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Posterior tibial tendoscopy: Description of an accessory proximal portal and assessment of tendon vascularization lesion according to portal

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ABSTRACT

Background: Posterior tibial tendoscopy was codified in 1997 by Van Dijck, who described a portal between 1.5 and 2 cm proximally and distally to the tip of the medial malleolus. However, this approach does not allow proximal exploration of the posterior tibial tendon (PTT). We here describe an accessory portal 7 cm proximal to the medial malleolus, enabling complete PTT exploration.

Methods: Posterior tibial tendoscopy was performed on 12 cadaver specimens, mapping PTT exploration and vascularization.

Results: The accessory portal enabled the whole PTT to be explored, from the myotendinous junction to the entry into the retromalleolar groove. PTT observation quality was improved compared to using a submalleolar portal. Dissection confirmed systematic presence of a vincula on the posterior side of the tendon, connected to the flexor digitorum longus (FDL) tendon, containing collateral vessels of the posterior tibial artery. None of these elements were damaged by the tendoscopy as long and the scope and motorized instruments were not rotated on the posterior side of the supramalleolar part of the PTT. Conclusions: This accessory entry portal provides complete PTT exploration without the risk of neurovascular bundle lesion.

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1. Introduction

Ankle tendoscopy is a recent technique. Its advantages over open techniques include low postoperative morbidity, less blood loss, shorter hospital stay, faster rehabilitation, lower costs and a decreased complication rate [1–4].

The first posterior tibial tendon (PTT) tendoscopy was performed in 1994 by Wertheimer [5]; in 1997, Van Dijk [6] described the procedure. PTT tendoscopy is usually considered following failure of medical management of tendinopathy with associated inflammation and fissure [7,8]; some authors, however, have recently recommended it in PTT tear, enabling minimally invasive surgery using the endoscope to perform synovectomy on either side of the tear [9].

Van Dijk recommended 2 portals, between 1.5 and 2 cm proximally and distally to the medial malleolus. These, however, do not allow exploration or surgical procedures (debridement, or synovectomy) in the proximal part of the PTT. According to Van Dijk, exploration was feasible up to 6 cm proximally to the tip of the medial malleolus. In 2010, Reilingh [10] modified the portals,

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situating them between 2 and 3 cm from the tip of the medial malleolus.

We here recommend a 3rd, accessory, portal 7 cm proximally to the medial malleolus, enabling complete PTT exploration up to the myotendinous junction.

A cadaveric study was performed in an anatomy laboratory to map tendoscopic PTT exploration and confirm the absence of neurovascular bundle lesion induced by the passage of the endoscope through the sheath. PTT vascularization was analyzed, to map the possibilities for advancing the instruments in the sheath.

2. Method

Twelve fresh cadaver specimens were provided for the study by the Anatomy Department of Rouen University (France). None had any history of hindfoot or ankle surgery.

Ankle motion was required to be at least 15° dorsiflexion and 30° plantar flexion.

A 4-mm DYONICS endoscope was used, angled at 30°.

Three portals were performed (Fig. 1): portal A, 3 cm distally to the medial malleolus; and portals B and C, respectively 3 and 7 cm proximally.

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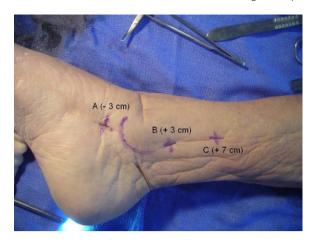


Fig. 1. Location of the 3 endoscope portals.

The subcutaneous plane was dissected using Halstead forceps and the tendon sheath was opened for 5 mm along its long axis. The endoscope was introduced successively through portals A (retrograde), B (retrograde and anterograde) and C (anterograde) and explored the anterior, lateral and medial sides of the PTT.

A needle (Fig. 2) was used to mark the endoscope's progress in the sheath.

For each portal, the following were assessed:

the progress (in cm) of the endoscope in the sheath; PTT observation quality (good, moderate, poor) during progress; feasibility of PTT exploration in the retro- and sub-malleolar reflection pulley;



Fig. 2. Endoscope progress marking by needle.

presence of vincula and quality of observation; feasibility of myotendinous junction observation.

Each cadaver specimen was then dissected, measuring:

distance between medial malleolar tip and PTT vincula; distance between medial malleolar tip and myotendinous junction.

The origin of PTT vincula vessels was explored, and their distribution with respect to the posterior tibial artery and FDL tendon.

Table 1Results of cadaveric tendoscopy (NA: not available).

	Anto of cudavene tendoscopy (171, not uranaste).												
	1	2	3	4	5	6	7	8	9	10	11	12	
Portal A													
Retrograde in-sheath distance (cm)	2	2	5	5.5	2.5	4	4.5	3.5	5.5	4.5	3	3	
PTT visualization quality	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
PTT visualization in reflection pulley	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
Vincula visualization	Poor	Poor	Moderate	Moderate	Poor	Moderate	Poor	Moderate	Moderate	Poor	Moderate	Poor	
Myotendinous junction visualization	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Portal B													
Anterograde in-sheath distance (cm)	2	2	3	4	2.5	3.5	4.5	4	3.5	3	3	3.5	
PTT visualization in reflection pulley	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
Submalleolar PTT visualization	Poor	Moderate	Poor	Moderate	Moderate	Moderate	Poor	Poor	Moderate	Moderate	Poor	Poor	
Retrograde in-sheath distance (cm)	4	3	5	5.5	4	5	3	4	6	4.5	5.5	4	
PTT visualization quality	Good	Good	Good	Good	Good	Good	Moderate	Moderate	Good	Good	Moderate	Good	
Vincula visualization	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
Myotendinous junction visualization	Moderate	Moderate	Good	Good	Moderate	Moderate	Moderate	Moderate	Good	Moderate	Good	Moderate	
Portal C													
Anterograde in-	5	6	4	5	4	5	5.5	4	5	6	4.5	5.5	
sheath distance (cm)													
PTT visualization in reflection pulley	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Submalleolar PTT visualization	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
Vincula visualization	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
Myotendinous junction visualization	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	

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