Complete Encasement of the Peroneal Tendons by the Peroneal Tubercle

TRAPPER A. J. LALLI, MD; JONATHAN C. KING, MS-IV; ROBERT D. SANTROCK, MD

abstract

The peroneal tubercle is an osseous structure on the lateral side of the calcaneus present in 90% of individuals. Hypertrophy of the peroneal tubercle resulting in stenosing peroneal tenosynovitis has been well described in the literature. Repair of this condition involves operative treatment to remove the hypertrophied peroneal tubercle and repair any resulting tendon pathology. The authors report a unique case of a hypertrophied peroneal tubercle with an associated tarsal coalition, resulting in complete bony encasement of the peroneal tendons. In this case, a 50-year-old white man presented with worsening bilateral foot and ankle pain for several years. On examination, he had fixed hindfoot varus and bilateral equinocavovarus feet. Magnetic resonance imaging and weight-bearing radiographs showed a calcaneonavicular coalition. Intraoperatively, the authors discovered complete bony encasement of the peroneal longus and brevis tendons. On examination, the peroneal longus and brevis were severely stenotic, with the peroneal brevis to the point of near laceration. This painful condition was repaired by takedown of the calcaneonavicular coalition, the peroneal tubercle was resected, and the peroneal tendons were freed from their bony encasement. Tenodesis of the peroneus brevis to longus was performed and the hindfoot varus was corrected with wedge osteotomy of the calcaneus. The patient reported excellent postoperative results. At 3 months postoperatively, he was pain-free and his calcaneal osteotomy was well healed. This case appears to be the first of its type to be reported in the literature. The details of the case are presented along with a review of the relevant literature.
The peroneal tubercle is located at the junction of the anterior and the middle third of the lateral aspect of the calcaneus. This bony process normally separates the peroneus longus and peroneus brevis tendon sheaths. As such, it acts as a pulley about which the peroneal tendons can glide easily and exert their force on the forefoot. An anatomic variant of the tubercle can result in peroneal tubercle hypertrophy that can be either congenital or acquired. The acquired form has been associated primarily with flat or paralytic feet. The peroneal tubercle can also become hypertrophied because of attachment of the peroneus quartus.

An enlarged peroneal tubercle can be the source of lateral hindfoot pain when the tubercle impinges on the peroneal tendons. Hildebrand first described tenosynovitis in the peroneus tendons in 1907, but Burman was the first to describe stenosing tenosynovitis in conjunction with a hypertrophied painful peroneal tubercle in 1953. This connection of stenosing tenosynovitis and a hypertrophied peroneal tubercle has been reported several times in the literature; however, only 1 reported case described this connection in conjunction with encasement of the peroneus longus tendon in a bony canal. The current case is unique because both the peroneus longus and peroneus brevis tendons were completely encased in a bony canal in connection with a hypertrophied peroneal tubercle and calcaneonavicular coalition.

**Case Report**

*Preoperative Course*

A 50-year-old white man was referred to the authors’ institution for evaluation of bilateral ankle and foot pain for 7 to 8 years. The patient reported worse pain in the left ankle. The pain was exacerbated by movement throughout the day and was greatest in severity at night. He noted that the pain had increased recently, and he could walk only approximately 100 feet before the pain was limiting. Resting and elevation of the feet provided some pain relief, but nonsteroidal anti-inflammatory drugs offered little relief. He wore a neoprene brace with bolting that seemed to decrease his pain. There was no history of trauma to either ankle.

On initial presentation, the patient was not obese, with a body mass index of 29.5. He did not use tobacco or alcohol. Medical history was significant for rheumatoid arthritis. On examination, the lower extremities were neurovascularly intact. He had a negative Silfverskiold test result bilaterally. He had no retrocalcaneal pain or tenderness around the lateral malleolus or medial hindfoot. He had slight subtalar motion bilaterally. On standing toe raise, there was hindfoot varus that did not correct. He had cavus feet bilaterally with equinocavovarus that was much greater on the left foot than on the right foot. Bilateral radiographic examination of the ankles showed os formation bilaterally (Figure 1). Cavovarus deformity and calcaneonavicular coalition were noted on the left. Magnetic resonance imaging scan showed degeneration of the peroneal tendons, edema surrounding the flexor hallucis longus, and a calcaneonavicular coalition on the left (Figure 2). Treatment options were discussed, and the patient was offered both operative and nonoperative treatment. The patient elected to undergo operative intervention.

**Operative Approach**

After informed consent was obtained, repair of the left ankle was performed. Two parallel incisions were made from the lateral pole of the foot 4 cm apart. The anterior incision was centered over the distal fibula and sinus tarsi and extended to the base of the 5th metatarsal. The posterior incision was parallel to the first and centered over the midportion of the calcaneus. Caution was used when dissecting through the soft tissue to protect the branches of the sural nerve and superficial peroneal nerve. The anterior incision was taken down to the sinus tarsi to expose the calcaneonavicular coalition. The coalition was followed laterally and posteriorly and found to be contiguous with an extremely hypertrophic peroneal tubercle that enveloped the peroneus longus and peroneus brevis tendons in a bony canal (Figure 3). The peroneus brevis was completely encased within the bony structures and was stenotic almost to the point of laceration (grade IV). The peroneus longus was severely stenotic, and the bony structures enveloped approximately 70% of it. The peroneal tendons were freed from the bone, and the peroneal tubercle coalition was removed with osteotomes and rongeurs. The coalition was followed down to the calcaneonavicular coalition and was resected adequately. An osteophyte was debrided from the lateral border of the subtalar joint so that the joint could move...
freely. Attention was turned back to the peroneal tendons. The peroneus longus was thickened but viable, but the peroneus brevis was shredded to one-tenth of its normal diameter and determined to be nonviable. It was debrided at the point of the peroneal tubercle resection and was repaired with a Pulvertaft weave into the longus. Attention was then turned to the posterior incision to realign the calcaneus by subperiosteal elevation. With confirmation by fluoroscopic imaging, an incision was made parallel to the posterior facet and an opposing wedge of approximately 6 to 7 mm was made. The wedge was closed with a single 6.5-mm titanium cannulated screw. This procedure corrected the hindfoot varus to neutral. The posterior incisions were copiously irrigated and closed in layers. Sterile bandages and a short leg splint were applied, and the patient was taken to the recovery room neurovascularly intact.

Postoperative Follow-up
The patient was immobilized in a well-padded AO short leg splint postoperatively. Two weeks postoperatively, the patient was healing well without complications and exhibited good range of motion of the ankle joint. He was placed in a walking cast. Four weeks postoperatively, the patient was tolerating full weight bearing in a walking boot with moderate hindfoot edema and slightly restricted range of motion in the ankle joint. By 9 weeks postoperatively, the patient was transitioned out of the walking boot into normal shoe wear. Subtalar motion was good and unrestricted. At the 3-month visit, the patient was pain-free and tolerated dress shoes without difficulty. Radiographs obtained at 3 months showed a healed calcaneal osteotomy with intact instrumentation.

DISCUSSION
The peroneal tubercle is an osseous structure on the lateral side of the calcaneus that is present in 90% of individuals. Prominence of the peroneal tubercle is noted in up to 30% of calcanei. Hypertrophy of the peroneal tubercle can be congenital or acquired and can cause peroneal tenosynovitis as a result of increased stress on the peroneal tendons. Stenosing peroneal tenosynovitis must always be considered in the differential diagnosis of lateral foot and ankle pain. This tenosynovitis can be severe to the point of laceration of the peroneal tendons and most commonly affects the peroneus longus tendon. This condition often results in inflammation of the inferior peroneal retinaculum and formation of a restrictive sheet of connective tissue, as seen in the current patient.

Formation of an osseous canal of the peroneal tendons in conjunction with a hypertrophied peroneal tubercle is a rare complication of stenosing peroneal tenosynovitis. Bruce et al described a case in which a bony tunnel enveloped the peroneus longus tendon, resulting in stenosing peroneal tenosynovitis. However, the authors believe this to be the first case reported in the literature that describes involvement of both the peroneal longus and peroneus brevis tendons in an osseous canal. Few reports have described impingement of the peroneus brevis tendon in stenosing tenosynovitis, and few
have reported impingement as severe as the condition seen in the current patient, which led to near-laceration of the peroneus brevis tendon.\textsuperscript{4,5,7,9} Boya and Pinar\textsuperscript{5} described stenosing tenosynovitis of the peroneus brevis tendon without involvement of the peroneus longus. However, this case was associated with only a hypertrophied peroneal tubercle without formation of a bony canal.

Tarsal coalition is a fibrous, cartilaginous, or osseous connection of 2 or more tarsal bones. The most common sites are the calcaneonavicular joint and the middle facet of the talocalcaneal joint.\textsuperscript{10} The prevalence of tarsal coalition is approximately 1%.\textsuperscript{11} Coalitions restrict normal subtalar motion and can result in pes planus deformity, pain, tarsal tunnel syndrome, and peroneal tendon spasm.\textsuperscript{12,13} Stenosing peroneal tenosynovitis and hypertrophic peroneal tubercle have not been directly associated with tarsal coalitions in the literature. Therefore, the authors assumed that these conditions in the current patient had unrelated causes and that 2 separate biomechanical processes were responsible. The fibro-osseous canal enveloping the peroneal tendons appeared continuous with the tarsal coalition; however, additional information and prospective follow-up are needed to establish a connection between these bony overgrowths.

**CONCLUSION**

The authors reported the 1st case of stenosing tenosynovitis secondary to peroneal tubercle hypertrophy with associated calcaneonavicular coalition and complete encasement of the peroneal tendons in a bony canal. Although peroneal tendon erosion is a known complication of stenosing tenosynovitis, the current case shows the need for prompt operative intervention when chronic irritation leads to the creation of a bony overgrowth. The authors recommend both nonoperative and operative intervention early in the pathogenesis of stenosing tenosynovitis to avoid the anatomic changes seen in the current patient.

**REFERENCES**