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Peroneal Tendon Dislocation

Abstract

Acute peroneal tendon subluxation and dislocation are frequently misdiagnosed as ankle sprains. The most common mechanism is a dorsiflexory force on the ankle associated with a rapid and strong contraction of the peroneal tendons and with an eversion of the hindfoot. Inadequate treatment may lead to chronic dislocation. In chronic situation patients frequently complain about a painful wind glass mechanism and can typically reproduce the dislocation by active dorsiflexion-eversion of the foot. Chronic painful dislocation requires surgical treatment which consists in stabilization of the peroneal tendons within the retromalleolar peroneal groove. Numerous surgical techniques have been described. Nevertheless, the overall goal of a surgical management is to achieve a compromise between excellent stability and adequate gliding of the tendons within the reconstructed fibular groove.

Résumé

La luxation aiguë des tendons péroniers est souvent diagnostiquée comme une simple entorse. Le mécanisme conduisant à cette lésion consiste typiquement en une force de dorsiflexion appliquée à la cheville en association avec une contraction rapide des tendons péroniers et à une éversion de l'arrière-pied. Un traitement inadéquat peut conduire à une luxation chronique des tendons péroniers. Dans les cas chroniques les patients se plaignent typiquement d'un phénomène d'«essuie-glace» douloureux autour de la malléole externe et peuvent reproduire activement ce phénomène en contractant leur pied en extension-éversion. Les luxations chroniques nécessitent une prise en charge chirurgicale stabilisatrice. De nombreuses techniques sont connues mais le but commun est de réaliser un compromis entre une excellente stabilité des tendons dans la gouttière reconstruite et leur libre coulissage.

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Introduction

Within the lateral compartment of the leg, the two major structures arising from the fibula are the peroneus longus and the peroneus brevis muscles. These two muscles become tendinous prior to crossing the ankle joint and remain in a common sheath bordered anteriorly by the fibular sulcus, medially by the calcaneofibular and posterior tibiofibular ligament, and postero-laterally by the superior retinaculum (SPR). As the tendons pass distal to the fibula, each enters a distinct tendon sheath separated by the peroneal tubercle [1]. The brevis inserts on the base of the fifth metatarsal, whereas the longus passes through the plantar foot to insert on the first metatarsal. Three other anatomical structures of great surgical importance are also present in that lateral compartment. These are the SPR, the architecture of the posterior surface of the fibula and the fibro-osseous ridge of the fibula. The SPR is the primary restraint to peroneal instability. It is formed by the thickening of the superficial aponeurosis originating from the lateral border of the retromalleolar groove and the tip of the lateral malleolus [2, 3]. It then passes over the peroneal tendons on its way of insertion to the Achilles tendon and the calcaneus [4]. The peroneal groove is traditionally defined as the sulcus present on the posterior surface of the lateral malleolus. Its main role is to assist in containing the peroneal tendons [5]. It is covered by fibro-cartilage and widely varies in depth and shape. Edwards found a definite sulcus in 82% of his cases while the remaining specimens had a flat (11%) or a convex surface (7%) [6]. The lateral border of the posterior surface of the fibula usually forms a prominent bony ridge often covered with fibro-cartilage contributing thus by additional 2–4 mm to the depth of the sulcus aiding overall stability [3]. The main function

of the peroneals is inversion of the hindfoot but they also contribute to plantarflexion of the ankle. The peroneus longus also acts as a plantarflexor of the first ray.

Acute peroneal tendon subluxation and dislocation are frequently misdiagnosed as ankle sprains. This lesion was first described by Monteggia in a ballet dancer in 1803 [7]. Difficulty in establishing the correct diagnosis or inadequate initial treatment may lead to recurrent subluxations or chronic dislocations of the tendons. Accurate diagnosis requires both knowledge of the regional anatomy and a high degree of clinical suspicion.

Pathomechanics

Some controversy exists as to the mechanism of injury that produces peroneal subluxation. [3, 8, 9]. Predisposing factors such as shallow peroneal groove or weakened peroneal retinaculum can explain the congenital subluxation [10, 11] but almost all childhood and adult cases are precipitated by a traumatic event in 90% of cases [3, 8, 9, 12, 13]. The most common mechanism is a dorsiflexory force on the ankle associated with a rapid and strong contraction of the peroneal tendons and with an eversion of the hindfoot [8, 14, 15]. The same brutal contraction of the peroneal tendons together with eversion of the hindfoot has also been described in association with a plantarflexed foot. Skiing has been the activity most often associated with the diagnosis [16, 17]. Football, running, ice skating and tennis have also been implicated in causing injury to the peroneal retinaculum with resultant subluxation or dislocation of peroneal tendons [18, 19, 20]. If the traditional belief is oriented toward an associated rupture of the retinaculum, intraoperative

studies have found no cases of a ruptured peroneal retinaculum [21, 22]. This retinaculum in the majority of cases strips the periosteum from the lateral malleolus or avulses a thin cortical shell [15, 23, 24].

Clinical presentation

Acute peroneal subluxation is often difficult to appreciate clinically. There is usually oedema, ecchymosis and point tenderness in the same distribution than in case of a sprained ankle, therefore making diagnosis difficult.

In chronic situations, the diagnosis is facilitated by the patient's complaints that clearly describes a wind glass mechanism or can reproduce the dislocation by active dorsiflexion-eversion of his ankle. In most cases, a peroneal tendon snapping around the posterior margin of the lateral malleolus can be palpated and even visualised by the examiner (*figure 1*). These clinical findings can be enhanced by applying a slight resistance to the dorsiflexion-eversion. Examination with the patient in the prone or lateral positions enables easier detection of tendon dislocation. A progression of subluxation to dislocation of the tendon is characterised by chronic lateral swelling, vague lateral ankle pain and a palpable ridge over the lateral distal fibula. Eckert and Davis classified peroneal dislocations into 3 grades depending on the severity of the injury [3]: grade I, SPR elevated from the fibula; grade II, fibrocartilaginous ridge elevated from the fibular; grade III, cortical fragment avulsed with the SPR.

Imaging

X-rays of the ankle are usually normal and only occasionally helpful in diagnosing peroneal tendon subluxation. In 10–15% of cases, a flake fracture can be seen paralleling the fibula [3, 25, 26]. When the tendons sublux, the periosteum is stripped from the lateral cortex of the lateral malleolus and sometimes presents with a small avulsion of that cortex. This is indicative of subluxing peroneal tendons. This flake fracture is best seen on a mortise view of the ankle. Magnetic resonance imaging (MRI) can detect injury to the supportive structure, identify the location of the tendons and evaluate intrasubstance degeneration and splits in the tendons. Computed tomography has been suggested to visualise the extent of the fibular groove and can provide more information when combined with tenography. Dynamic ultrasound is less reliable and is very technician and reader dependant but is regaining popularity because of its rapid availability and lower cost.



Figure 1: Clinical appearance of a chronic subluxation of the peroneal tendons.

Treatment

In infants and neonates, conservative management of subluxing peroneal tendon is the rule and spontaneous resolution is extremely high [10, 11]. In adults the treatment can be divided into operative and non operative when considering acute or chronic injuries. Acute injury treatment is controversial. Non operative treatment consists in applying a short leg, non weight bearing cast with the foot in neutral to inversion for 4–6 weeks. This conservative management aims to allow the SPR to re-adhere to the posterolateral aspect of the fibula. Conservative treatment is associated with minimal risks but also with a high rate of failure [3, 13, 15, 26]. McLennan found that only 60% of patients did well with conservative treatment [13]. Escalas et al. reported poor results with recurrence of subluxation in 73% of patients treated conservatively for acute subluxation [15]. Less controversy exists for the management of chronic lesions, where the majority of authors believe that surgical repair for peroneal tendon subluxation provides good results in most cases [8, 21, 23, 24, 26, 27, 28]. By reviewing the literature, we can divide the surgical procedures for repairing the dislocated peroneal tendon into 4 categories:

- *Bone block procedure:* It consists in distal sliding fibular osteotomy and was described by Kelly in 1920. The results are good in spite of the associated high risk of tendon lesion because of their potential contact with a rough structure [29, 30, 31].
- *Periosteal/retinacular re-attachment:* The success of this procedure depends upon the quality of the remaining retinaculum to cover the tendon.
- *Tenoplasty technique:* Numerous variations have been described, including roof reconstruction utilising the Achilles tendon [20], rerouting procedure utilizing the calcaneofibular ligament [32], or a plasty utilizing the middle part of the external lateral ligament [33]. The authors of these techniques also report good results. The concept of using neighbour intact structures may be questioned however, firstly because of the risk to create additional deficits by weakening these structures and secondly because of the difficulty associated with non-anatomic reconstructions.
- *Groove deepening procedures:* The principle was described by Zollner and Clancy [34], later by O'Donoghue [25] and also slightly modified by Porter et al. [35]. It consists of increasing the depth of the peroneal groove while decreasing the risk of tendon irritability. An osteotomy is performed at the posterior aspect of the lateral malleolus to elevate the cortex. The groove is deepened using a burr and the cortical flap is then replaced to the base of the groove in order to provide a smooth gliding surface. We use a modification of this technique that includes elevation of the fibro-cartilaginous bed of the groove starting

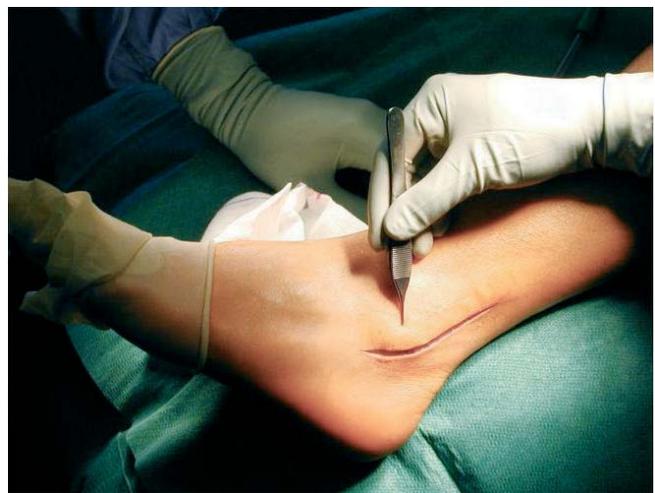


Figure 2: The retromalleolar approach allows for easy access to the peroneal groove.

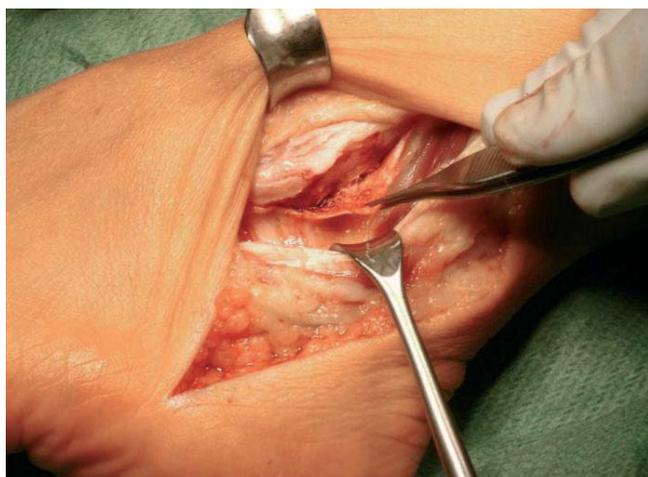


Figure 3: The fibro-cartilaginous bed of the groove is carefully elevated and retracted dorsally.

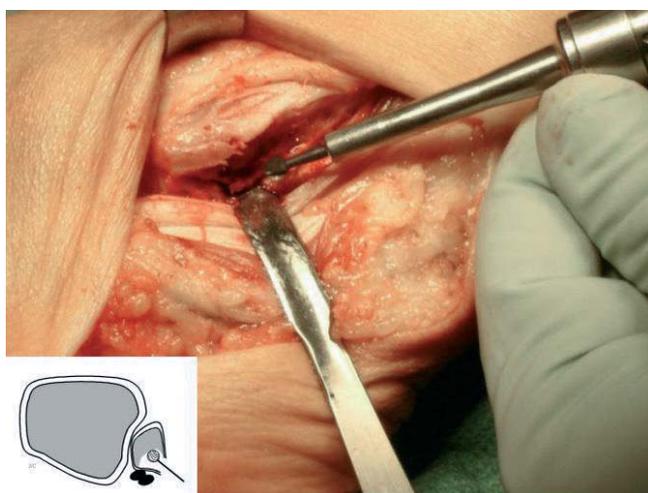


Figure 4: The groove is deepened using a rotatory burr.

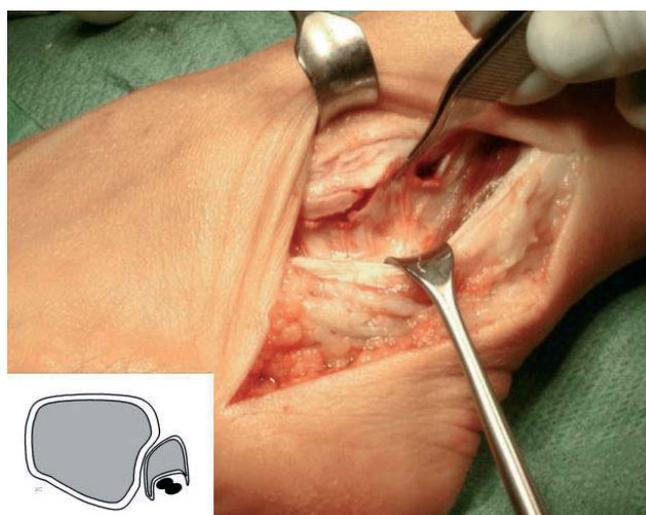


Figure 5: The fibro-cartilaginous bed is replaced into the base of the groove in order to provide a smooth gliding surface for the tendons.

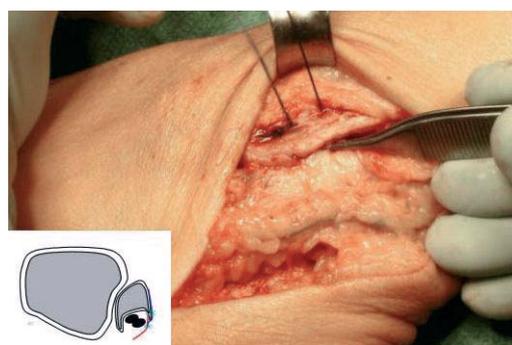


Figure 6: The SPR is reattached under the posterior lip of the malleolus through transosseous sutures.

close to the lip of the lateral aspect of the fibula with special attention not to perforate the back of the sheath (figures 2–3). The exposed posterior surface of the lateral malleolus is then deepened with the help of a rotatory burr (figure 4). Once this is accomplished, the stripped fibro-cartilaginous bed is refixed in order to provide a gliding surface for the tendons (figure 5) and the retinaculum is re-attached under the lip of the fibula by transosseous sutures (figure 6). Partial weight bearing is adopted in the first two weeks and then tolerated weight bearing is allowed. Early passive mobilization of the ankle in the sagittal plane only is started at two weeks in order to avoid adhesions and, therefore, enhance gliding of the tendons. The non published results of a personal series of 10 patients operated by this modified technique favourably compare to the 77%–100% good to excellent outcomes reported in the literature for groove deepening procedures [36, 37, 38].

Conclusion

Acute peroneal tendon dislocation is a challenging entity because it may mimic and frequently be misdiagnosed as an ankle sprain. Conservative treatment may be considered for acute dislocation but may be associated with high failure rate. Symptomatic chronic peroneal tendon dislocation or subluxation is easier to diagnose and necessitates operative management. Although there is a general

agreement on the effectiveness of the surgical approach, no randomised control trials are available to determine relative effectiveness of one surgical technique over another. Nevertheless, groove deepening procedure including special attention to maintain a smooth gliding surface for the tendons, and combination with retinacular re-attachment appears as a logical, anatomic and reproducible technique that provides adequate stability and function.

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