

Peroneus Quartus Muscle

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Abstract

The peroneus quartus (PQ) muscle is a rare but sometimes missed potential etiology of ankle pain and tendon subluxation. We report the case of a 16-year-old boy who presented with lateral right ankle pain and subluxation of peroneal tendons. He had a history of non-Hodgkin lymphoma and palpable distal fibular osteochondroma. Seven months after excision of the exostosis and repair of the peroneal tendon retinaculum, the pain recurred. Imaging showed a split peroneus brevis (PB) tendon. During surgery, a PQ muscle was found and excised, and the PB tendon was repaired. One year after surgery, the patient's symptoms were resolved.

The peroneus quartus (PQ) is an accessory muscle arising from the leg's lateral compartment, which typically contains the peroneus longus (PL) and the peroneus brevis (PB). The many cadaveric studies that have been conducted indicate a general population prevalence ranging from 6.6% to 23%.¹ Radiographic studies, including magnetic resonance imaging (MRI) and ultrasonography, have shown a similar prevalence.² Although the PQ is asymptomatic in most cases, it may compromise the space of the superior peroneal tunnel and cause problems, including ankle pain, PB tear, subluxation of peroneal tendons, tendinous calcification, painful hypertrophy of retrotrochlear eminence, and recurrent hematomas.^{1,3-5} Given its differing anatomy, the PQ variously has been referred to as *peroneocalcaneus externum*, *peroneocuboideus*, *long peroneal tendon*, and *peroneoperoneolongus*.¹ Although the PQ's origin and insertion differ

between subjects, the most common origin is the muscle fibers of the PB, and the most common insertion is the retrotrochlear eminence of the calcaneum.³

We report a case of peroneal tendon pathology that was initially thought to be caused primarily by impingement of a large osteochondroma on the tendons, but was later thought to be caused in part by a PQ and a split PB tendon seen only at the time of the second operation. The patient provided written informed consent for print and electronic publication of this case report.

Case Report

A 16-year-old boy with an osteochondroma of the right distal fibula presented to clinic with the chief complaint of lateral right ankle pain. A "sharp" pain accompanied by audible "popping" occurred with ankle motion. Medical history was significant only for non-Hodgkin lymphoma treated with bone marrow transplantation and whole body radiation at a young age. Physical examination revealed a palpable exostosis of the distal right fibula and associated ankle swelling. There was anterior subluxation of the peroneal tendons with active eversion of the ankle joint. Radiographs of the ankle again showed a 1.5-cm × 1.2-cm osteochondroma of the right distal fibula (**Figure 1**). The patient was taken to the operating room for osteochondroma excision of the distal fibula as well as tenosynovectomy of the peroneal tendons. During surgery, no subluxation was noted after osteochondroma excision and repair of the peroneal retinaculum. Six weeks after surgery, the patient reported improved pain and function, and there was no evidence of peroneal subluxation.

One year after surgery, the

Take-Home Points

- PQ is easily mistaken for a PB tear.
- PQ is best identified on MRI, but commonly missed.
- For symptomatic cases, excision is the best treatment.
- Consider PQ in patients with chronic ankle pain, swelling, and/or instability.

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Figure 1. Anteroposterior radiograph of the right ankle shows a distal fibula osteochondroma.



Figure 2. Anteroposterior radiograph of the right ankle 7 months after excision shows no recurrence of the osteochondroma.

patient returned with recurring right ankle pain and audible popping during ankle movement. There was no appreciable peroneal tendon subluxation on physical examination. Repeat imaging of the ankle showed no recurrence of the osteochondroma (**Figure 2**). MRI showed some tendon flattening, which could be consistent with a longitudinal tear (**Figures 3A-3C**). Consent was received to operatively explore the peroneal tendons and possibly repair the split PB tendon. During exploration of the tendon sheath, an accessory tendon and muscle belly consistent with a PQ were discovered. The complex was excised, and the split tendon was repaired and retubularized. After surgery, the patient was doing well and reported pain relief. There was no evidence of subluxation.

Discussion

Absence of a PQ muscle in simian and prosimian species suggests that the PQ represents an evolutionary adaptation to evert the lateral foot and improve bipedal gait. Although the 3 peroneal (PL, PB, peroneus tertius [PT]) muscles evert the middle part of the lateral border of the foot, the PQ inserts on the retrotrochlear eminence, which everts the posterior part of the lateral border of the foot.^{1,6} The PQ has often been described as

a variation of the PB. The PQ may also stabilize the ankle and reduce the energy required for walking. A similar functional adaptation has been proposed for the PT, which dorsiflexes at the ankle. Although presence of a PT also varies in the population, its occurrence does not correlate with presence of a PQ. In people with PQ muscles, there is an 83% to 95% incidence of also having PT muscles.⁷

PQ prevalence has ranged from 6.6% to 23% in cadaver studies² and from 7% to 17% in radiologic studies.¹ To better evaluate prevalence, Yammine² performed a meta-analysis of data from 46 studies (cadaveric dissection, MRI, ultrasonography) and 3928 legs and found an overall incidence of 10.2% and a higher incidence in the Indian population than in other races. Another study found no correlation between PQ presence and sex.⁷

MRI is the best imaging modality for assessing for PQ but must be performed specifically for this anatomical variation. Axial images may show a fat pad separating the PQ muscle from the PB muscle.⁸ On imaging, a PQ muscle can be mistaken for a peroneal tendon tear. A feature that helps in distinguishing the 2 is location; the PQ typically is found posterior and medial to the PL and PB tendons, whereas PB tears are anterior to the

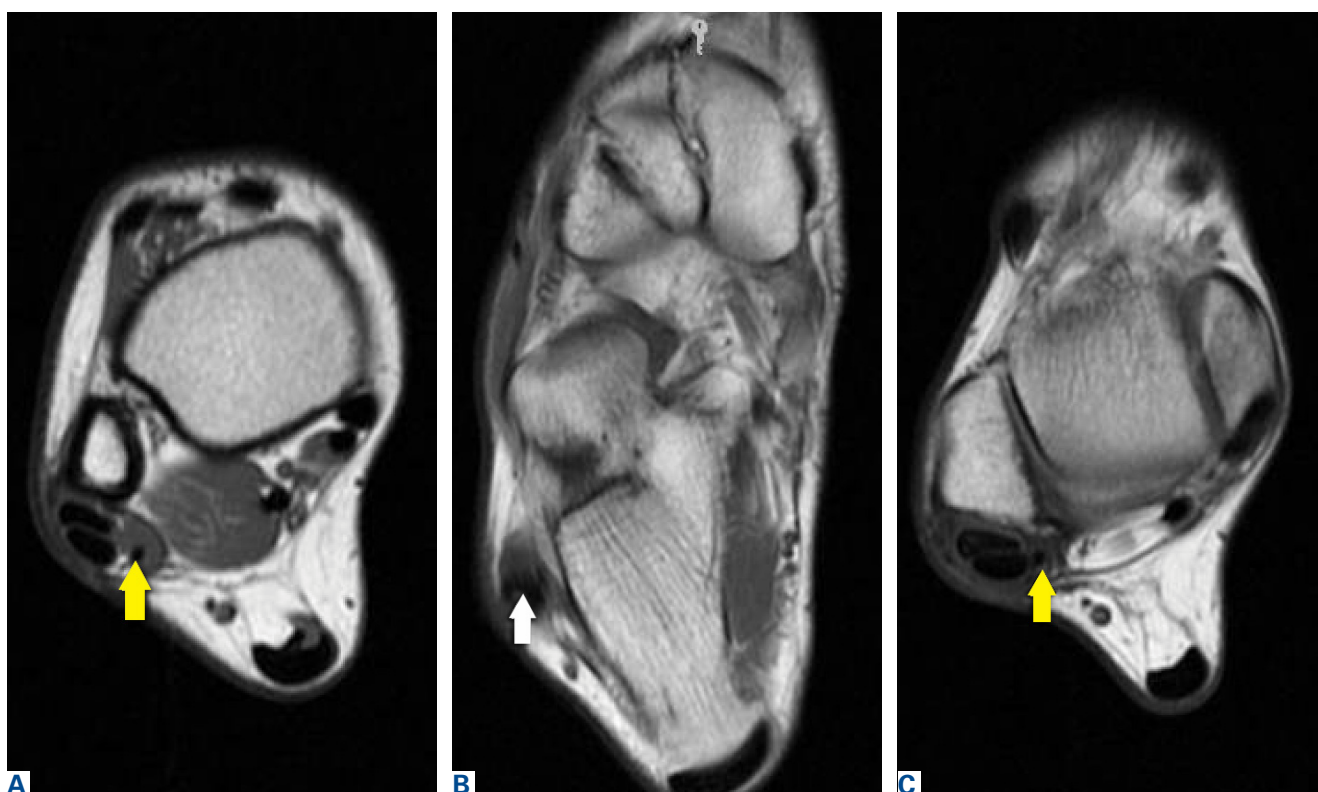


Figure 3. (A-C) Axial T1-weighted magnetic resonance imaging shows (A,C) an accessory peroneus quartus tendon (yellow arrows) and (B) peroneus brevis tear (white arrow) that went unnoticed before the second operation.

retromalleolar groove.² Presence of a PQ muscle may be missed on initial MRI, as occurred in our patient's case. Zammit and Singh³ reviewed 80 leg MRIs and found 6 PQs. Only 1 of the 6 reports described the PQ as an "atypical appearance of peroneus brevis [that] appears to be made up of more than one tendon."

Surgical excision is often adequate treatment for a symptomatic PQ. If the PQ muscle is small and symptomatic from pressure to the muscle mass, a short fasciotomy may be performed.⁹ More commonly, complete excision of the accessory muscle is required. Although the PQ muscle is usually asymptomatic, it should be considered in cases of chronic ankle pain, swelling, or instability; recurrent hematomas; and peroneal tendon subluxation or tears.^{5,7}

Our patient's diagnosis was initially overlooked because of an osteochondroma in the region of interest. It remains unclear whether his pain was caused by the PQ itself or, more likely, from the PB tear. It is thought that the accessory muscle adds bulk to the peroneal tunnel, predisposing to peroneal pathology, such as muscle tears and tendon subluxation. Regardless, advanced imaging

performed before the index procedure, along with a general understanding of the PQ and its classic MRI findings, may have prevented the repeat operation in this case.

The PQ muscle is a rare but sometimes missed potential etiology of ankle pain and tendon subluxation. In our patient's case, the most obvious abnormality, an osteochondroma, may have masked the true cause.

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This paper will be judged for the Resident Writer's Award.