

Statement of Purpose

The Peroneus Quartus (PQ) muscle is one of the most common accessory muscles found in the ankle, however its occurrence is still relatively rare. This study presents cases where the PQ muscle was discovered intraoperatively and used as augmentation for the repair of Peroneus Brevis (PB) tendon tears.

Literature Review

Peroneus Quartus (PQ) is a rare accessory muscle. In regards to the foot and ankle, it is the most common accessory muscle and is found in the lateral compartment of the lower leg. The incidence of PQ has been reported in literature to be between 5.9%-21.7%. (2,5).

As originally published, PQ was described with its origin from the distal portion of the lower fibula and inserting into the lateral surface of the calcaneus (2,5). However, as more research was conducted, it was determined this to be just one variation. Several variations of PQ origins and insertions exist in literature. The most frequent origin of PQ tendon was from Peroneus Brevis (PB) muscle fibers and most commonly inserted to the retrotrochlear eminence of calcaneus (5).

PQ tendon usually is identified clinically, and confirmed by either Ultrasound (US) or Magnetic Resonance Imaging (MRI); MRI being 83 percent sensitive and 75 percent specific for tendon tear. On ankle Axial view MRI, PQ is observed posterior to the Peroneus Longus (PL) and PB tendons (5).

Isolated PQ pathology has not been scientifically shown to cause lateral ankle pathology, however it has been found in conjunction with a number of pathologies. In addition to pain and instability, these findings include any or all of the following: peroneal tenosynovitis, peroneal tendon subluxation, and longitudinal tears of the PB tendon. Patients with intrasheath subluxation within the canal were associated with either a "low-lying PB muscle belly" or a PQ tendon and had a tear of one or both of the peroneal tendons (2).

In such cases, treatment typically includes; PB repair and/or surgical debridement or excision of the PQ muscle belly with debridement to resolve peroneal tendon subluxation (2,4).

Case Studies

Case 1: 47 y/o female presented with a 20 year history of right ankle pain. Patient had history of fractured right ankle 20 years ago and continued having pain when walking and standing. Patient exhausted ankle supports, orthotics, anti-inflammatories, physical therapy and injections, all which did not relieve pain.

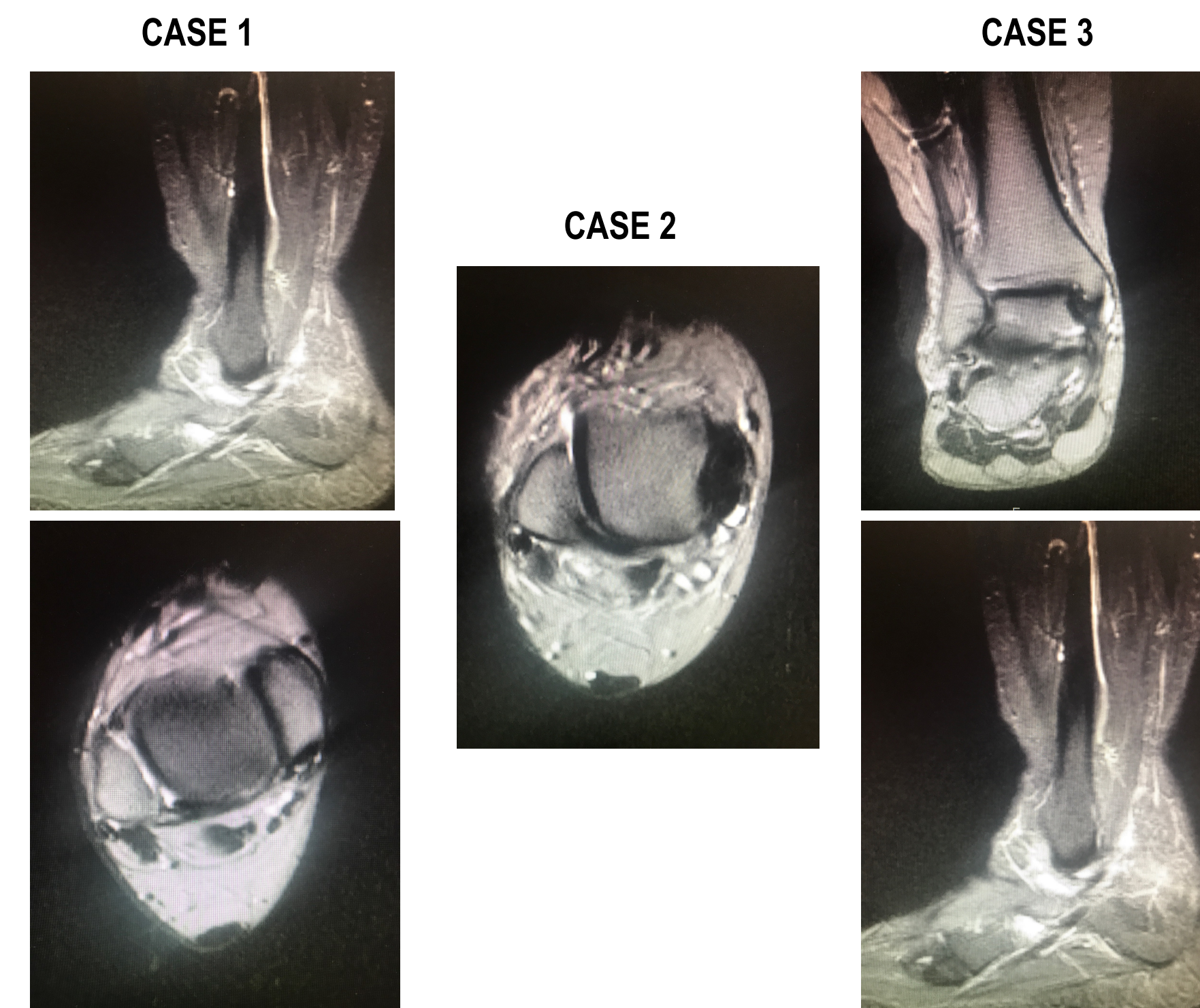
Case 2: 37 y/o female presented with a 2 week history of recent left ankle pain. Pt had history of multiple ankle sprains in the past as a dancer. Patient denied recent trauma but noted that pain started after a long day of shopping. Patient complained of swelling and pain on the "side and back" of her left ankle. Patient exhausted anti-inflammatories, changes in shoe gear, and cryotherapy, all which did not help.

Case Studies Con't

Case 3: 23 y/o female presented with a 2 day history of right ankle pain after twisting her ankle while playing football. Patient noted a history of spraining the right ankle numerous times in the past. Patient complained of pain, swelling, and bruising to outside of ankle. Patient tried an ankle sleeve/brace, anti-inflammatories, RICE therapy. These modalities did not relieve pain.

MRI was performed in all cases with common findings including tear of PB and ankle joint effusion. Other findings in these three cases included one or more of the following: sinus tarsi effusion, presence of an os trigonum, fracture of os trigonum, FHL tenosynovitis, and ganglion cyst posterior ankle.

Following discussions with the patients, decision was made to proceed with surgical management.



Surgical Procedure

In all cases, the patients were brought to the operating room and transferred on the operating room table in the supine position. Following the induction of general anesthesia, the ankle and foot were then scrubbed, prepped, and draped in the usual aseptic manner. Attention was then directed to lateral aspect of the ankle. A curvilinear skin incision was made posterior to the fibula coursing distally along the inferior lateral malleolus, to the styloid process.

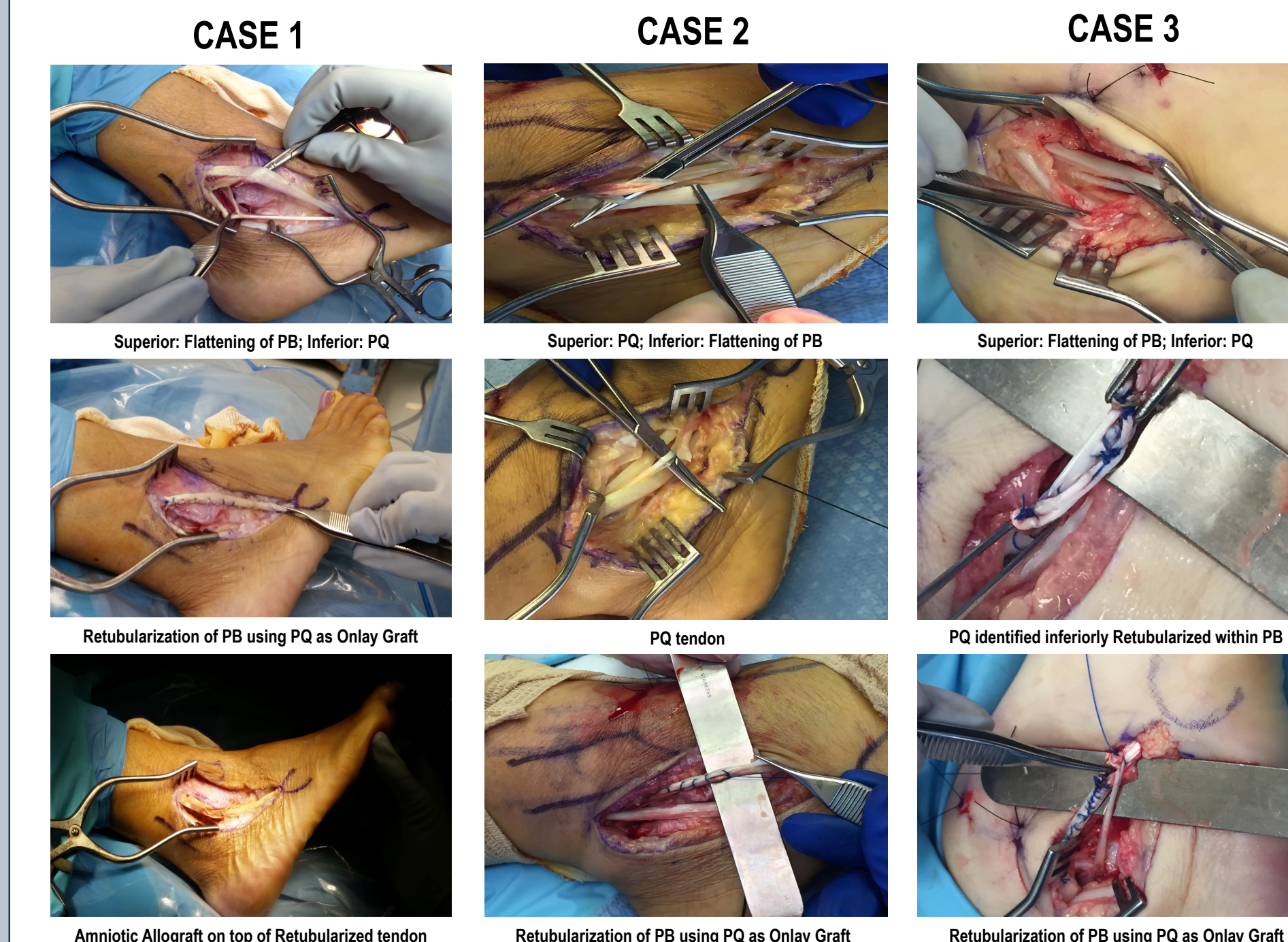
Case 1: PB was located and noted to have a longitudinal split tear noted approximately 2 cm distal to the lateral malleolus. The presence of a low-lying PQ muscle belly, not evident on MRI, was identified.

Surgical Procedure Con't

Case 2: PB was located and noted to have a longitudinal split tear and exhibited flattening from the fibular groove down to the Styloid process. PL tendon was intact and healthy. The presence of a low-lying PQ muscle belly, similarly not evident on MRI, was identified.

Case 3: PL and brevis tendons were located, dissected free and determined to both have longitudinal split tears. The presence of a low-lying PQ muscle belly, similarly not evident on MRI, was identified.

In these cases, the PL was re-tubularized, if needed. PQ was resected as distally as possible at its insertion to use as an onlay autograft to augment the PB. The PB was re-tubularized using 2-0 prolene in a running fashion with PQ as augmentation. An amniotic graft was then applied to the peroneal tendons for additional augmentation and was utilized to prevent soft tissue adhesions. Other procedures to surgically manage other pathologies were carried out as necessary.



Results

Repair of PB with augmentation using PQ was performed in all patients. Following a 6-week period of non-weightbearing to affected side with immobilization, physical therapy was initiated.

All Patients returned to pain free regular physical activity within three months of surgical intervention, including gym and football activities. After a 20-27 month follow-up period, no residual evidence of reoccurrence of PB tear was noted.

Discussion

PQ is an accessory muscle anomaly of the lower lateral leg compartment that typically arises from the PB muscle and inserts on the lateral aspect of the calcaneus. While PQ symptoms alone have not been shown to be the cause of lateral ankle pathology, it has been shown to likely cause mass effect on the lateral aspect of the foot.

In the presented cases, the presence of PQ were all initially missed on MRI and discovered as incidental findings clinically during surgical procedures. Partial tears found on MRI were not only found in the PB, but also the PQ. These findings in all 3 cases give rise to the thought of how many of these findings are truly missed and/or treated solely as a PB injury.

Nevertheless, in the past, with the presence of PQ in conjunction with lateral ankle pain, the excision of PQ was the treatment of choice, and was shown to be effective for a time period (1). PQ has also been used in the reconstruction of the superior peroneal retinaculum in cases of peroneal tendon dislocation (3). Chinzei et al found that following simple excision or simple augmentation of PQ; pathology would quickly return. It was suggested that additional peroneal augmentation would be needed to make the repair a lasting effect (1).

These cases detailed the use of the PQ muscle as augmentation of PB tendon tears in cases of lateral ankle instability. The goal of our study was to provide evidence that the incidental finding of the PQ muscle may be effectively used as augmentation to improve pain and function in the presence of chronic lateral ankle instability.

References

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