery for patients with tibialis anterior tendinopathy. Foot and Ankle Disability Index was 102 out of 104 maximum and AOFAS ankle-hindfoot score was 93 out of 100 maximum. He reported 0/10 pain at rest and 1/10 pain with activity, improved from 4/10 pain at rest and 8/10 pain with activity preoperatively.

Discussion

Here we have reported successful treatment of DTAT with a proximal medial gastrocnemius recession in an active patient who had failed nearly 1 year of conservative treatment. There have only been a few small case series that have documented surgical treatment for DTAT. DTAT was originally described in a series of 29 patients.[3] In a follow-up study, the operative results were reported on 12 out of the original 29 patients who failed nonoperative treatment. Six patients were treated with debridement and reattachment of the tendon with suture anchor, whereas 6 were treated with debridement with EHL tendon transfer, depending on whether there was less than or greater than 50% tendon involvement, respectively. They reported good to excellent results in 75% of patients. Of the patients initially treated without EHL transfer, 2 patients required revision to EHL transfer: 1 with spontaneous rupture 3 months postoperatively and 1 with a recurrence of symptoms after initial success. The authors also reported that 50% of patients treated with EHL transfer noted some donor site morbidity.[7] Postoperatively, patients were splinted for 2 weeks, transitioned into a short leg walking cast for 4 weeks, and then a CAM boot for another 4 weeks.

Another described technique for the treatment of DTAT is TA debridement with decompressive medial cuneiform exostectomy. In a series of 14 feet, having failed an average of 8.5 months of nonoperative management, all had reliable postoperative pain relief and significant improvement in patient reported outcomes. They did report 1 postoperative tendon avulsion requiring direct repair. Patients were allowed protected weightbearing in a CAM boot for 6 weeks after surgery.[10]

The etiology of TA tendinopathy remains unclear; however, there is evidence that acquired gastrocnemius equinus plays a significant role. Multiple studies have found that DTAT primarily affects women. It was speculated that longstanding high-heel shoe wear may cause undue tension on the TA insertion and predispose it to degeneration.[7] Furthermore, nocturnal pain was found to be a key feature of DTAT. One study reported that this finding was pathognomonic for the condition and was often the main reason for referral to a specialist.[10] The resting equinus posture of the ankle that occurs during sleep again is thought to put tension on the distal TA insertion, thus exacerbating symptoms. Indeed, a high percentage of patients were noted to have gastrocnemius equinus contracture on physical examination.[10]

We propose that gastrocnemius equinus contracture is one of the main driving forces of DTAT. As the most powerful antagonist to the dorsiflexors on the dorsum of the foot, gastrocnemius tightness leads to a plantarflexion moment at the ankle that, over time, can cause tensile failure of the distal TA tendon. This may ultimately result in tendinosis, split tears, or even rupture of the TA tendon. Recession of the gastrocnemius tendon can relieve tension in the distal TA tendon, leading to a decrease or resolution of symptoms. More research is necessary to explore the relationship and results of gastrocnemius recession to successfully treat DTAT.

This report has several limitations that limit its clinical impact. First, it is based on 2 feet from 1 patient. Second, there was no nonoperative control with which to compare. This is especially important as DTAT is a poorly described condition and the likelihood of resolution, progression, or tendon failure is not known. Although a larger series is in progress to further describe the outcomes of this indication, gastrocnemius recession appears to be an effective surgical treatment option for recalcitrant distal tibialis anterior tendinopathy.

Conclusion

We have reported on a case of bilateral DTAT successfully treated with gastrocnemius recession. DTAT is a rare condition with limited literature guiding its treatment. As with other tendinopathies, nonoperative management is the mainstay of treatment but may result in a prolonged recovery. Compared to previously described surgical options, gastrocnemius recession offers the advantage of faster recovery, minimal postoperative immobilization, and no donor site morbidity as seen with tendon transfers.

Declaration of Conflicting Interests

The author(s) declared the following conflicts of interest with respect to the research, authorship, and/or publication of this article: John Anderson, MD, reports personal fees from Piroview Gastrocnemius Recession designer, Nextremity, outside the submitted work. In addition, Dr. Anderson has design input on a patent pending. ICMJE forms for all authors are available online.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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References

1. Abbassian A, Kohls-Gatzoulis J, Solan MC. Proximal medial gastrocnemius release in the treatment of recalcitrant plantar fasciitis. *Foot Ankle Int*. 2012;33(1):14-19.
2. Anderson JG, Bohay DR, Eller EB, Witt BL. Gastrocnemius recession. *Foot Ankle Clin*. 2014;19(4):767-786.
3. Beischer AD, Beamond BM, Jowett AJL, O'Sullivan R. Distal tendinosis of the tibialis anterior tendon. *Foot Ankle Int*. 2009; 30(11):1053-1059.
4. Christman-Skieller C, Merz MK, Tansey JP. A systematic review of tibialis anterior tendon rupture treatments and outcomes. *Am J Orthop (Belle Mead NJ)*. 2015;44(4):E94-E99.
5. Cychosz CC, Phisitkul P, Belatti DA, Glazebrook MA, DiGiovanni CW. Gastrocnemius recession for foot and ankle conditions in adults: evidence-based recommendations. *Foot Ankle Surg*. 2015;21(2):77-85.
6. Ellington JK, McCormick J, Marion C, et al. Surgical outcome following tibialis anterior tendon repair. *Foot Ankle Int*. 2010; 31(5):412-417.
7. Grundy JRB, O'Sullivan RM, Beischer AD. Operative management of distal tibialis anterior tendinopathy. *Foot Ankle Int*. 2010;31(3):212-219.
8. Harkin E, Pinzur M, Schiff A. Treatment of acute and chronic tibialis anterior tendon rupture and tendinopathy. *Foot Ankle Clin*. 2017;22(4):819-831.
9. Jastifer JR, Marston J. Gastrocnemius contracture in patients with and without foot pathology. *Foot Ankle Int*. 2016;37(11): 1165-1170.
10. Laing AJ, Carr C. Decompressive medial cuneiform exostectomy for resistant tibialis anterior insertional tendinopathy. *J Foot Ankle Surg*. 2018;57(3):531-536.
11. Maskill JD, Bohay DR, Anderson JG. Gastrocnemius recession to treat isolated foot pain. *Foot Ankle Int*. 2010; 31(1):19-23.
12. Sammarco VJ, Sammarco GJ, Henning C, Chaim S. Surgical repair of acute and chronic tibialis anterior tendon ruptures. *J Bone Joint Surg Am*. 2009;91(2):325-332.