CHAPTER 5

CHRONIC PERONEUS BREVIS TENDON LESIONS

Richard J. Zirm, D.P.M.

Recently, much attention and literature has been written about chronic lesions affecting the tibialis posterior tendon. In a related, yet dissimilar process, chronic lesions of the peroneus brevis tendon develop, causing symptoms and dysfunction of the lateral ankle and rearfoot. Changes can occur in the peroneus brevis tendon following acute or chronic ankle injuries or sprains. The purpose of this paper is to propose a mechanism that causes peroneal tendon splits, to describe a technique of diagnosis, to classify the lesions, and to report on present treatment options including surgical technique. In addition, the interpretation of these lesions with the use of magnetic resonance imaging (MRI) will be discussed.

PRESENTATION

Symptoms of isolated peroneus brevis tendon include the insidious onset of lateral ankle pain. Patients may or may not relate acute injury. A history of overuse syndrome may be elucidated. Activities as are found in dancers, runners, competitive walkers and industrial operators of machinery that require constant pedal contact may predispose the patient to injury.

Tenderness is present below the lateral malleolus along the course of the tendon. Occasionally, the tenderness is located retromalleolarly, infrequently extending 3 to 5 centimeters proximal to the tip of the malleolus. As the chronic nature of the lesion progresses, swelling becomes evident within the overlying tendon sheath. There is pain upon plantarflexion of the ankle, and inversion of the subtalar joint. Testing eversion against resistance aids in diagnosis. Muscle weakness of the peroneus brevis is not normally evident, but the maneuver may cause pain. Associated conditions may be present and must also be assessed. These include lateral ankle instability, subluxing peroneal tendons, subtalar joint arthritis and an enlarged peroneal tubercle.

ETIOLOGY

Early research theorized that the peroneus brevis tendon splits were due to the stress accumulation from repeated microtrauma. Meyers originally described the lesion as "attritional" secondary to wear and tear in the fibular groove.[1] Subsequently, Sammarco and DiRaimondo linked the origin of peroneus brevis tendon splits to repetitive, chronic ankle sprains.[2] However, in cadaveric dissections performed by Sobel et al.[3] the lesions were found to be present in a significant number of ankles, with no evidence of trauma or ligamentous injury. Despite the lack of an agreed-upon mechanism, histologic evaluation of these lesions shows evidence of the chronic wear and tear effects on the collagen, with sufficient vascularity to mount a healing response.

A mechanical etiology proposed by Sobel[3] theorizes that the maximal pull of the peroneus longus tendon compresses the peroneus brevis against the peroneal groove, with the tight retaining force of the superior peroneal retinaculum. The peroneus brevis tendon then perpetuates a longitudinal division originating at the fibular groove. This may explain one subset of patients whose symptoms primarily are located at or posterior to the malleolus.

The author has seen several variations of pathologic splits involving the peroneus brevis. Anatomically, the peroneus brevis tendon is uniquely stress prone. Symptomatic, concomitant chronic ankle instability may or may not be present. The location of tendon hypertrophy may be at the tip of the malleolus, in-between the malleolus and the fifth metatarsal base, or more distal at the insertion. A hypertrophied peroneal tubercle is infrequently a coexisting finding, however it can be causative in certain instances. The relevance of anatomic foot types, tibial varum/valgum, and biomechanics are also thought to contribute to the overall clinical scenario, but are

not well-understood or presently documented. The presence of an anomalous peroneus quartus or a sharp posterior edge of the fibula have also been implicated as possible etiologic factors.

DIAGNOSIS

Diagnosis is suggested primarily by history and location. Eversion against resistance of the subtalar joint may be painful, especially if acute tenosynovitis is present. The peroneal compression test may be performed, with the examiner placing his fingers directly over the posterior ridge of the fibula while resisting eversion with the opposite hand. A positive test is marked by a recreation of the patient's pain. Crepitus or friction of the involved tendons may be palpated. This is a similar maneuver to the test for diagnosing subluxing peroneal tendons.

Radiographs of the foot, ankle and an axial view of the calcaneus are used to rule out arthritic spurs, subtalar/ankle joint arthrosis, calcaneal post-fracture impingement, or fractures involving the fifth metatarsal tuberosity. A mortise view of the ankle allows a good tangential view of the peroneal tubercle. If ankle instability is suspected, then stress radiography is indicated to confirm the existence of ankle laxity. A bone scan may be necessary to rule out stress fracture.

The gold standard remains magnetic resonance imaging (MRI). Axial images positioned in slight plantarflexion demonstrate tendon sheath fluid accumulation or synovitis. Minor signal abnormalities within the tendons themselves may suggest splits or tears. These changes include ill-defined, irregular margins of the tendons. A longitudinal tendon split is suspected when a multipartite appearance of the tendon is noted in the peroneal sheath. Occasionally, flattening of the peroneus brevis is encountered. The longitudinal split and damaged peroneus tendon may have an "arrowhead" or "flame-shaped" appearance as the separate tendon fascicles reunite below the tendon split or rent.[4]

Tenograms have been replaced by the superior, less invasive MRI exam due to unsatisfactory diagnostic interpretation. Tendinous lesions are easily confused with folds in the tendon itself, the tenosynovium, and where the peroneus longus passes the brevis. The test also is unreliable because of possible inadvertent intratendinous injection or extravasation of dye into the surrounding tissue.

Histologically, specimens examined microscopically reveal degeneration of the tendon fibers with retraction and separation of tendon fibers. There are also areas of fibroblastic proliferation present, with lymphocytes infiltrated into the tendon. However, these areas of reparative tendon hypertrophy do not attain the same size and girth as the hypertrophic, fusiform response of the injured tibialis posterior tendon. The question of hypovascularity as a contributing cause of peroneal tendon splits has shown a sufficient blood supply at the site of the tendon split. A classification of peroneus brevis tendon splits has been proposed by Sobel[3], (Table 1).

Table 1

GRADING SCALE FOR PERONEUS BREVIS SPLITS

Grade 1	Splayed out
Grade 2	Partial thickness split <1 cm
Grade 3	Full thickness split 1-2 cm
Grade 4	Full thickness split >2cm

TREATMENT

Peroneal tendinitis is usually responsive to conservative measures. Treatment of peroneus brevis tenosynovitis includes compression and/or immobilization with a below-knee cast or Cam walker for 3 to 4 weeks with nonsteroidal anti-inflammatory medication. This is followed by physical therapy directed at a strengthening and flexibility program. Close attention is directed toward pre-activity warm-up and stretching. An ankle brace that limits inversion reduces stress on the tendon. However, once mild symptoms associated with tenosynovitis progress to chronic, debilitating, painful symptoms, surgical intervention is then indicated.

Surgical treatment of a severe peroneus brevis tenosynovitis may require open exploration and debridement. This is performed with a 5 centimeter incision directly over the tendon. The incision begins at the lateral malleolus and avoids the sural nerve. The respective sheaths of the peroneus brevis and longus tendons are opened. The

peroneus longus is retracted to allow access to the deep side of the peroneus brevis tendon. There on the underside of the tendon against the lateral wall of the calcaneus or the fibular groove is where the peroneus brevis splits are likely encountered. Intraoperative findings can reveal longitudinal, single or multiple lesions frequently frayed and discolored. Reactive tenosynovitis as well as scar tissue and irregular tendon edges are debrided, with the goal of obtaining a uniform diameter throughout the length of the tendon. Next, attention is directed at repair. This is best performed using a braided, nonabsorbable 4.0 suture with a "swedged-on" tapered needle to avoid cutting the remaining tendon fibers. Knots are buried to avoid impingement, with a running technique. Severe partial or complete ruptures may require peroneus brevis to longus tenodesis (or vice-versa). Concomitant repair of a lax peroneal retinaculum or remodeling of an irregular peroneal groove may be performed. A hypertrophied peroneal tubercle may also necessitate osseous remodeling. Arthroscopic or open synovectomy and debridement of the ankle joint may infrequently be mandated as well.

Associated problems that may have contributed to the tear should also be addressed. Patients with significant ankle ligament insufficiency must be treated adequately to decrease the risk of associated degenerative lesions to the peroneus brevis tendon or the ankle or subtalar joint. In these cases, one-half of the split peroneus brevis tendon is harvested proximally with the distal attachment maintained. The remaining tendon is repaired. The harvested partial tendon can be used in the tenodesis procedure of choice depending on the pattern of ankle ligament deficiency. An accompanying stenosing tenosynovitis will require decompression with no repair of the peroneal sheath upon closure.

Postoperative care for simple tendon repair without ancillary procedures requires three weeks of immobilization in a non-weight-bearing cast, followed by three weeks weight bearing in a Cam walker while initiating range of motion exercises. An adjunctive lateral ankle tenodesis requires four to six weeks of initial immobilization, followed by bracing or taping during the early rehabilitative stage. The patient is permitted to return to a high activity level when soft-tissue healing has occurred with diminution of edema, and when muscle strength has progressed to 90% on the contralateral side.

SUMMARY

Peroneus brevis tendon lesions are more common than previously recognized. Presentation is pain and tenderness along the peroneal tendons at or distal to the malleolus. The causes are multifactorial, but the underlying common denominator is chronic tension on the tendon itself, coupled with anatomical impingement. A grading scale applied to MRI evaluation may help to clarify the extent of the injury, and predict the success of the repair. The extent and severity of the peroneal brevis split will influence the surgical management. An awareness of the unique characteristics of the peroneus brevis tendon split will allow surgeons to more effectively treat patients with this injury.

REFERENCES

1. Meyers AW: Further evidence of attrition in the human body. *Am J Anat* 34:241-267, 1924.
2. Sammarco GJ, DiRaimondo CV: Chronic peroneus brevis tendon lesions. *Foot Ankle* 9:163-170, 1989.
3. Sobel M, Geppert MJ, Olson EJ, et al: The dynamics of peroneal brevis tendon splits: A proposed mechanism, technique of diagnosis, and classification of injury. *Foot Ankle* 13:413-422, 1992.
4. Sammarco GJ: Peroneal tendon injuries *Orthop Clin North Am* 25:135-145, 1994.

ADDITIONAL REFERENCES

Rosenberg ZS, Feldman F, Singson RD: Peroneal tendon injuries: CT analysis. *Radiology* 161:743-748,1986.

Sammarco GJ: Injuries of peroneal tendons. In Myerson M, ed. *Current Therapy In Foot and Ankle Surgery*. St. Louis, Mosby; 1993: 136-141.

Yao L, Tong DJF, Cracchiolo A, et al: MR findings in peroneal tendonopathy. *J Comput Assist Tomogr.* 19:460-464, 1995.