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Case Report Open Access

Plantar Rupture of Peroneus Longus Tendon Associated to Os Peroneum Fracture: A New Method of Treatment

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Abstract

We report a case of plantar rupture of peroneus longus tendon with fracture of the os peroneum after a minor trauma. This is a rare pathology and several treatment optionshave been proposed in the literature. We describe a new way of treatment consisting in subperiosteal excision of the proximal fractured os peroneum and side-to-side repair with augmentation with the peroneus tertius if present.

Keywords: Peroneus longus tendon; Fracture; Os peroneum; Peroneus tertius

Introduction

Most peroneal tendon ruptures are the result of an inversion ankle sprain. Usually tears of the peroneal tendons are partial ruptures called longitudinal tears. Partial and complete rupture of peroneus longus tendon do occur but are far less common than injuries seen in peroneus brevis. The weakest point of peroneus longus tendon is the point where it changes direction and rounds the plantar surface of the cuboid. Complete transverse rupture of the peroneus longus tendon is rare. They occur most frequently at the site of the os peroneum- a small accessory bone found within the peroneus longus tendon at the lateral wall of the cuboid.

We report a case of plantar left peroneus longus tendon rupture associated with os peroneum fracture and treated with partial excision of os peroneum fracture and side-to-side suture of the peroneal tendon and fibularis tertius enhancement.

Case Report

44 year old male patient presented to the emergency department after a left ankle sprain. His pain was mainly on the lateral malleolus and on the plantar aspect of the lateral left foot. Physical examination showed some tenderness in the lateral retromalleaolar area with no neurovascular disturbance. AP and lateral radiographs of the left foot and ankle were made and the diagnosis of fractured os peroneum was made (Figure 1 and 2). The patient was treated symptomatically and discharged.

Figure 1: Lateral X-Ray of left foot showing fracture of left os peroneus, note the proximal retraction to the cuboid notch.

Because of persistent pain in his left foot and functional dysfunction he was referred to our unit 2 weeks after the accident. Physical examination showed tenderness on the plantar lateral aspect of the left foot just behind the base of the fifth metatarsal. Pain was evoked with first ray plantar flexion against resistance with some weakness detected in the lateral eversion against resistance of the left foot with the ankle in plantar flexion. There were no neurovascular complications of the left foot and toes.

A lateral and oblique foot radiographs showed a displaced fracture of the left os peroneum. The large proximal fragment of the fractured osperoneum was located at the cuboid notch and the thin distal

Figure 2: Oblique X-Ray of the left foot with os peroneum at the cuboid notch.

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fragment was displaced distally. We completed the exam with an MRI and confirmed the diagnosis of plantar rupture of the left peroneus longus tendon with fracture of the os peroneum (Figure 3 and 4). The patient was operated under spinal anesthesia in a dorsal decubitus position. A tourniquet was inflated for 45 minutes. A curved incision was made from the tip of the lateral malleolus to the base of the fifth metatarsal going through the inferior edge of the sinus tarsi.

The peroneus longus tendon rupture was identified with the proximal stump retracted with a biggest part of the os peroneum. The distal part was detected with the small cartilaginous part of the os peroneum at the level of the base of the fifth metatarsal. The peroneus brevis and the inferior peroneal retinaculum were intact. We identified the presence of a fibularis tertius tendon. Because the distal part of the os peroneum was too small to be fixed, we decided to excise in a subperosteal way the proximal fractured os peroneum. This gave us more length of the proximal peroneus longus stump. The difficult part was to have suture passed through the distal short stump. For that purpose, we used a mini scorpion suture passer that allowed us to have a thin fibre wire anchored 1 cm away from the distal stump. We repeated this action twice. On the final result, we had four fibre wire stumps ready to use. On the more proximal longer stump, we used again a thin fibre wire that we passed according to the Kessler technique providing us enough stability for the traction and the approximation of both stumps. We then sutured the proximal and distal fiber wires

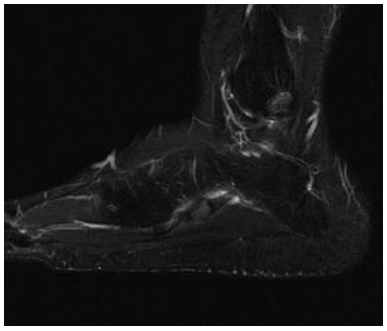

Figure 3: Lateral MRI of left foot showing the retraction of os peroneum.

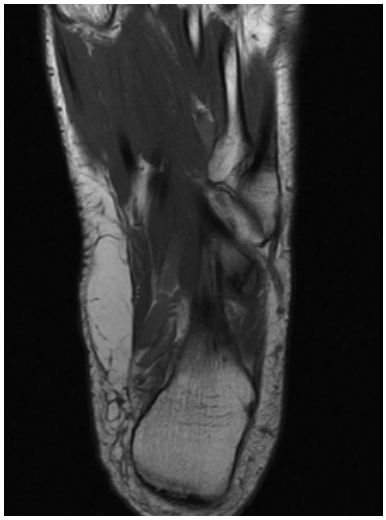

Figure 4: Axial MRI of left foot with rupture of peroneus longus at the level of os peroneum.

Figure 5: Oblique X-Ray of the left foot at one year follows up after excision of large fractured part of os peroneus.

Figure 6: Lateral X-Ray of left foot at one year follows up after excision of large fractured part of os perineum.

getting thus a good overlap between the 2 stumps. For more strength we did a fibularis tertius transfer by cutting it at the more distal part and suturing it to both stumps of the peroneus longus tendon.

The patient was then immobilized in a below knee cast for two weeks with partial weight bearing. At two weeks we changed the cast to a dynamic Vacoped for an additional 4 weeks with full weight bearing. We started the physiotherapy exercises with proprioception within the Vacoped and worked on ankle motion and first ray plantar flexion with no resistance outside the Vacoped. The patient returned to his previous activities at 2 months postoperatively and to his sports activity at 6 months after the operation. At one year follow up he resumed a symmetrical strength in lateral eversion of the left foot against resistance with the ankle in plantar flexion and with first ray hyper flexion (Figure 5 and 6).

Discussion

The fibular longus muscle originates proximally from the lateral condyle of the tibia and head of the fibula, turns sharply at the cuboid groove and inserts into the plantar-lateral aspect of the first metatarsal and medial cuneiform. The musculotendinous junctions of both tendons are usually located proximal to the superior peroneal retinaculum [1]. In approximately 20% of the population, at the os peroneum, an ossified sesamoid bone is present at the calcaneocuboid joint [2]. The os peroneum predisposes to the development of stenosing

fibular longus tenosynovitis in the region of the cuboid tunnel [3]. The peroneus tertius is the smallest of the three peroneus muscles in the lower leg. Situated on the lateral side of the leg between the calf and shin, it is found near the fibula bone just below the extensor digitorum longus muscle and to the inside of the peroneus brevis.

The primary action of the fibular longus is eversion and plantar flexion of the foot. Together with the peroneus brevis, it provides supplemental lateral ankle stability, especially during the midstance and heel rise of the gait cycle [4]. The fibular muscles are antagonists to the tibialis posterior, flexor hallucis longus, flexor digitorium longus and tibialis anterior muscles.

Both the fibular brevis and the fibular longus muscles are innervated by the superficial peroneal nerve and receive their blood supply from the posterior peroneal artery and branches of the medial tarsal artery. The distribution of blood vessels supplying the fibular tendons is not homogeneous. The peroneus longus has two avascular zones. One around the lateral malleolus, which extends to the peroneal tubercle, and the second around the cuboid. These zones correspond well with the most frequent locations of peroneal tendinopathy [1].

Brandes and Smith [5] categorized three zones along the peronei longus tendon. Zone A extends from the tip of the malleolus to the peroneal tubercle, Zone B from the lateral trochlear process to the inferior retinaculum, and Zone C from the inferior retinaculum to the cuboid notch. Zone C is a high-stress area, particularly at the cuboid notch, and is the location of the majority of fibular longus tears [6]. Tendon ruptures, complete or incomplete may occur at the musculotendinous junction beneath the superior peroneal retinaculum or at its distal edge. Tears may occur within the cuboid tunnel, where a rupture may be associated with an intratendinous sesamoid bone.

Disorders of the fibular tendons fall primarily into three types. The first type is peroneal tendinopathy without subluxation of the fibular tendons, with or without attritional rupture. The second type is peroneal tendinopathy associated with instability of the fibular tendons at the level of the superior peroneal retinaculum. The third type is stenosing tenosynovitis of the fibular longus tendon, which may be associated with a painful os peroneum, and an enlarged peroneal tubercle [7].

Tendon injury can be classified as a direct or indirect injury. Direct trauma usually involves a sharp object. Indirect injury mechanisms are multifactorial and depend heavily on anatomic location, vascularity, and skeletal maturity, as well as on the magnitude of the applied forces.

Avulsion fractures and tendon ruptures at the musculotendinous junction occur much more frequently than midsubstance tendon ruptures [8]. Fibular longus tears typically occur in 3 distinct anatomic zones: the lateral malleolus, the peroneal tubercle of the calcaneus, and the cuboid notch [8,9]

Physical examination, starting with inspection may disclose swelling posterior to the lateral malleolus. Palpation along the peroneal trajectory may identify areas of tenderness with the tendon palpable and painful. Muscle strength may be decreased because of pain and tendon rupture. However, an absence of marked eversion weakness does not preclude a fibular tendon tear or rupture. Loss or limitation of plantar flexion of the first ray is consistent with dysfunction of the peroneus longus tendon [1].

The os peroneum is an accessory ossicle located within the substance of the peroneus longus tendon and its location, size, and appearance are varied [10]. Because of variable ossification centers, the ossicle may present bipartite and multipartite which may mimic fracture lines on the radiographs. A partite os peroneum may be misdiagnosed, as fracture and the diagnosis of fracture of the os peroneum may be difficult. Biltz demonstrated the usefulness of magnetic resonance imaging (MRI) to diagnose the retracted fractured os peroneum retained within the peroneus longus tendon [11]. By contrast, 3D-CT is applied and useful for evaluation of tendons of foot and hand and is useful for surgical planning and patient education [12,13]. Fujioka et al used a 3D-CT in their case and agreed that it has an advantage of visualizing the disorders of tendon and bone simultaneously in three-dimension compared with MRI [14].

In the present case, we used MRI to evaluate the tendon pathology and to rule out any associated ligamentous injury to the left ankle. Treatment of peroneus longus rupture with displaced fracture of os peroneum is a more challenging situation. Conservative treatment with immobilization or excision of the fractured os peroneum is one of the options for treatment of os peroneum fracture [15-18] .

Peacock et al. [19] reported primary repair of an os peroneum fracture by weaving non- absorbable suture through the ossicle and tendon. Biltz and Nemes [12] reported that the peroneus longus transfer to the peroneus brevis tendon above the ankle joint after excision of the fracture ossicle of os peroneum was successful.

Fujioka et al. described a case where the proximal fragment of the os peroneum was excised and additionally the proximal tendon stump was attached to the lateral aspect of the calcaneus using the suture anchor with a good functional result [14]. In the present case, the proximal os peroneum was excised and the peroneus longus tendon stumps sutured side-to-side, strengthened with a fibularis tertius transfer. We believe that excising the proximal remnant of the fractured os peroneus in a subperiosteal way will provide us with more room to work and with a longer proximal peroneus longus stump allowing thus an easier solid side-to-side repair. The trick of using the mini scorpion suture passer in the distal stump is very helpful and efficiacous. If a peroneus tertius is present, it should be used as an adjunct transfer.

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