Peroneal Tendons Injuries

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Introduction

Pathology of the peroneal tendons is often underdiagnosed when evaluating patients with lateral foot and ankle pain. Likewise, it is sometimes difficult to distinguish the origin of the symptoms at this location [1]. For this reason, a wide knowledge of anatomy, biomechanics, and physiopathology of the peroneal tendons is necessary for diagnosing and treatment. A correct exploration of the patient, and the peroneal tendons, is mandatory to achieve the proper diagnosis. In case conservative treatment fails, a surgical procedure (open or minimally invasive) should be suggested. Current options include the following: (1) peroneal tendoscopy, (2) open debridement and tubularization of the remaining tendon, (3) tenodesis, (4) tendon transfer,

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and (5) reconstruction with allograft or autograft. With the goal of reducing comorbidity observed from open surgery, minimally invasive techniques are increasing. In 1998, van Dijk and Kort were the first to describe tendoscopy of the peroneal tendons [2]. Technological advances and instrumentation improvements have increased indications for tendoscopic techniques in the foot and ankle [3–5], including those referred to peroneal tendons tendoscopy.

The objective of this chapter is to offer the orthopedic surgeon complete information related to the peroneal tendons that may help manage patients with lateral pain of the foot and ankle arising from the peroneal tendons.

Anatomy

The peroneal muscles lay in the lateral compartment of the leg and are innervated by the superficial peroneal nerve. The peroneus longus tendon originates proximally from the lateral condyle of the tibia and the head of the fibula, and the peroneus brevis tendon originates from superior 2/3 of the fibula and the interosseous membrane.

Typically, the muscle-tendinous unit of the peroneus brevis tendon is located proximal to the superior peroneal retinaculum; however, it may occasionally present a lower insertion and generates a continent-contained conflict at the retromalleolar groove, increasing pressure in this space and producing pain [6]. Under the same perspective, a quartus peroneus muscle can be located inside this space and produce a similar situation. The prevalence of this muscle oscillates between 10% and 22% and typically originates from the muscle belly of the peroneal brevis and inserts into the peroneal trochlea of the calcaneus [7–10].

Both tendons enter in a common synovial sheath approximately 4 cm proximal to the tip of the lateral malleolus. They run posterior to the lateral malleolus through a fibrous bone tunnel called the retromalleolar groove, with the peroneus longus tendon located posterolateral with respect to the peroneus brevis tendon. Distal to the articulation of the ankle, the synovial sheath separates upon reaching the peroneal trochlea on the lateral face of the calcaneus. The peroneus longus tendon passes underneath the peroneal trochlea, and the peroneus brevis tendon passes over the top. The peroneal tendon transverse inferior retinaculum lays approximately 2–3 cm distal from the tip of the fibula. The peroneus brevis tendon continues directly until its insertion in the tuberosity at the base of the fifth metatarsal. The peroneus longus tendon rotates medially between the groove of the cuboid and the long plantar ligament and inserts in the superficial plantar surface of the first metatarsal and the lateral aspect of the medial cuneiform.

There are two critical zones for the pathology of the peroneal tendons: the retromalleolar groove for both tendons and the cuboid notch for the peroneus longus tendon.

The retromalleolar groove is limited by the superior peroneal retinaculum posterolateral and anterior to the fibula and medially by both talofibular (anterior and posterior) and calcaneofibular ligaments [11, 12]. This groove is lined by fibrocartilage and varies in depth and shape [13], potentially affecting the stability of the peroneal tendons when passing behind the fibula. In a cadaveric study of 178 fibulas, 82% presented a concave retromalleolar groove, 11% flat, and 7% convex [14]. The groove measures between 6 and 7 mm in width and between 2 and 4 mm of depth and is reinforced by a fibrocartilage ridge. The shape of the groove is determined more by its fibrocartilage ridge than by the concavity of the fibula [15, 16]. Although the morphology of the retromalleolar groove can contribute to the subluxation and consequent injury of the peroneal tendons [7, 14, 17], apparently there are no clinical differences considering groove type in patients with and without instability of the peroneal tendons [18]. The superior peroneal retinaculum is the primary restriction to avoid subluxation of the peroneal tendons in the ankle. This structure corresponds to a band of fibrous tissue approximately 1–2 cm of width that originates from the posterolateral and distal fibula, with great variety in its insertion [19].

The passage of the peroneus longus tendon at the level of the cuboid notch represents a zone of direction change and therefore of increased stress for the tendon. The os peroneum, a fibrocartilaginous enlargement, is a structure that increases the resistance of the peroneus longus tendon in this zone of maximum stress, and it is estimated that it ossifies in approximately 20% of the general population [20, 21]. The hypertrophy of the os peroneum is considered a cause of tenosynovitis in the peroneal tendons [9, 21–23], given the mechanical stress trauma and thinning of the sheath that can secondarily alter normal excursion [24].

The peroneal arteries and the perforating branches of the anterior tibial artery irrigate the lateral compartment of the leg. Additionally, they receive irrigation through links that originate from the posterior peroneal artery and from branches of the medial tarsal. These links penetrate the posterolateral aspect of each tendon of its route to the retromalleolar groove. It has been proposed that the peroneal tendons present critical vascular zones that can contribute to tendinopathy [25]. However, the presence of avascular zones has been refuted by many authors [26, 27].

Pathophysiology

Tendinosis and tenosynovitis of the peroneal tendons correspond to an alteration of the normal tendon structure and inflammation of the synovial sheath, respectively [11, 28]. Among its causes are repetitive and prolonged activities, severe inversion ankle sprains, chronic instability of the ankle, peroneal subluxation, and fractures of the ankle or calcaneus [7, 23, 24, 29–33]. Although the etiology of peroneal tendons tears is not completely understood [34], predisposing anatomical factors have been reported to contribute to this pathology. A convex fibula groove, low or abnormal muscle belly, incompetence of the superior peroneal retinaculum, presence of a posterolateral osteophyte, and cavus foot have been associated directly with injury of the peroneal tendons [35, 36].

The primary function of the peroneal muscles is the eversion and plantar flexion of the ankle. Secondarily, the peroneus longus produces plantarflexion of the first metatarsal. Both tendons participate in the dynamic stability of the ankle especially during the partial support and elevation of the heel on the gait [13, 37].

The presence of anatomical variants related both to the retromalleolar trochlea can predispose the presence of pathology of the peroneal tendons. The hypertrophy of the peroneal trochlea also has been implicated in the pathogenesis of this problem increasing the mechanical stress in the peroneal tendons, potentially leading to tendinopathy and restriction of the normal displacement [7, 22, 38–41].

The presence of cavus and/or varus of the foot predisposes to biomechanical alterations of both peroneal tendons, reducing the lever arm and increasing forces of displacement in the lateral malleolus, peroneal trochlea, and in the cuboid notch [42, 43], so the addition of other stress agents can raise the probability of producing disorders at the level of the peroneal tendons.

Tendinopathy and/or tear of the peroneal tendons can cause lateral instability of the ankle and can present acute or chronic. During acute inversion of the ankle, an impingement of the peroneus brevis tendon is produced between the peroneus longus tendon and the posterior aspect of the fibula, which can lead to a longitudinal split tear (Fig. 6.1) or a complete tear of the peroneus brevis tendon [44, 45]. The posterolateral border of the fibula can create a defect in the tendon while it is repeatedly subluxated over the crest. This defect often evolves into a longitudinal tear of approximately 2.5–5 cm in length [46].

Tears of the peroneus longus tendon can occur in an isolated form or in conjunction with tears of the peroneus brevis tendon. Acute tears of the peroneus longus tendon result from sports injuries, lateral instability of the ankle, instability of the peroneal tendons, or traumatic injuries such as tendon avulsion at the level of the os

Fig. 6.1 Longitudinal split type tear of the peroneus brevis tendon

peroneum and/or traumatic lacerations of the tendon [17, 23, 30, 47–49]. Classically, these tears occur at the level of the cuboid, in the os peroneum, in the peroneal trochlea, or at the level of the tip of the lateral malleolus [50–54].

Although longitudinal tears are the most frequent, there has also been documented transverse tears of both tendons. These tears occur most frequently in acute injuries and are located distal to the os peroneum but also can occur at the level of the muscle-tendinous unit [55].

Peroneal tendon instability occurs under physiological loads, as the tendons alter their position and/or anatomical location producing symptoms. This condition can be subdivided depending on the competence of the superior peroneal retinaculum and the grade of dislocation (complete or incomplete) of the tendons with respect to the retromalleolar groove. The most frequent form of presentation occurs with a rupture of the retinaculum and producing dislocation of both tendons outside the retromalleolar groove (Fig. 6.2a, b). The most common mechanism is an abrupt contracture of the peroneal tendons during a forced inversion of the ankle or during a forced dorsiflexion of the foot while it is in eversion [15, 56]. This produces disruption of the superior peroneal retinaculum and allows that the peroneal tendons subluxate anteriorly over the lateral malleolus [12, 57]. This condition is frequently associated with lateral instability of the ankle, considering that rupture of the lateral ligamentary complex increases the tension over the superior peroneal retinaculum [58, 59]. A dysplastic retromalleolar groove, hyperlaxity of the superior peroneal retinaculum for a cavovarus hindfoot or congenital absence of the superior peroneal retinaculum, can contribute to the subluxation mechanism of the peroneal tendons [30, 60, 61].

Subluxation of the peroneal tendons can be classified in four grades. In grade 1, the superior peroneal retinaculum is elevated from the fibula at the subperiosteal level. In grade 2, the fibrocartilage crest comes off from the anterior aspect of the fibula. In grade 3, the superior peroneal retinaculum is avulsed from the fibula with a small cortical fragment, and in grade 4, the superior peroneal retinaculum is disinserted at the level of its posterior insertion in the calcaneal and/or the Achilles tendon [16, 62].

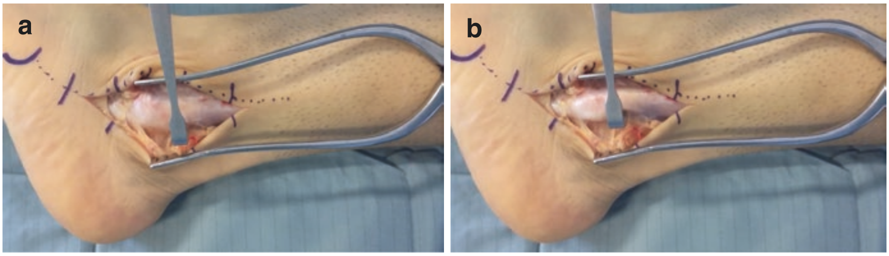

Fig. 6.2 Instability of the peroneal tendons in a left foot. (**a**) Peroneal tendons in anatomical situation and (**b**) dislocated outside the retromalleolar groove

Diagnosis/Clinical Evaluation

A detailed history and a thorough physical exam are essential, in particular, for patients presenting with chronic pain and instability of the ankle. Frequently, patients refer repetitive ankle sprains or malleolar/calcaneal fractures, among other injuries. Associated conditions are rheumatoid arthritis, psoriasis, hyperparathyroidism, diabetic neuropathy, use of fluoroquinolones, and history of infiltration with corticosteroids, which should be investigated [55, 63–65].

Differential diagnosis include lateral instability of the ankle, tarsal sinus syndrome, fifth metatarsal, cuboid and fibula fractures, stress fractures of the calcaneal, cuboid tunnel syndrome, osteochondral injuries of the talus, free bodies (tibiotalar or subtalar), degenerative joint disease, tarsal coalition, sural neuritis, radiculopathy, malign tumor, and accessory muscle or bone [60].

Acute peroneal tendinopathy is defined as symptoms presenting for less than 2 weeks, subacute if the symptoms are present for 2–6 weeks, and chronic if the symptoms persist for more than 6 weeks [11].

Patients with a history of subluxation of the peroneal tendons often describe it as a painful clicking sensation. Tears of the peroneus brevis tendon are often referred to a persistent increase of volume along the trajectory of the tendon, while tears of the peroneus longus tendon pain can flow around the cuboid notch and extend to the plantar aspect of the foot in relation to its distal insertion zone.

The evaluation of the alignment of the hindfoot and forefoot is paramount, due to the coexistence of cavovarus that can predispose it to injuries in the peroneal tendons [37]. Coleman block test can be useful for determining if the cavovarus hindfoot is the primary problem or if it is secondary to a plantar flexed first metatarsal.

Tenderness can be generated while palpation of the peroneal tendons throughout its entire length. The strength of the peroneal tendons should be evaluated for both weakness and pain while performing counter-resistance to eversion of the midfoot, maintaining the ankle in plantar flexion.

Presence of instability can be evaluated with flexion of 90° and requesting the patient to actively perform movements of plantar flexion and dorsiflexion of the ankle while counter resistance is performed. The test is considered positive when you can see or feel the anterior subluxation of the tendons over the lateral malleolus. Sobel et al. [21] described the compression test of the peroneal tendons in the peroneal grove to evaluate the presence of tendinopathy.

Radiological study of patients presenting with lateral pain of the ankle, and in which there is a suspicion of peroneal pathology, should always include X-ray examination. Weight-bearing anteroposterior, lateral, and Saltzman projections of both ankles should be obtained. Abnormal findings indicating pathology of the peroneal tendons include an avulsion at the base of the fifth metatarsal, an avulsion of the distal fibula denominated “fleck sign” (that indicates a grade 3 injury of the superior peroneal retinaculum which is in turn pathognomonic of traumatic subluxation of the peroneal tendons) [66], hypertrophy of the peroneal trochlea, or presence of an os peroneum [37]. X-rays can also reveal fractures of the os peroneum or an os peroneum bi- or multipartite [53, 54].

Ultrasonography (US) is a noninvasive method allowing dynamic evaluations of the tendons [66] which is useful to evaluate competence of the superior peroneal retinaculum.

MRI is the standard method for evaluating disorders in tendons, since it provides a tridimensional evaluation of the peroneal tendons [67]. Axial views with the foot in slight plantar flexion provide the best definition of the contour of the peroneal tendons, the content of the synovial sheath, and the adjacent structures such as the superior peroneal retinaculum or the retromalleolar groove [68, 69]. Both tendons normally present a homogenous intensity in signal T1, T2, and in STIR (short tau inversion recovery). In cases with tenosynovitis, tendinosis or in tears of the tendons, high-intensity signal in T2 or in STIR, decrease in the homogeneity of the signal, or thinning of the tendons can be observed [70, 71] (Fig. 6.3).

Computed tomography is a useful method to define with greater accuracy those bone abnormalities associated with tendinopathy of the peroneal tendons such as hypertrophy of the peroneal trochlea, calcaneum fractures, os peroneum or lateral malleolus avulsion fracture [32].

A tear of the peroneal brevis tendon can be appreciated in the shape of a V (“chevron-shaped”), bisected or with an increased signal in T2 [68]. Common

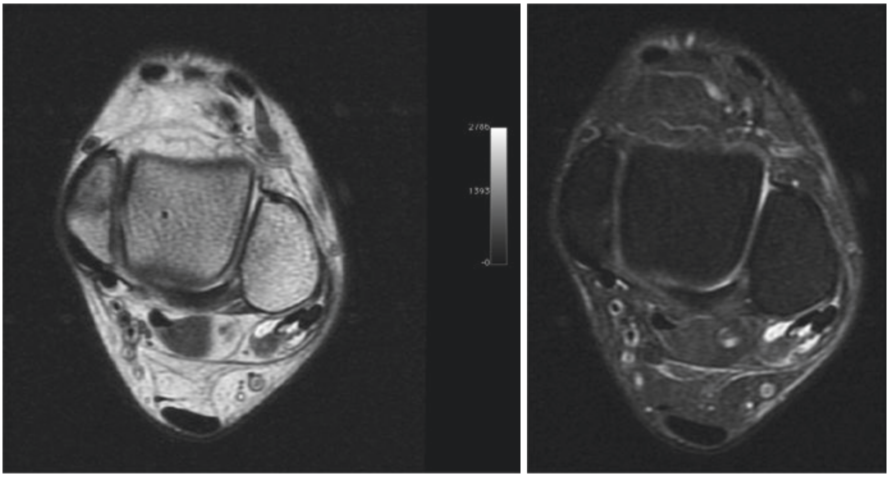

Fig. 6.3 Compatible findings with tear of the peroneus brevis tendon, tenosynovitis, and dissection by synovial liquid of the superior peroneal retinaculum in the fibula, suggesting instability of the peroneal tendons

findings in cases with tears of the peroneal longus tendon include an increased signal inside the tendon in a linear or circular shape, a synovial sheath with excessive fluid, bone edema in the lateral wall of the calcaneal, or hypertrophy of the peroneal trochlea [72, 73]. Additionally, loss of homogeneity can be seen on MRI, with discontinuity of the tendon or with fracture and/or an increase of intensity of the signal in the os peroneum [60].

Treatment

Conservative Treatment

Despite the fact that conservative treatment in patients with chronic peroneal tendon injuries has shown a failure rate of up to 50%, particularly in peroneal tendon instability [16, 74].

Several conditions should be taken into consideration: chronicity of the injury, the moment of the injury, associated clinical findings, level of activity, and patients' expectations [75]. Conservative treatment includes nonsteroidal anti-inflammatory drugs (NSAIDs), ice, compression, physiotherapy with stretching, strengthening and proprioception exercises, modification of the activity, and variable methods of immobilization. In refractory cases, rigid ankle braces and/or orthotics with ankle mobility restriction (CAM-boot) can be used.

Injections with NSAIDs or corticosteroids inside the synovial sheath of the tendon can be diagnostic and therapeutic. However, infiltration with corticosteroids should be limited to avoid iatrogenic tears of the peroneal tendons [37, 41].

Surgical Treatment

Pain persisting after a prolonged conservative treatment after a minimum of 3 months and imaging study evidence of tendinopathy of the peroneal tendons are indications of surgical management [21, 38, 41].

Tendinopathy

Surgical treatment implies debridement of the affected tendon, and tenosynovectomy can be performed with open or endoscopic procedures. For the open procedure, a lateral incision is made, starting 1 cm back from the tip of the fibula and extends to distal following the course of the peroneal tendons until 1 cm proximal to the base of the fifth metatarsal. During this approach, special care should be taken not to damage the sural nerve, of which is located in the retromalleolar zone between the lateral malleolus and the Achilles tendon. The synovial sheath of the peroneal tendons is opened longitudinally, and each tendon is inspected if there is evidence of erythema, attenuation, synovitis, and/or granulatory tissue that must be debrided. The peroneus longus tendon should be explored distally up to the cuboid groove. If it is evident, a peroneal quartus tendon or a peroneal brevis of low insertion must be resected (Fig. 6.4).

Associated split tears must be repaired firstly with the tubularization technique; however, it is reported that tears of 30% or less of the thickness of the tendon are resected since they correspond to areas of tendinosis [76]. The authors prefer to resect the affected segment and not to tubularize the remaining to maintain an adequate excursion of the tendon. The postoperative management includes a period of brief initial immobilization with the foot in plantar flexion and eversion, which will allow for the correct healing of the peroneal tendons.

Indication for tendoscopy in the peroneal tendons is pain caused by an inflammatory process related with the peroneal and their synovial sheath [4, 5]. The tenosynovitis of the peroneal tendons is often associated with recurring sprains of the ankle or chronic lateral instability of the ankle [60]. As the peroneal muscles act as lateral stabilizers of the ankle as greater stress falls on them in cases of recurring sprains, microinstability or greater chronic instability resulting in tenosynovitis (Fig. 6.5).

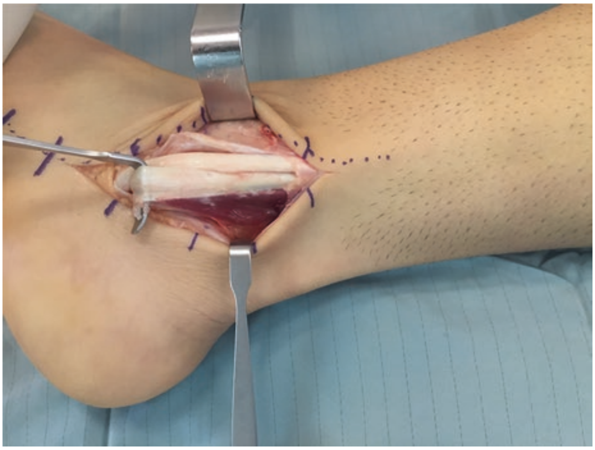

Fig. 6.4 Lateral approach for accessing the peroneal tendons. Identifies a muscle belly of low insertion in the peroneus brevis tendon, which should be resected

Fig. 6.5 Tendoscopy of the peroneal tendons. A tenosynovitis of both tendons can be observed, without evidence of tears. The mechanical debridement of the synovitis is performed through the middle portal

Instability

Incompetent Superior Peroneal Retinaculum

In these patients, incompetence of the superior peroneal retinaculum determines that the peroneal tendons are dislocated outside of the retromalleolar groove. Surgical treatment is usually indicated in young patients and athletes that have presented acute episodes or recurrences of subluxation [77]. Many surgical procedures have been described, including (1) anatomical reconstruction of the retinaculum, (2) bone-block technique, (3) reinforcement of the superior peroneal retinaculum with transference of adjacent soft tissue, and (4) deepening of the retromalleolar groove [58]. Independently from the selected procedure, all associated pathologic findings with debridement of the low muscle belly of the peroneal brevis or the presence of a peroneus quartus should be addressed. The anatomical reinsertion of the superior peroneal retinaculum is the procedure of choice in acute injuries, since it allows to primarily return the containment of the peroneal tendons [58].

The procedure consists of making an incision in line with the peroneal tendons approximately at 6 cm proximal and 2 cm distal to the tip of the fibula. The superior peroneal retinaculum is elevated from the posterolateral aspect of the fibula, and a rongeur is utilized to expose cancellous bone for healing. Three drill holes in the posterolateral border of the fibula are performed to reinsert the retinaculum with transosseous suture. Alternatively, suture anchors can used into the posterolateral border of the fibula to reinsert the retinaculum. Non-reabsorbable, high-resistance sutures are used to approximate the superior peroneal retinaculum to the bone [78, 79]. Adachi et al. [79] did not report episodes of subluxation with this technique after a follow-up period of 3 years, and Maffuli et al. [78] reported that all patients returned to their previous activity levels. In general, the authors concomitantly perform a groove deepening procedure as described by Anderson [80], independently of the peroneal groove morphology. Recently most authors are moving out from groove deepening procedures into retinaculum tightening with similar good results and apparently less pain and recovery time. This approach is based in studies showing that there is no relation between groove shape and peroneal tendon dislocation [81]. Kelly et al. [82] originally described the bone-block technique that consists of a sagittal osteotomy of the distal fibula, followed by a posterior displacement of this lateral fragment that serves as a mechanical block to the subluxation of the peroneal tendons. Nonunion, tendon irritation, and adherence to the subjacent bony fragment are reasons not to consider this modality the treatment of choice.

Patients that present with recurrent subluxation of the peroneal tendons frequently are associated to insufficiency or attenuation of the superior peroneal retinaculum. Many types of tissue transfer have been described, including the plantaris tendon and the peroneus brevis tendon to reinforce the superior peroneal retinaculum [60, 79].

Deepening of the retromalleolar groove is another procedure used for the treatment of the recurrent dislocation of the peroneal tendons. Open techniques can be done by impaction of the posterior fibular after elevating the peroneal tendons, and an osteotomy of the posterior fibular wall is performed maintaining a hinge on medial side. Cancellous bone is removed until a 5 mm deepening is reached, and the osseous flap is reduced and impacted. The peroneal tendons are reduced, and the superior peroneal retinaculum is repaired [60, 78].

The endoscopic deepening of the peroneal groove is a noninvasive procedure to address chronic subluxation of the peroneal tendons [5, 83]. Under endoscopic control, the groove is easily deepened with the use of a burr [83]. In those cases in which there exists a concave surface of the peroneal groove, the endoscopic reparation of the superior peroneal retinaculum will be indicated, as described by Lui et al. [84].

Competent Superior Peroneal Retinaculum: Intrasheath Dislocation

In this subgroup an injury of the superior peroneal retinaculum is not observed, and the patients describe pain in the retromalleolar zone without clinically dislocation. This clinical entity includes a flat or convex peroneal groove and/or the added presence of an anatomical structure occupying the space that includes a low muscle belly of the peroneus brevis or a peroneus quartus [78, 85, 86]. The surgical treatment through endoscopic or open approach includes the resection of the occupying added structures of evident space, and in those patients without structure occupying space, deepening of the peroneal groove can solve the subluxations [5, 86].

Tears

Sobet et al. [6] classified tears of the peroneus brevis tendon by severity: (I) widening of the tendon, (II) tears of partial thickness < 1 cm of diameter, (III) complete tear of thickness of 1–2 cm of diameter, and (IV) complete tear of thickness > 2 cm of diameter. Then Krause and Brodsky [47] designed an alternative classification to guide surgical management according to the area of cross section of the viable tendon: (I) compromise of the tendon <50% and (II) compromise of the tendon >50%. Likewise, tears compromising <50% of the cross section area should be treated with excision of the affected area and tubularization of the remaining tendon. If the normal anatomical shape of the peroneus brevis tendon is flat, tubularization should not be indicated. Those tears that compromise >50% should be treated with tenodesis to the peroneus longus tendon.

Despite a low incidence of tears of the peroneal tendons, repairing and debridement and tubularization of the tendon have been proposed as the best option for treatment [44, 45, 73]. However, although the evidence available comprises of a series of cases [35, 49, 70, 87], expert opinions [14, 88], or case reports [89], it has not been demonstrated that the normal biomechanics of the ankle and foot are restored with these surgeries. The problem that arises with these pioneer studies is that there were no established guidelines of what can be considered a remnant of adequate and viable, susceptible to repair. Tenodesis of a severely damaged peroneal tendon to the adjacent tendon or even transfer to the cuboid or calcaneus has been reported as a salvage option for the tears of the peroneus longus tendon [90] and for the tears of the peroneus brevis tendon [35].

Although tenodesis is a relatively simple surgical procedure and less demanding from technical point of view, there are still questions about its functional results. It is estimated that at least 50% of the patients who submitted to this surgical technique were not able to resume their previous levels of activity, while approximately two-thirds reported pain related with the activity [47].

To preserve the continuity of the muscle-tendon unit, Mook et al. [88] described bridging the defect with an intercalary segment of allograft tendon. In each case, the allograft was integrated into the distal end of the native tendon with a Pulvertaft type suture, or in case of distal end inadequately fusing, it is sutured with anchors of 3.5 mm at the base of the fifth metatarsal. After appropriately adjusting the tension of the muscle-tendon unit, another Pulvertaft suture is used to integrate the proximal segment of the allograft in the healthy remnant of the native tendon.

Tears of both peroneal tendons have been rarely documented, and the great majority of studies correspond to case studies [24, 49] or small retrospective series [34, 87, 91, 92]. And the presence of irreparable tears of both tendons is even rarer; consequently, its treatment is controversial.

Another valid alternative for reconstructing irreparable tears of both peroneal tendons is tendon transfer. Borton et al. [55] initially described the transference of the flexor digitorum longus tendon (FDL) as a method of reconstruction for concomitant irreparable tears of the peroneal tendons. Redfern and Myerson [34] subsequently reported the use of FDL transference in four patients with type llla concomitant tears. In a series of seven patients with chronic tears and both irreparable tendons, Wapner et al. [91] reported good results with the use of a Hunter Bar and then a transference of the flexor hallucis longus (FHL), as a procedure of salvage in two stages.

Tendoscopy treatment of peroneal tendon tears is possible for the majority of patients when tendon tear is localized in the retromalleolar zone. On the other hand, when the diagnosis for peroneal tendon tears is not possible through means of image, tendoscopy of the peroneal is indicated as diagnosis [2–5].

The endoscopic debridement in partial tendon tears is possible in all zones. The possibility of endoscopic resection of the smallest tendinous lip must be considered in those split-type complete longitudinal tears [11]. However, the reparation and endoscopic suture in total or partial longitudinal tears is a technically possible procedure in the retromalleolar zone, but not in other zones where an open or mini-open procedure is suggested [5].

In some cases of peroneal tendon tears, some additional tendoscopic techniques such as the deepening of the peroneal groove or the resection of a low muscle belly of a peroneus quartus can be carried out.

Literature Review

Mercer et al. performed a systematic review conducted according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines on MEDLINE, EMBASE, and The Cochrane Library databases in August 2020 with combination of search terms of peroneal tendon *or* peroneal tear *or* peroneal tendon tear [93]. As a result of the search findings, nine articles evaluating a total of 336 patients were included in this systematic review with six articles being retrospective studies and three being case series. The systematic review demonstrated improvement in functional outcomes (AOFAS, FAAM, VAS, SF, LEFS, and SMFA scores) after surgical treatment intervention for peroneal tendon tears, which showed significant improvement from baseline for each surgical intervention consisting of primary repair with and without tenodesis, FDL/FHL tendon transfer, and allograft reconstruction, and no statistical significance was identified between each surgical treatment modality [93]. The systematic review found that overall the most common concomitant pathologies found during arthroscopic evaluation were peroneal synovitis and lateral ankle instability, and the complication rate for patients who underwent primary repair without tenodesis was associated with a higher rate of complications [93].

Conclusion

Disorders of the peroneal tendons are infrequent but at the same time underdiagnosed as pain and lateral dysfunction of the ankle. For the correct diagnosis, a detailed clinical history should be performed as a complete physical exam, as well as understanding the mechanisms of injury and the anatomical variants that can predispose to said injury. MRI is the gold standard for the evaluation of the pathology of the peroneal tendons. Dynamic MRI is a new available and useful option. Although there exists diverse alternative of surgical treatment, there does not exist sufficient evidence to recommend one treatment over the other in irreparable tears of the peroneal tendons. The tenodesis is an easy and reproducible procedure that should be reserved for patients with less functional demand. The reconstruction with allograft should be reserved for those patients with higher demand that preserves muscular excursion and maintains the functional muscle-tendon unit. In the presence of irreparable tears of both peroneal tendons without muscular excursion, a tendon transfer should be considered as a salvage procedure (Fig. 6.6).

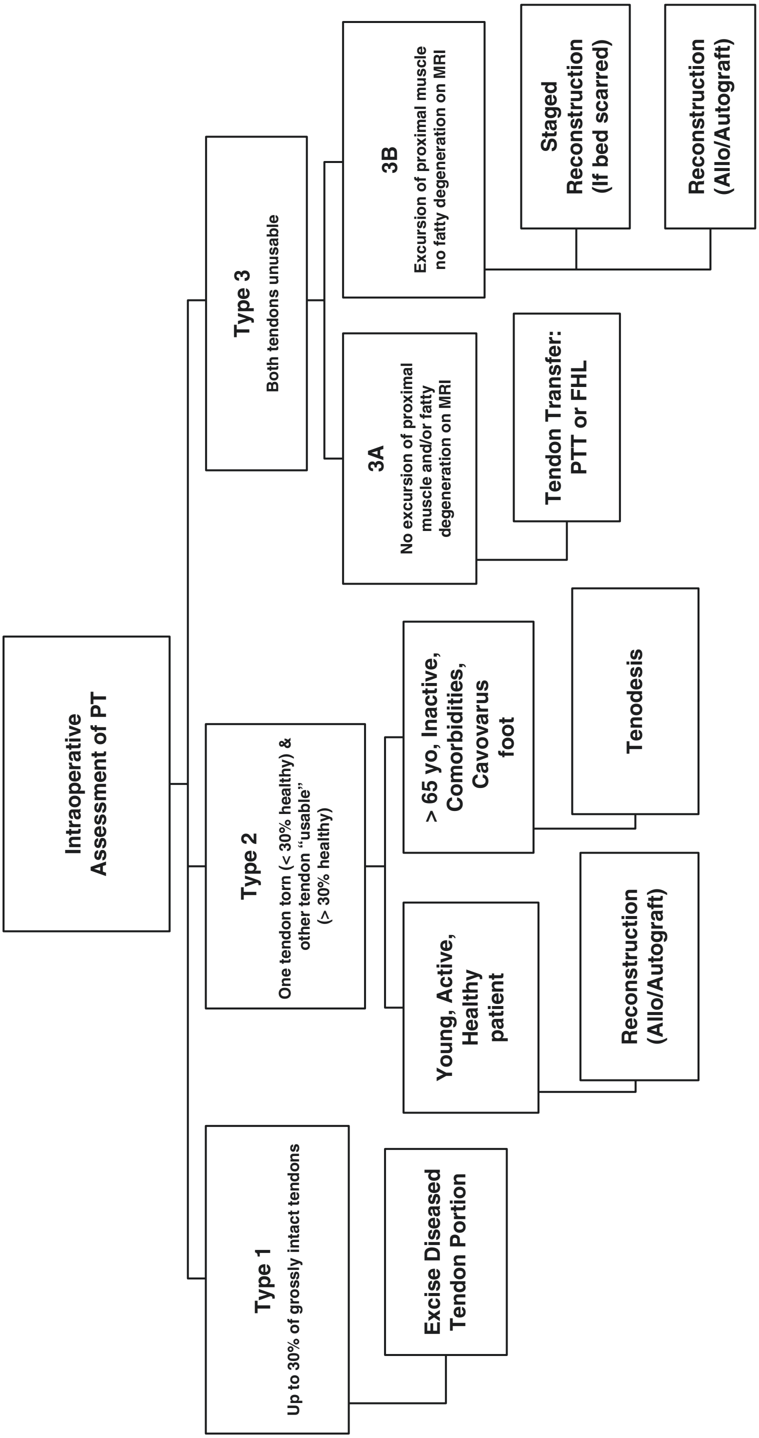

Fig. 6.6 Treatment algorithm recommended by the authors for peroneal tendon disorders

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