

# Peroneal tendoscopy. A pictorial essay

Panagiotis Symeonidis

*St. Luke's Hospital, Thessaloniki, Greece*

## ABSTRACT

Tendoscopy of the peroneal tendons is gaining popularity in the diagnosis and treatment of retromalleolar pain as a result of tenosynovitis, impingement and tendon tear. Further indications for the technique include tendon subluxation or dislocation, a low riding muscle belly and symptomatic vinculae. The method combines the advantages of minimally invasive surgery such as minimal soft tissue trauma, quick recovery, small scars and better cosmesis with a short hospital stay and low cost. Similar to any advanced operative technique, a thorough knowledge of the local anatomy, adherence to detail, adequate training and familiarity with small joint arthroscopic skills are prerequisites for a safe and successful peroneal tendoscopy.

**KEY WORDS:** tendoscopy; peroneal tendon tear; tenosynovitis

### Introduction

Peroneal tendoscopy is an evolving technique in the diagnosis and treatment of various pathologic and traumatic conditions which affect the peroneal tendons. Although the technique was first described in detail by Niek van Dijk in 1997, until recently the relevant publications have been sparse. [1, 2] A better understanding of the local anatomy based on high quality cadaveric and imaging studies, along with advances in the instrumentations have led a new generation of surgeons to increase their exposure with the technique and apply it in an ever growing spectrum of indications [3, 4, 5, 6]

Advantages of tendoscopy over open procedures include a relatively low intra- and postoperative morbidity (especially with regards to postoperative pain), minimal soft tissue trauma

which results to a quicker recovery and the option to be performed as a day surgery with a low cost. Further advantages are a superior cosmetic result due to the small incisions and the option to convert the procedure to an open one without changing the operative setup and patient positioning. [7, 8]

The peroneals are amenable to tendoscopy as they run a subcutaneous course and share a common peroneal sheath to a considerable length. This common sheath usually extends from the retrofibular groove to the peroneal tubercle, although anatomical variations to this common course have been described. The sheath surrounds the two tendons as a tubular bursa in two layers, between which a working area is being created [9, 10, 11]. The length which can be scoped in a routine procedure is between a point 2.5 - 3 cm

CORRESPONDING  
AUTHOR,  
GUARANTOR

**Panayiotis Symeonidis**

Tel.: +30-231-0-258100

Email: p.symeonidis@gmail.com

proximal to the tip of the lateral malleolus up to the peroneal tubercle on the lateral aspect of the calcaneus. At this level the sheath splits creating separate chambers for each tendon. In specific cases, a short 2.7 mm scope may follow each tendon separately in its distal course.

The most common indication for performing a peroneal tendoscopy is a persisting posterolateral pain along the course of the tendons with inconclusive imaging studies. As it has been shown, the average positive predictive value of MRIs for peroneal pathology is below 0.8. [5] Relevant pathologic conditions diagnosed and treated with peroneal tendoscopy are a small tendon tear, tendinopathy, a low riding muscle belly (especially of the peroneus brevis), impingement of the tendons due to a hypertrophic or prominent tubercle, tendon subluxation or dislocation, an accessory peroneal muscle (peroneus quartus) and hypertrophic vinculae causing impingement or symptomatic snapping [1, 12, 10].

The surgeon needs to be aware of the fact that an isolated peroneal pathology is relatively infrequent [13]. Before proceeding to a peroneal tendoscopy, he needs to consider all aspects of foot alignment and function, which may coexist with, cause, or contribute to the pain over the peroneals. Typically these would include ankle instability, hindfoot varus or valgus malalignment, subtalar joint pathology and neuropathic pain. Therefore a tendoscopy may also be performed as part of a more complex procedure in order to address such coexisting issues [10].

A thorough knowledge of the local anatomy and advanced arthroscopic skills are prerequisites for performing a peroneal tendoscopy. Adequate exposure and training of the technique in cadaveric courses are essential in order to ensure a safe and successful procedure.

## Operative technique

### *Preoperative planning*

After careful clinical examination and review of the imaging studies, the surgeon is advised to ask the patient to actively evert the foot. In most cases the peroneals are palpable under the skin and can



*Fig. 1: Preoperative skin marking*

easily be marked at the bedside before induction of anaesthesia. This is also the best time to mark the point of maximum tenderness over the course of the tendons, which usually represent areas of localized pathology such as tears or / and synovitis. (Fig. 1)

### *Instrumentation*

A 2.7 mm 30 degrees arthroscope is recommended in order to combine adequate visualization with safe maneuvering in the limited working space. [14] Larger scopes may be used but the ability to slide between the tendons with a side to side motion is limited. A Wissinger rod helps in exchanging portals easily without causing more trauma to the tendon sheath. Small diameter 2.5 to 2.9 mm shavers are used for debridement [10]. A high pressure fluid irrigation is to be avoided. Rather, a gravity-feed or low-pressure, low-flow pump system is used in order to prevent insufflation of the subcutaneous tissue [15]. Finally, the procedure can be aided by a combination of small joint instruments such as mini probes and graspers.

Tendoscopy can be performed under either general or regional anaesthesia. Popliteal blocks in particular offer the advantage of a prolonged postoperative analgesia in an otherwise mobile patient. Local anaesthesia has also been proposed, as it enables a dynamic evaluation of the tendons with active excursion in real time. Although it is



**Fig. 2:** A. Skin incision for the distal portal B. “Nick and spread” technique using two haemostats C. Introduction of the 2.7 mm arthroscope

not essential, the use of a thigh or high ankle tourniquet is recommended [3].

### Patient positioning

The patient can be placed in either a lateral or a semilateral decubitus position with the affected side facing up [14]. The latter gives the option to combine the procedure with an anterior ankle arthroscopy [10]. A third option is the supine position, especially if the tendoscopy is to be combined with a lateral ankle reconstruction procedure. [9]

### Portal placement

Typically a two portal technique is used. The distal portal is made first. A number 11 blade is used for the skin incision which is located around 2 cm distal to the tip of the lateral malleolus and is 3 to 5 mm long and parallel to the tendons' direction. (Fig. 2a) By using a “nick and spread” technique,



**Fig. 3:** Proximal portal placement through transillumination and introduction of needle, tendoscopic and open view.

the surgeon develops the space between the subcutaneous tissue and the tendon sheath with one or two small haemostats [3]. (Fig. 2b) This allows for identification and protection of branches of the sural nerve crossing the surgical site and visualization of the external surface of the sheath. [14] The tendon sheath is raised with a curved Kelly clamp and a blunt trocar is introduced under direct vision. Another helpful step is to inject 20 cc of saline solution into the sheath before incising it. Arthroscopic view may be inhibited by either stenosing tenosynovitis, scar formation or by hypertrophied, frayed tendons. The saline enlarges the sheath throughout its length, facilitating the easier passage of the arthroscope. [10, 16]

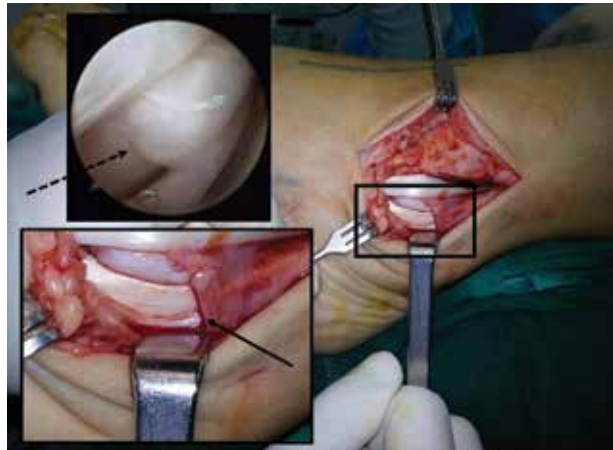
A useful maneuver is to plantar flex the ankle while the arthroscope is being introduced. This causes the course of the peroneal tendons to straighten and with a gentle push the scope can be driven in a cephalad direction to the retromalleolar zone [10]. (Fig. 2c) An 18 gauge needle is introduced with transillumination approximately 2.5 cm proximal to the posterior edge of the lateral malleolus. (Fig. 3) The superior portal is then created with an 11 blade and a small probe is introduced. Care is being taken not to injure the tendons when creating portals with the knife [16].

The surgeon evaluates the integrity of the tendons, the presence and extent of tenosynovitis,





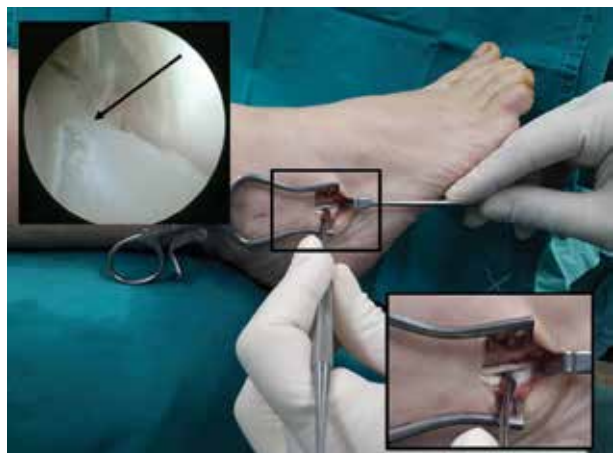
**Fig. 4:** Introduction of shaver through the superior portal. Peroneal vinculum to the right (arrow).



**Fig. 5:** Dislocation of peroneus longus with partial tear of peroneus brevis (arrow). Arthroscopic and open view of the tendons on either side of the lateral malleolus (dotted arrow).



**Fig. 6:** Tendoscopic debridement of a partial peroneus brevis tendon tear.



**Fig. 7:** Small distal tear of peroneus longus, tendoscopic and open view.



**Fig. 8:** Extended tear of peroneus longus, tendoscopic view with the probe inside the tear (arrow) and operative approach.

vinculae, and low lying muscle fibers, the anatomy of the retromalleolar groove and the presence of a peroneus quartus. (Fig. 4, 5) It is important for the surgeon to evaluate both surfaces of each tendon by switching portals and rotating the scope accordingly. Small longitudinal tears and tenosynovitis can be debrided arthroscopically with small 2.5 to 2.9 shavers. (Fig. 6) Larger tears are better treated with a mini open or extended approach, depending on the level and length of the rupture. (Fig. 7, 8)

#### Postoperative care

Portals are at best sutured with a single non

absorbable suture. A drain is not required. The postoperative regimen is dictated by the specific pathology which was treated. In general, a tenosynovitis debridement requires a 2 weeks protected weight bearing status in a crepe bandage. In cases of tendon tear the ankle is immobilized in a type of ankle brace which offers control of inversion, such as a short boot or a cast. When the tendoscopy involves peroneal groove deepening or tendon repair procedures the immobilization non weight bearing status is prolonged to 4-6 weeks accordingly. In any case, ankle dorsi- and plantar flexion exercises are initiated as early as possible whereas inversion and eversion motions are usu-

ally restricted in the early postoperative period.

### Complications

In general, peroneal tendoscopy is a safe procedure. [1, 6] Complications include injury to the sural nerve or the communicating branch of the sural nerve to the superficial peroneal nerve, extended perforation and trauma to the peroneal sheath which results increased swelling postoperatively, and an iatrogenic laceration of the peroneal tendons themselves. <sup>Ⓐ</sup>

### Conflict of interest:

The authors declared no conflicts of interest.

## REFERENCES

- Bernasconi A, Sadile F, Smeraglia F, et al. Tendoscopy of Achilles, peroneal and tibialis posterior tendons: An evidence-based update. *Foot Ankle Surg.* 2017 Jun 21. pii: S1268-7731(17)30128-5. doi: 10.1016/j.fas.2017.06.004.
- van Dijk CN, Scholten PE, Kort NP. Tendoscopy (tendon sheath endoscopy) for overuse tendon injuries. *Oper Tech Sports Med* 1997;5:170-178.
- Christensen J, Lanier T, Tendoscopy of the Ankle. *Clin Podiatr Med Surg* 28 (2011) 561-570.
- Hull M, Campbell JT, Jeng CL, et al. Measuring Visualized Tendon Length in Peroneal Tendoscopy. *Foot Ankle Int.* 2018 Apr 1:1071100718768506. doi: 10.1177/1071100718768506. [Epub ahead of print].
- Kennedy JG, van Dijk PA, Murawski CD, et al. Functional outcomes after peroneal tendoscopy in the treatment of peroneal tendon disorders. *Knee Surg Sports Traumatol Arthrosc.* 2016 Apr;24(4):1148-54. doi: 10.1007/s00167-016-4012-6. Epub 2016 Feb 4.
- Monteagudo M, Maceira E, Martinez de Albornoz P. Foot and ankle tendoscopies: current concepts review. *EFORT Open Rev.* 2017 Mar 13;1(12):440-447. doi: 10.1302/2058-5241.160028. eCollection 2016 Dec.
- Cychosz C, Phisitkul P., Barg A., et al. Foot and Ankle Tendoscopy: Evidence-Based Recommendations. *Arthroscopy.* 2014 Jun;30(6):755-65.
- Lui TH, Tse LF. Peroneal Tendoscopy. *Foot Ankle Clin N Am* 20 (2015) 15-25.
- van Dijk CN, Kort N, Scholten PE. Tendoscopy of the Posterior Tibial Tendon. *Arthroscopy.* 1997 Dec;13(6):692-8.
- Marmotti A, Cravino M, Germano M, et al. Peroneal tendoscopy. *Curr Rev Musculoskelet Med.* 2012 Jun;5(2):135-44.
- Sobel M, Geppert MJ, Hannafin JA, et al. Microvascular anatomy of the peroneal tendons. *Foot Ankle.* 1992;13:469-72.
- Guelfi M, Vega J, Malagelada F, et al. Tendoscopic Treatment of Peroneal Intratheath Subluxation: A New Subgroup With Superior Peroneal Retinaculum Injury. *Foot Ankle Int.* 2018 May;39(5):542-550. doi: 10.1177/1071100718764674. Epub 2018 Mar 29.
- Roster B, Michelier P, Giza E. Peroneal Tendon Disorders. *Clin Sports Med.* 2015 Oct;34(4):625-41.
- Vega J, Golano P, Batista JP, et al. Tendoscopic Procedure Associated With Peroneal Tendons. *Techniques in Foot & Ankle Surgery* Vol 12, N 1, March 2013.
- Sammarco VJ. Peroneal Tendoscopy Indications and Techniques. *Sports Med Arthrosc.* 2009 Jun;17(2):94-9.
- Reilingh M, De Leeuw P, Van Sterkenburg M, et al. Tendoscopy of Posterior Tibial and Peroneal Tendons. *Tech Foot & Ankle* 2010;9: 43 - 47.

## ΠΕΡΙΛΗΨΗ

Η τενοντοσκόπηση των περονιαίων τενόντων εφαρμόζεται με αυξανόμενη συχνότητα σε ασθενείς με εμμένον άλγος που εντοπίζεται πίσω από το έξω σφυρό, ως αποτέλεσμα τενοντοελυτρίτιδας, συνδρόμου προστριβής και τενόντιας ρήξης. Περαιτέρω ενδείξεις της τεχνικής περιλαμβάνουν υπεξάρθρημα ή εξάρθρημα των τενόντων, χαμηλά προσφυόμενη μυική γαστέρα του βραχέως περονιαίου τένοντα και συμπτωματική υπερτροφία του αγγειακού χαλινού (vinculum) των περονιαίων. Η μέθοδος συνδυάζει τα πλεονεκτήματα των τεχνικών ελάχιστης παρεμβατικότητας, όπως περιορισμένη κάκωση μαλακών μορίων, ταχεία αποκατάσταση και καλύτερα αισθητικά αποτελέσματα με τον βραχύ χρόνο νοσηλείας και το χαμηλό κόστος. Όπως και σε κάθε απαιτητική χειρουργική τεχνική, προαπαιτούμενα για την ασφάλεια και την επιτυχία της τενοντοσκόπησης των περονιαίων αποτελούν η άριστη γνώση της ανατομίας της περιοχής, η προσήλωση του χειρουργού σε τεχνικές λεπτομέρειες της μεθόδου, και η εκπαίδευση και εξοικείωσή του με την αρθροσκόπηση των μικρών αρθρώσεων.

**ΛΕΞΕΙΣ ΚΛΕΙΔΙΑ:** Τενοντοσκόπηση, ρήξη περονιαίων τενόντων, τενοντοελυτρίτις περονιαίων