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Surgical Treatment for Stenosing Peroneal Tenosynovitis

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Abstract

Background: Stenosing peroneal tenosynovitis (SPT) is an uncommon entity that is equally difficult to diagnose. We evaluated our outcomes with a local anesthetic diagnostic injection followed by surgical release of the sheath and calcaneal exostectomy.

Methods: Eleven patients diagnosed with SPT underwent surgery between 2006 and 2014. Upon initial presentation, all patients reported a persistent history of pain along the ankle. Ultrasound-guided injections of anesthetics were administered into the peroneal tendon sheath to confirm the diagnosis. In patients with a confirmed diagnosis of SPT, we proceeded with surgical intervention with release of the peroneal tendon sheath and debridement of the calcaneal exostosis. Retrospective chart review was performed, and functional outcomes were assessed using the Foot and Ankle Outcome Score (FAOS). FAOS results were collected pre- and postoperatively and were successfully obtained at 1 year or greater.

Results: Of these patients, all showed significant improvements ($P < .05$) in 4 of 5 categories of the FAOS (pain, daily activities, sports activities, and quality of life).

Conclusion: We present a case series in which the peroneal tendon sheath was diagnostically injected with anesthetic to confirm a diagnosis of SPT. In each of these cases, symptomatic improvement was obtained following the injection. With the fact that many of these patients had advanced imaging denoting no significant tears, we believe that this diagnostic injection is paramount for the success of surgical outcome.

Level of Evidence: Level IV, retrospective case series.

Keywords: peroneal tendon, stenosing tenosynovitis, diagnostic injection

Stenosing tenosynovitis (STS), which occurs when the sheath of a tendon becomes inflamed, is most frequently seen in the wrist with the condition de Quervain's tenosynovitis.[6] This is a common phenomenon that is well described in the literature. In contrast, stenosing tenosynovitis in the ankle occurs much less often (approximately 4.5% of all tenosynovitis).[11] Furthermore, occurrence within the peroneal tendon sheath is even less frequent.[11] Though its occurrence remains infrequent, knowledge of this condition is an important consideration in the differential diagnosis of persistent lateral ankle pain. Patients with STS of the peroneal tendons commonly present with lateral-sided foot and ankle pain. The pain can occur with both supination and pronation and is typically made worse with activities.[19] At present, there are only a few published reports of this condition in the peroneal tendon sheath. This is likely due to both the rarity of the condition and the vagueness of symptoms, which makes it easy to misdiagnose, especially by caregivers who are unaware of this diagnosis in this part of the body.

Nonoperative treatment has been described as the first line of treatment in this condition, including NSAIDs, physical therapy, immobilization, and injections, which may provide diagnostic and therapeutic value.[1] If nonoperative treatment of this condition fails, surgical treatment is the next option. Treatment of this condition has traditionally been aimed at the underlying pathology. For

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Table 1. Summary of Preoperative MRI Findings for All Study Patients.

Patient	MRI Finding
1	No abnormalities.
2	No abnormalities.
3	Peroneal tendinosis with no tear.
4	No abnormalities.
5	Mild peroneal tendinosis with small amount of fluid surrounding the tendon at the calcaneal fibular ligament.
6	Remodeling of both the peroneus longus and peroneus brevis tendons with intrasubstance longitudinal splitting of the peroneus brevis tendon inferior to the fibular tip, superior peroneal retinaculum intact, and minimal remodeling of the inferior peroneal retinaculum. An accessory peroneus quartus was noted.
7	No abnormalities.
8	Mild subfibular tendinosis of the peroneus brevis with a focal incomplete longitudinal split that reconstituted just proximal to the level of the calcaneocuboid joint. No associated tenosynovitis.
9	No abnormalities.
10	Peroneal tendinosis without focal tear.
11	No abnormalities.

instance, excision of the peroneal tubercle if hypertrophied, removal of low-lying muscle belly, and release of the peroneal tendon sheath have been documented as successful treatments in the few small series' that exist.[8,15,17,18] In this case series, we present both a diagnostic and an operative technique for STS in the peroneal sheath that has proven successful in diagnosing and treating patients.

Methods

Fourteen patients presented with possible stenosing peroneal tenosynovitis (SPT) and, after confirmed diagnosis, underwent surgery between December 2006 and November 2014. Three were excluded from the study group due to failure to complete a preoperative Foot and Ankle Outcome Score (FAOS) questionnaire. Thus, the final study group included 11 patients. All 11 patients were female, with an average age of 23.0. Questionnaire results were collected postoperatively and were successfully obtained at 1 year or greater from all 11 patients. Upon initial presentation, all 11 patients reported a persistent history of pain along the lateral ankle and had exhausted conservative treatment options, including physical therapy, injections, and use of orthotics. All patients had an MRI prior to any injection. There was no evidence of subfibular impingement, sinus tarsi syndrome, or other causes of lateral-sided ankle pain. MRI was normal for all patients, with atypical indications primarily limited to mild peroneal tendinosis (Table 1).

In order to confirm the diagnosis as SPT, ultrasound-guided injections of anesthetic were administered into the peroneal tendon sheath for all 11 patients. If the injection alleviated the pain, this confirmed the diagnosis. A subset of patients also had neurological consults to rule out possible sural neuritis. For these patients, electromyography and nerve conduction velocity tests were negative. In patients with a confirmed diagnosis of SPT, the decision was made to proceed with surgical intervention.

All patients were administered the FAOS questionnaire preoperatively and follow-up scores were collected at a minimum of 1 year postoperatively. Differences between outcomes were assessed using the Student *t* test and a *P* value less than .05 indicated statistical significance.

Surgical Technique

In all patients, dissection was carried out to the level of the peroneal tendon (Figure 1). The superior peroneal retinaculum was cut distally off the fibula. Both the longus and brevis sheaths were independently opened and their residual sheathing was excised sharply, and then distal peroneal tenolysis was performed (Figure 2). The peroneal tendons were inspected to ensure that there were no peroneal tendon tears. Often, an area of stenosis could be visualized by a dimpling of the tendon that could be seen. In patients with low-lying peroneus brevis muscles, the muscle was debrided. In patients with a thickened area of synovium, this was also debrided. If a patient had a prominent calcaneal tubercle, it was removed and the remainder of the calcaneal bone was smoothed. Patients were placed in a splint after the operation and remained nonweightbearing for 2 weeks. They were put in either a postoperative shoe or a CAM boot at 2 weeks postoperatively and progressed to weightbearing with crutches at this point. Patients progressed out of the CAM boot between 6 and 10 weeks, going first to a lace-up brace and then to full weightbearing with no support between 3 weeks and 5 months. Physical therapy was started at 6 weeks postoperatively and patients were able to return to normal activities at 8-12 weeks postoperatively.

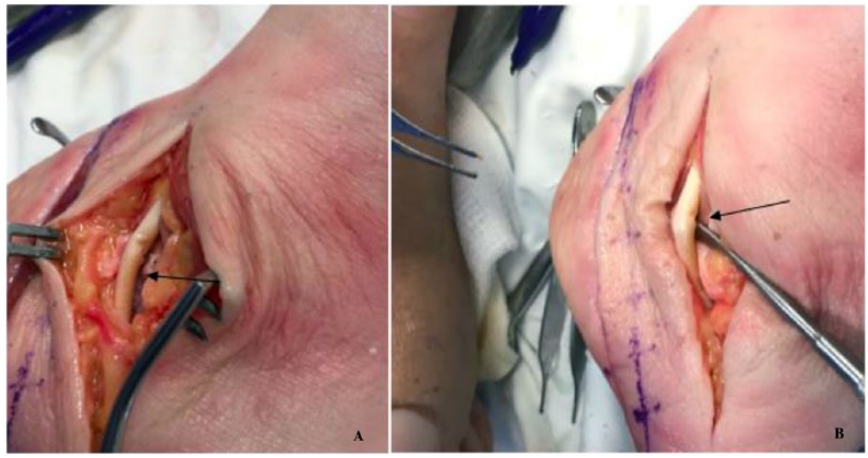

Figure 1. (A, B) Example of the creasing of the peroneus longus tendon in a cadaveric specimen.

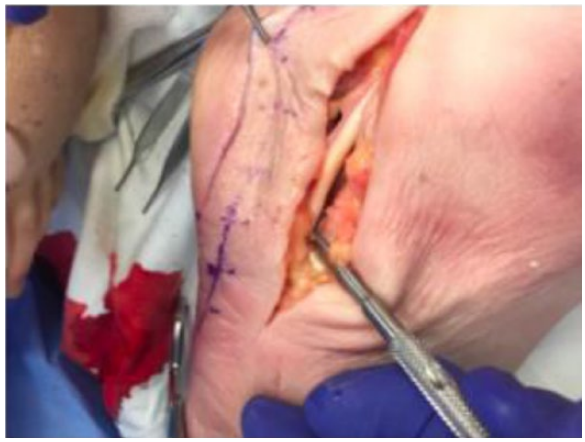

Figure 2. Peroneus longus tendon after release.

Results

Of the 11 patients, all showed significant improvements ($P < .05$) in 4 of 5 categories of the FAOS (pain, daily activities, sports activities, and quality of life) (Table 2). In the FAOS pain category, average scores improved from 52.9 to 82.8 ($P = .0001$). In the FAOS daily activities category, average scores improved from 70.7 to 92.8 ($P = .0002$). In the FAOS sports activities category, average scores improved from 33.6 to 60.9 ($P = .0092$). In the FAOS quality of life category, average scores improved from 17.4 to 58 ($P = .0009$). In the FAOS symptoms category, average scores improved from 72.1 to 79.4 ($P = .0684$). All patients were able to return to daily activities, and many reported participating in sports in as little as 7 weeks postoperatively.

Table 2. Average Pre- and Postoperative Foot and Ankle Outcome Scores.

Outcome Scores			
	Preop Average ($n = 11$)	Postop Average ($n = 11$)	*P* Value ($P < .05$)
FAOS pain	52.9	82.8	.0001
FAOS symptoms	72.1	79.4	.0684
FAOS daily activities	70.7	92.8	.0002
FAOS sports activities	33.6	60.9	.0092
FAOS quality of life	17.4	58	.0009

Abbreviations: FAOS, Foot and Ankle Outcome Score.

Discussion

SPT is an uncommon entity. In fact, STS in the ankle occurs in less than 5% of all cases of STS seen, and of the cases seen in the ankle, it is also quite uncommon for it to be found in the peroneal tendon sheath.[11] STS is an important diagnosis for foot and ankle specialists to be aware of as its presentation is one of vague lateral-sided ankle pain. In addition to lateral-sided ankle pain, patients often complain of pain that is worse with activities and can occur with both supination and pronation.[19] As a result of this nonspecific presentation, STS of the peroneal sheath is easy to misdiagnose and can often remain either undiagnosed or misdiagnosed for extended periods of time. In fact, it took caregivers an average of 3.2 months to determine the diagnosis for the previously mentioned patients, and many had seen other practitioners prior to finding a diagnosis.

There have been several reports of small case series over the years. It was first reported in the peroneal

tendons in 1907 by Hilderbrand,[19] and further by Burman with a report of 2 cases.[4] Trevino described a treatment paradigm for this entity in 1981.[18] It has almost exclusively been reported as case reports, and is most frequently associated with trauma, including in a case of a peroneal tubercle fracture as well as one with a calcaneal fracture.[8,15,19] Nontraumatic causes that contribute to this condition include hypertrophy of the peroneal tubercle,[2-4,10,15,17] hypertrophy of the tendon sheath,[7,14] and low-lying muscle belly of the peroneus brevis musculature as well as the peroneus quartus.[11] Most reports have described the condition as unilateral;[18] however, there is 1 case report of a patient who had this condition in both feet.[17] Despite its rare presentation in the literature, it is likely more common than it would appear and often is undiagnosed.[1]

In our patients, the preoperative scores in clinic revealed a very disabling physical disease process. Furthermore, the patients' persistence to find a diagnosis and treatment after early failure implies that this condition had an impact on their quality of life. When there is a suspected case of STS in the peroneal tendon sheath, it is important that other pathologies that could lead to similar symptoms, such as ankle instability, sinus tarsi syndrome, subfibular impingement, nerve injury, and peroneal tendon injury, be ruled out before considering the diagnosis. In our patients, FAOSs improved significantly in 4 of 5 categories evaluated. Though the symptoms category did not show a statistically significant improvement, there was still an average improvement of more than 7 points. Small sample size likely precluded statistical significance, especially given our patients' high mean baseline score in this category and the relatively short length of this category on the FOAS questionnaire (eg, 7 questions in the symptoms category, compared with 17 in the daily activities category). While the 7-point increase was not statistically significant, it still suggests improvement, which suggests that, on average, the patients' overall symptoms did improve postoperatively. Though the FAOS has been shown to be an effective evaluator of foot and ankle symptoms pre- and postoperatively, using it as our primary measure of clinical improvement is limited due to the fact that it has not been validated for this specific condition, due to the rarity of the condition.[5,9,12,13,16] Additional study limitations include collection of data retrospectively and the loss of 3 patients due to missing preoperative questionnaires. It is important that further work be done, both to diagnose SPT and to continue to assess patients pre- and postoperatively.

Conclusion

In each of the cases presented, symptomatic improvement was obtained following an ultrasound-guided injection of an anesthetic. Given the fact that many of these patients had advanced imaging denoting no significant tears, we believe that this diagnostic injection is important for determining a successful diagnosis and, subsequently, a successful surgical outcome. Release of the tendon sheath can improve symptoms, as demonstrated by the improvements in FAOSs.

Approval Statement

The study took place at the Hospital for Special Surgery and was approved by the institution's Foot and Ankle Registry, which is approved by our institutional review board.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. ICMJE forms for all authors are available online.

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