Isolated proximal rupture of flexor digitorum longus tendon in a traumatic open subtalar dislocation

Y Ghani, K Marenah, PA Kumar

King's College Hospital NHS Foundation Trust, UK

ABSTRACT

Tendon ruptures associated with ankle fractures and dislocations or subtalar dislocations are very rare entities with only a few reports of these in the literature. We report a case of an open subtalar dislocation and associated isolated proximal rupture of the flexor digitorum longus tendon at the musculotendinous junction, following a relatively low energy trauma. The finding of the avulsed flexor digitorum longus tendon was intraoperative, and management involved thorough washout of the joint and a primary side-to-side tenodesis with the flexor hallucis longus tendon. The patient has made a good functional recovery from his injuries. This case is reported because of the rarity of this combination of injuries and the associated management dilemma with which it presented us.

KEYWORDS

Flexor digitorum longus rupture – Subtalar dislocation – Flexor digitorum longus repair – Foot and ankle trauma

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CORRESPONDENCE TO

Yaser Ghani, E: y.ghani@doctors.org.uk

Subtalar dislocation is a fairly rare injury accounting for only 15% of all talar injuries and no more than 1% of traumatic dislocations.¹ These usually result from high energy trauma such as falls from height, athletic injuries and motor vehicle accidents. Subtalar dislocations are classified into four types: medial (accounting for 80% of the total), lateral (17%) and two rarer types (anterior and posterior).² Between 10% and 40% of subtalar dislocations are open, and 50–100% of cases are accompanied by a fracture.³ Open injuries and associated fractures tend to occur more commonly with the lateral subtalar dislocation pattern, and probably as the result of a more violent injury. Long-term follow-up demonstrated very poor results with open subtalar dislocations.^{2,5}

Tendon ruptures around the distal tibia and ankle are very rare entities.⁴ Injury to the tibialis posterior tendon associated with subtalar dislocations has been described previously. However, to our knowledge, no previous cases of isolated rupture of the flexor digitorum longus (FDL) associated with traumatic open subtalar dislocation have been described.

Case History

A 24-year-old muscular patient was seen in the emergency department following a fall in his bathroom. He described slipping on the wet floor with plantar flexion and eversion of his right foot. There was no history of previous ankle sprains or ligament laxity. His foot was pink but a posterior

tibial pulse was not palpable. He had no other distal neurovascular deficit of his right foot.

There was a 4cm laceration beginning anteroinferiorly to the medial malleolus and extending posteriorly (Fig 1). An osteochondral defect was noted on the lateral aspect of the distal subtalar articular surface. Ankle radiography showed a lateral subtalar dislocation with no obvious fracture. The subtalar dislocation was reduced under sedation in the emergency department, and intravenous antibiotics and tetanus vaccination were administered promptly. The wound was dressed with saline soaked gauze and the patient's leg was placed in a below-knee plaster of Paris cast. Following reduction, computed tomography (CT) of the ankle showed congruent reduction, with some intra-articular debris but no overt fractures (Fig 2).

The patient was admitted to theatre the next morning on a planned trauma list. The exploration of his ankle wound revealed communication with the ankle joint. The flexor retinaculum was ruptured, and there was complete rupture of the superficial and deep portions of the deltoid ligament. The tibialis posterior tendon had subluxed anteriorly to the medial malleolus. When exposed, the posterior tibial neurovascular bundle revealed complete laceration of the artery and vein but an intact tibial nerve. A proximal avulsion rupture of the FDL tendon, from its musculotendinous attachment, was discovered (Fig 3). The distal insertions of the tendon were intact on testing. The flexor hallucis longus (FHL) was intact, and the tibiotalar joint appeared congruent and stable.

Figure 1 Open subtalar dislocation at presentation

Figure 2 Computed tomography of the ankle showing congruent reduction, with some intra-articular debris but no overt fractures

Meticulous debridement of the open wounds and abundant washout of the joint was performed. The posterior tibial artery and vein were ligated on advice from vascular surgeons as there was no vascular compromise of the foot. The FDL tendon was shortened in order to perform a primary side-to-side suture tenodesis of the FDL stump to the FHL just proximally to the flexor retinaculum using size 3 Ethibond® (Ethicon, Somerville, NJ, US). The anterior joint capsule was closed, and both deltoid ligaments and the flexor retinaculum were repaired using bone anchor sutures. The skin closure was carried out using 3/0 nylon interrupted sutures and the leg placed in a below-knee cast.

Discussion

To our knowledge, no previous accounts of rupture of the proximal musculotendinous junction of the FDL associated with an open lateral subtalar dislocation have been reported. Rheumatic disease, tendon degeneration and non-specific tendon tenosynovitis have been associated with tibialis posterior ruptures.⁵ However, our patient did not have any history or evidence of these.

The mechanism of isolated FDL rupture is not clear. Nevertheless, based on the mechanism of injury, we can postulate that the forced valgus/adduction and external rotation forces that resulted in the subtalar dislocation against a concomitant strong contracture of the FDL would cause maximal tensile force within this tendon, causing it

to avulse at the musculotendinous junction although this more commonly causes avulsion fracture at the tendon insertion.

All the other tendons were examined and appeared intact. Studies have shown a tendinous connection between the FHL and FDL in the midfoot in up to 90% of people,⁶ and this may negate the need for tenodesis proximally, as

Figure 3 Intraoperative finding of ruptured flexor digitorum longus tendon with intact distal end

performed in our case. However, we could not definitively determine any such connection intraoperatively without further extending the wound and further dissection. The decision was therefore made to carry out a primary side-to-side tenodesis of the FDL to the FHL proximally to try and maximise our chances of preventing any loss of function. It has been debated in elective FDL transfer surgery whether this is necessary and whether there is even any loss of push-off function from losing FDL function.

A previous case report described musculotendinous rupture of FDL in an open bimalleolar fracture with associated tibialis posterior proximal rupture.⁷ In this case, a primary repair was performed through a separate incision to the muscle bellies, with a good functional outcome. It is quite possible that the function of lesser toe flexion could have been due to the connection between the FDL and FHL although the authors also reported good function of the tibialis posterior at the two-year follow-up appointment.

Radiological investigations allow assessment of associated fractures like malleoli or osteochondral talar dome fractures. CT can demonstrate osteochondral lesions initially missed in x-ray evaluation.⁴ A thorough neurovascular examination of the foot before and after reduction is mandatory.

In open injuries, meticulous debridement and washout are required. In our patient's case, thorough debridement and abundant washout avoided septic complications.

There are several controversies about the repair of the disrupted ligaments. Several authors have recommended carrying out ligamentous repair at the time of debridement.⁸ However, others have reported satisfactory outcomes without undertaking repair and state that it does not improve ankle function.⁹

Conclusions

We have reported, for the first time, a case of isolated proximal rupture of the FDL tendon in a traumatic open subtalar dislocation. The tendon rupture injury was only diagnosed intraoperatively. This case is reported because of the rarity of this combination of injury and the associated intraoperative management dilemma. Our patient was treated with debridement and thorough washout of the wound, and closure with primary side-to-side tenodesis of the FDL tendon. He made a good functional recovery from his injuries and has been able to return to his work as a builder.

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