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Statement of Purpose

Anterolateral ankle pain is a common symptom treated regularly within a foot and ankle surgeon's practice. However, establishing the correct diagnosis and a successful treatment plan can be challenging. Common etiologies of anterolateral ankle pain include: proliferative synovitis, ligamentous injury, soft tissue impingement, osteochondral lesions, loose bodies and arthritis. In addition, the peroneus tertius tendon may also be a rare cause of anterolateral ankle pain. The purpose of this study is to define Peroneus Teritius Syndrome (PTS), a syndrome involving a symptomatic peroneus tertius tendon, which to the authors' knowledge is a syndrome not previously described in the literature. Furthermore, we aimed to analyze patient outcomes following surgical management involving a case series.

Methodology & Hypothesis

A retrospective review was conducted from January 2016 to August 2017 involving three patients diagnosed with PTS. We defined PTS based on the patients' presenting symptoms consisting of anterolateral ankle pain accompanied by catching or popping of the peroneus tertius tendon over the rearfoot/ankle. All three patients obtained magnetic resonance imaging (MRI) of their symptomatic ankle after initial plain film radiographs were unremarkable. All patients underwent excision of a symptomatic peroneus tertius for definitive treatment of PTS. The interval between symptom onset and surgical intervention ranged from one month to three years. Average patient follow-up was 11.6 months. All three surgeries were performed at a single institution by the senior author utilizing a minimally invasive approach as described in the procedures section. Post-operative follow-up cares and a standardized questionnaire were used to evaluate patient outcomes and overall satisfaction. We hypothesized surgical excision of a symptomatic peroneus tertius tendon and muscle provides satisfactory relief of anterolateral ankle pain in patients with PTS.

All surgeries were performed with the patients under general anesthesia in the supine position and with the use of a thigh tourniquet. A 3 centimeter (cm) incision was made overlying the base of the fifth metatarsal. The peroneus tertius tendon insertion was identified and released in its entirety. A second linear incision, measuring approximately 2 cm, was made just proximal to the anterolateral aspect of the ankle joint overlying the peroneus tertius musculotendinous junction. Using a tendon-passer, the distal portion of the peroneus tertius tendon was delivered through the proximal incision. Through this proximal incision, the entire tendon as well as a portion of the peroneus tertius muscle was excised (Figure 2). The operative ankle was then stressed through passive range of motion in which no clicking, catching, locking or impingement was appreciated. The surgical sites were copiously irrigated and then closed in layers. Patients were placed in a Sir Robert Jones modified dressing and were permitted to bear weight as tolerated in an Anklizer boot or surgical shoe. Sutures were removed at two weeks post-operative. At three weeks post-operative, patients were transitioned into supportive shoe gear, and allowed to gradually increase activity as tolerated.

Literature reporting a symptomatic peroneus tertius is scarce. Available studies primarily focus on the functional significance and anatomy of the tendon. The peroneus tertius is a variably present muscle, which has been thought to play an evolutionary role in bipedal gait¹. Prevalence of the tendon ranges from 49% to 94% in anatomic studies². Functionally, the tendon is solely active in the swing phase of gait and helps assist in ankle dorsiflexion and eversion¹. Varying literature considers the peroneus tertius as either part of the extensor digitorum longus muscle or an individualized tendon and muscle complex³.

To our knowledge, Sammarco et al. is the only previously reported case of anterolateral ankle pain and snapping secondary to a hypertrophied peroneus tertius muscle⁴. This patient underwent an arthroscopic myoplasty which included partial resection of the peroneus tertius muscle belly. The authors concluded that surgical management alleviated the patient's symptoms with return to normal activities after eight weeks of surgery. McGoldrick et al. reported a case of an isolated peroneus tertius tendon tear resulting in lateral ankle pain⁵. The patient ultimately underwent primary surgical repair of a full thickness tear of the tendon. The patient reportedly was pain-free with full return to activities at nine months. Derrick et al. also reported on a longitudinal split tear of the peroneus tertius tendon with concomitant longitudinal tears of the peroneus longus and brevis tendons². Although the authors commented on these findings, no mention of conservative or surgical cares was noted as this was primarily a radiographic study.

Peroneus Tertius Syndrome: A Case Series Describing a Rare Cause of Anterolateral Ankle Pain

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Procedures

Literature Review

All patients experienced complete resolution of PTS symptoms by the third post-operative week. No incisional dehiscence or post-operative infections occurred. One patient returned to full activities within three weeks of surgery and reported transient numbness to the dorsal aspect of the third and fourth digits, which resolved by final follow up. Overall patient satisfaction was 100% with improved functional status and no evidence of recurrent symptoms (Table 1).





Figure 2. Minimally invasive two incision approach for peroneus tertius resection (A-C); excised portion of peroneus tertius tendon and muscle (D).

Table 1. Standardized Questionnaire Results			
Patient Demographics	65 year old male	43 year old male	18 year old male
Overall Satisfaction*	5	5	4
Functional Status**	3	3	3
Long Term Complications	none	none	none
Post-operative Visual Analog Score	0.5	2.5	0
Did Pre-operative Symptoms Resolve?	yes	yes	yes
Would You Recommend This Surgery to a Friend?	yes	yes	yes
*Overall Satisfaction (1- very dissatisfied, 2-dissatisfied, 3-neutral, 4-satisfied, 5-very satisfied), **Functional Status (1-decreased, 2-same, 3-improved)			

Results

Figure 1. Magnetic resonance imaging demonstrating presence of the peroneus tertius muscle and tendon in multiplane views, including: T1 axial (A); T1 axial (B); T1 coronal (C); T1 sagittal (D).



Analysis & Discussion

This study characterizes PTS as a peroneus tertius tendon that causes catching or locking over the anterolateral ankle or rearfoot with accompanying pain. This study presents clinical descriptions and imaging studies for diagnosis along with a minimally invasive surgical technique. Prior to surgical intervention, we recommend obtaining an MRI to confirm the presence of a peroneus tertius, to rule out other etiologies of anterolateral ankle pain, and for preoperative planning due to variable anatomy.

In our study, patient post-operative outcomes were assessed via a standardized questionnaire. At final follow up, all patients remained asymptomatic with an overall satisfaction rate of 100%. Based on our patient satisfaction scoring system, one patient was satisfied with post-surgical outcomes whereas the other two patients were very satisfied with the results. Of note, each patient related to improved functional status with no long term complications and complete resolution of pre-operative symptoms at the final follow-up.

Witvrouw et al. investigated the relationship between the absence of a peroneus tertius and the incidence of ankle ligament injuries⁶. There were 200 ankles evaluated with an absent peroneus tertius in 18.5% of the population. At the end of the two year study, the authors found no significant difference between the patients with and those without a peroneus tertius in regard to the incidence of ankle sprains. Furthermore, the authors concluded that patients without a peroneus tertius demonstrated no significant difference in eversion or dorsiflexion strength. Therefore, we may conclude that patients who undergo excision of a symptomatic peroneus tertius are unlikely to experience a significant functional deficit and will not have an increased risk of ankle sprains.

An inherent limitation to the present study is the retrospective nature of our case series and a relatively small sample size. Furthermore, a non-validated questionnaire was used to assess post-operative outcomes. Despite these drawbacks, our initial results are very promising. To our knowledge, this is the first study to formally describe PTS and further studies are warranted to determine the prevalence of the condition, as well as long-term outcomes of surgical management. In conclusion, excision of a symptomatic peroneus tertius provides complete resolution of PTS symptoms, facilitates a quick return to activity, and has excellent patient outcomes.

References

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