

# Chronic Lateral Ankle Pain Secondary to an Anomalous Peroneus Longus

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**T**he differential for chronic lateral ankle pain is broad and includes lateral ankle instability, subtalar instability, tarsal coalition, peroneal tendon subluxation, peroneal tendon rupture, longitudinal peroneal tendon tear, peroneal tendonitis, tenosynovitis, and lumbosacral radiculopathy. Disorders of the peroneal tendons have seldom been reported. Although peroneus brevis disorders have been described more often in the literature, peroneus longus problems are gaining more recent attention.<sup>1</sup> Much of the literature regarding both tendons is in the form of case reports.<sup>2-4</sup> Tenosynovitis, longitudinal ruptures or partial tears of the peroneus longus tendon, and pathologic changes isolated to the os peroneum are the major pathologic conditions associated with the peroneus longus.<sup>1</sup>

## CASE REPORT

A man in his late 40s presented with the chief complaint of left lateral ankle pain. He had sustained an inversion injury to the left ankle while turning on a wooden platform and then waited 2 months before seeking treatment at an outside institution. His orthopedist noted tenderness over the posterolateral aspect of the midfoot. Anteroposterior and lateral radiographs of the foot (Figures 1A, 1B) showed an avulsion fracture off the cuboid. The patient was placed in a short leg cast for 6 weeks and allowed partial weight-bearing, but symptoms did not improve. At 6-week follow-up, he was diagnosed with delayed union of the cuboid fracture. Magnetic resonance imaging (MRI) of the left foot and ankle was then used for further evaluation. The official interpretation was tenosynovitis of the peroneus brevis tendon, with no full-thickness tendon disruption or fracture. Pain continued and limited all the patient's activities. He was placed in a stirrup brace for 4 weeks, under the assumption that surgical

treatment would be considered if there was no improvement by then.

Seven months after injury, the patient noted some improvement in symptoms, and physical therapy was initiated. After 4 weeks of therapy, the severe lateral ankle pain recurred. The patient was referred to our foot and ankle clinic. Our initial evaluation occurred 10 months after initial injury. The patient reported that the severe posterolateral ankle pain worsened with activity. On physical examination, there was tenderness along the left posterolateral ankle, weakness of eversion, a positive provocative test, and a positive peroneal compression test, as described by Sobel and colleagues.<sup>5</sup> Of significance was no evidence of pes cavus or varus hindfoot.<sup>1</sup> Repeat radiographs of hindfoot and ankle showed no appreciable change. We thought that the previously diagnosed cuboid fracture was actually a normal os peroneum. MR images were carefully reviewed. We concurred with the diagnosis of peroneal tenosynovitis, as MRI showed the peroneus brevis primarily involved (Figures 2A, 2B). Surgery to correct this problem was discussed, and the possible need for staged reconstruction with Hunter rods and flexor digitorum longus transfer was considered.

The patient was taken to the operating room 2 weeks later and underwent surgi-



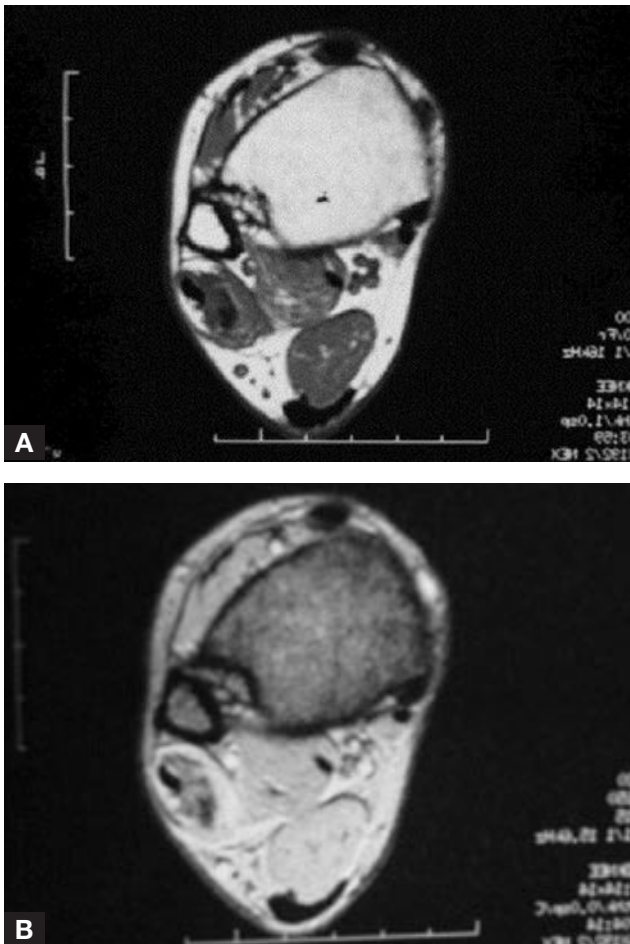
**Figure 1.** Anteroposterior (A) and lateral (B) radiographs of the foot.

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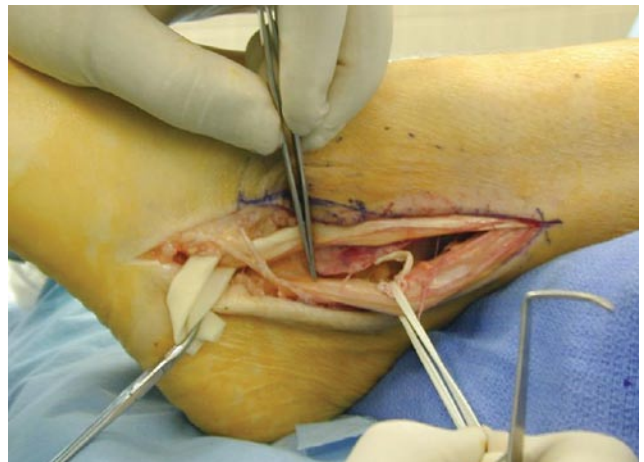
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**Figure 2.** T<sub>1</sub>-weighted (A) and T<sub>2</sub>-weighted (B) axial magnetic resonance imaging shows diseased peroneus tendon.

cal exploration of the left peroneal tendons. The peroneal tendons were visualized through a longitudinal incision dividing the tendon sheaths. On initial survey, significant tendinous degeneration was noted within the peroneus longus. The peroneus longus was in the position typically occupied by the peroneus brevis, directly posterior to the fibula (Figures 3, 4). The tendinous portion of the peroneus longus was also much shorter than the tendinous portion of the peroneus brevis. The peroneus brevis tendon was approximately twice as long as the longus tendon, the muscle belly of which extended much farther distally than usual. This anomaly was confirmed after careful exploration of both tendons, including their multiple insertions.

We found that what had appeared to be a routine degenerated peroneus brevis before surgery was actually a case of anomalous peroneal tendons with a degenerated peroneus longus. We therefore resected the degenerated portion of the peroneus longus and tenodesed it to the peroneus brevis (Figure 5). At time of surgery, no degeneration of the peroneus longus tendon was noted distal to the fibula. On further exploration, the os peroneum was thought not to be a source of pathology, as that region of the tendon appeared normal. The tendon sheaths were left unrepaired; the superior peroneal retinaculum was



**Figure 3.** Intraoperative image shows degenerative peroneus longus tendon in the position typically occupied by the peroneus brevis tendon, directly posterior to the fibula.

meticulously repaired to prevent postoperative subluxation or dislocation.

After surgery, the patient was placed in a short leg cast for 1 month of non-weight-bearing. On follow-up, he was placed in a Controlled Ankle Motion (CAM) Walker (AliMed, Dedham, Mass), and physical therapy was started with range-of-motion and strengthening exercises. The patient returned 3, 6, and 12 months after surgery with complete resolution of pain and return of eversion strength. Afterward, he was asymptomatic and returned to full duty at work.

The authors have obtained the patient's informed, written consent to publish his case report.

## DISCUSSION

In reports on peroneus longus injuries, investigators have emphasized that the correct diagnosis may be significantly delayed,<sup>6-9</sup> but none has cited anomalous peroneal tendon relationships in the lateral compartment as a potential cause. The peroneus longus muscle usually originates from both the lateral condyle of the tibia and the head and midlateral aspect of the fibula and inserts onto the inferior aspect of the first cuneiform and the inferolateral aspect of the first metatarsal. The muscular portion of the peroneus longus is posterior and lateral to the peroneus brevis muscle and becomes tendinous proximal to the ankle joint. The peroneus longus usually becomes tendinous before the peroneus brevis becomes tendinous. It usually courses posterior to the peroneus brevis at the level of the distal fibula before it runs beneath the trochlear process of the calcaneus, and it inserts on the plantar lateral aspect of the first metatarsal (Figure 6).<sup>10</sup>

The peroneus brevis muscle originates from the mid-portion of the lateral fibula and becomes tendinous at the distal aspect of the fibula. It usually courses on the posterior aspect of the fibula and lateral malleolus anterior to the peroneus longus. The peroneus brevis then crosses the peroneal tubercle and inserts onto the base of the fifth



**Figure 4.** Intraoperative image shows the degenerative portion of the peroneus longus tendon being resected. The length of the peroneus brevis tendon was approximately twice that of the peroneus longus tendon, the muscle belly of which extended much further distally than usual.

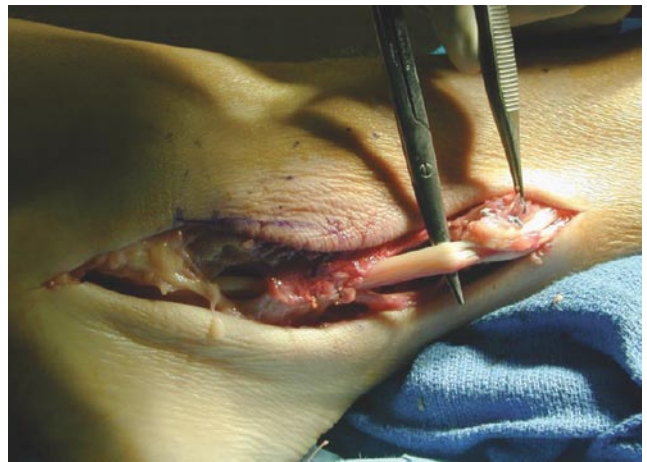
metatarsal. The peroneus longus is usually the more posterior of the 2 tendons and distal to the fibula. The peroneus longus also has been described as having a much longer tendinous portion than the peroneus brevis.<sup>11</sup>

For diagnostic and treatment purposes, most orthopedists and radiologists rely heavily on the anatomical relationship of the peroneus tendons as seen on axial MR images. Peroneus longus injuries often are more distal and are located in the region of the os peroneum,<sup>6</sup> whereas peroneus brevis injuries are localized to the distal aspect of the fibula. Brandes and Smith<sup>1</sup> described 3 anatomical zones in

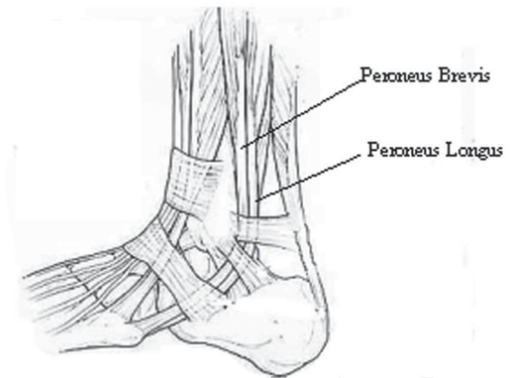
**“...intraoperative verification of tendon insertion before definitive surgical treatment is mandatory.”**

which the primary peroneus longus tendon can be injured. Zone A is at the level of the superior peroneal retinaculum, zone B is at the level of the inferior peroneal retinaculum, and zone C is the level of the cuboid notch. In their series, complete ruptures were most likely in zone C, and partial ruptures were more common in zone B. Our patient's tendinous degeneration occurred in zone A. Why?

In an anatomical study of cadaveric peroneal brevis tendons with longitudinal tears, Sobel and colleagues<sup>5</sup> found that the tears were centered over the posterior margin of the distal fibula and concluded that longitudinal tears or splits in the peroneus brevis were caused by acute or repetitive mechanical trauma. A sharp posterior edge of the fibula often contributes to tendon stability, though it also may be the site of peroneus brevis injury. Munk and Davis<sup>12</sup> suggested that the peroneus longus is pulled tightly



**Figure 5.** Intraoperative image shows peroneus longus tenodesed to the peroneus brevis, plus the repaired superior peroneal retinaculum.



**Figure 6.** Normal relationship between the peroneal tendons in the lateral compartment.

against the peroneus brevis, entrapping the peroneus brevis between the peroneus longus and the fibular malleolus. The peroneus longus therefore acts as a wedge, pressing on the underlying flattened peroneus brevis and creating a longitudinal cleft in the tendon. The etiology of peroneus brevis tears thus appears to be compression of the peroneus brevis against the ridge on the lateral malleolus by the peroneus longus.<sup>5,11,13</sup> We believe that this may explain the findings in our case. As the longus was found in the position typically occupied by the peroneus brevis, compression of the brevis on the peroneus longus may have caused degeneration of the peroneus longus through a mechanism similar to what has been described. This mechanism would also explain why our peroneal longus tendinopathy occurred in zone A, despite the findings of Brandes and Smith.<sup>1</sup> In this case, the anatomical relationships were reversed, and hence so were the injury patterns.

There is wide variability in treatment options for peroneus pathology. Had our patient's injury been a peroneus brevis tendon rupture, staged reconstruction would have been necessary, and there would have been increased potential for

morbidity, work absence, and health care cost. We believe that our patient's case is important, as it shows that variations in the anatomical relationships and in the tendinous length of the peroneal tendons are possible and that intraoperative verification of tendon insertion before definitive surgical treatment is mandatory. With these anomalous relationships in mind, appropriate treatment can be administered and patient outcome maximized.

### AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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