The Foot 30 (2017) 1–4

Contents lists available at ScienceDirect

The Foot

journal homepage: www.elsevier.com/locate/foot

Novel reconstruction technique for an isolated plantar calcaneonavicular (SPRING) ligament tear
A 5 case series report

Ezequiel Palmanovich*, Shay Shabat, Yaron S. Brin, Sabri Massrawe, Iftach Hestroni, Meir Nyska

Orthopedics Department, Meir Medical Center—Kfar Saba Israel, Associated to Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

HIGHLIGHTS

- 5 case series of isolated spring ligament tear.
- Follow up of the patients.
- AOFAS score improvement.
- Surgical technique.

ARTICLE INFO

Article history:
Received 29 January 2015
Received in revised form 21 March 2016
Accepted 23 October 2016

Keywords:
Spring ligament
Ligament reconstruction
Medial arch reconstruction
Fiber tape

ABSTRACT

Background: It is usually accepted that acquired flatfoot deformity after injury is usually due to partial or complete tear of the posterior tibial tendon (PTT), with secondary failure of the other structures which maintain the medial longitudinal arch, such as the plantar calcaneo-navicular (SPRING) ligament. It is unusual to find an isolated Spring Ligament (SL) tear, with an intact TP tendon.
Methods: The medial arch reconstruction technique of an isolated SL tear in 5 patients is presented discussed in this paper. In these 5 cases the clinical presentation mimicked PTT dysfunction. The operative regimen consisted of three steps: direct repair of the ligament, primary reconstruction of the SL by using FiberWire® (Arthrex, Inc) and a medial calcaneal osteotomy.
Results: American Orthopedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Score improved from 55.8 (range, 34–74) before surgery to 97.6 (range, 91–100) at more than one year follow-up. No recurrence of the flatfoot deformity was observed at 10 years follow-up.
Conclusion: SL tear should be suspected in cases of clinical presentation of medial arc collapse even when PTT is intact. In such cases of isolated SL tear reconstruction of the torn ligament using the method described is recommended.

1. Introduction

The spring ligament complex one of the most important ligaments of the foot, linking the midfoot and the hindfoot [1,2] providing the main static support of the medial longitudinal arch [3,4]. The Spring or Calcaneo-navicular complex ligament is classically described by two bundles. The superomedial calcaneonavicular ligament (SMCNL) [5] or Ligamentum Neglectum [6]. A third ligament was described under the cartilage covering the spring ligament fibrocartilage complex by Taniguchi *et al.* in 2003 [7]. The mechanical integrity of the medial longitudinal arch depends on a complex of structures: the manner in which the tarsal bones interlock, the static support of ligaments and joint capsules and the dynamic support of muscles and tendons. The main static support of the medial arch is the spring ligament and the main dynamic support of the arch is the posterior tibial tendon (PTT).

The main reason for acquired flattening of the medial arch is usually due to attenuation or complete tear of the PTT [8]. Following a rupture of the PTT, the ligaments and joint capsules appear to stretch or rupture under the increasing stress, leading to a more pronounced pronation deformity of the foot. The spring ligament

* Corresponding author.
E-mail address: ezepalm@gmail.com (E. Palmanovich).

http://dx.doi.org/10.1016/j.foot.2016.10.004
0958-2592/

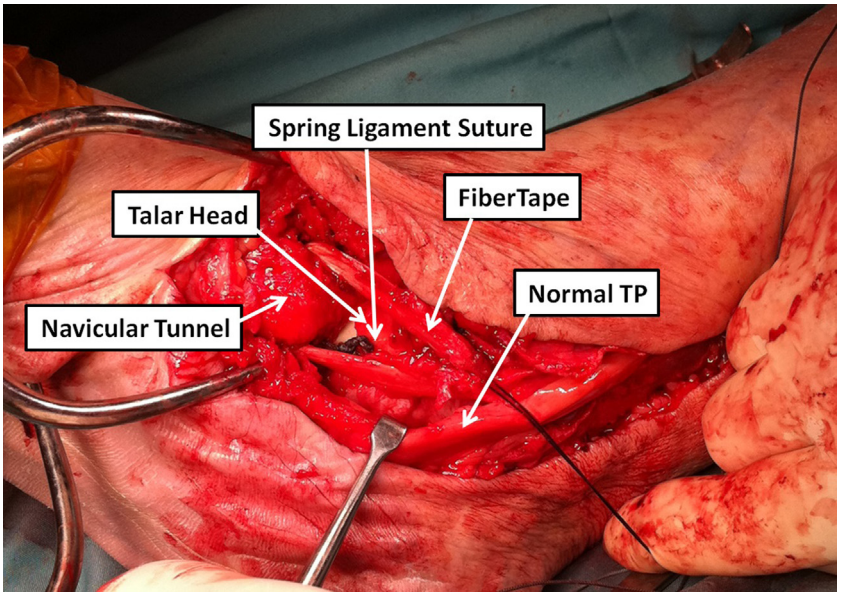

Fig. 1. Spring ligament reconstruction with normal tibialis posterior tendon.

Table 1
Patient's data.

Patient	Age	Sex	AOFAS	
			Before	After
1	40	F	34	91
2	48	M	42	100
3	61	F	57	97
4	49	M	72	100
5	49	M	74	100

complex was most frequently damaged in MRI study in patients with PTTI [9].

An acquired flatfoot resulting from an isolated tear of the SL without an injury to the PTT is very uncommon. Few cases were reported in the literature during the last few years [1,10–14].

Five patient(s) presenting with a unilateral acquired flatfoot deformity due to an isolated tear to the SL with an intact PTT is presented and discussed. The various pathologies and operative technique to correct this deformity are described in the study.

2. Materials and methods

Five patients were included into this study with isolated Spring Ligament tear. Mean age was 49.4 years. There were three males and 2 females (Table 1). All patients had clinical findings which were consistent with tibialis posterior dysfunction and included: medial ankle and midfoot pain and swelling, pes planus, calcaneovalgus and forefoot abduction and were unable to perform a Single Heel Rise test on the affected foot. All failed the common conservative treatment which include ankle support, physical therapy: PTT strengthening and Achilles lengthening for at least 6 months. All patients underwent MRI scan of the affected ankle and foot which demonstrated an intact PTT. The specific clinical presentation of failure of the medial arch support along with intact PTT, lead to the conclusion that the SL was probably insufficient. The indication for operation was increasing pain and medial arch collapse in normal PTT findings in MRI.

All patients underwent surgical exploration which demonstrated an isolated tear of the SL and confirmed that the TP tendon was normal (Fig. 1). The tear was vertical fashion and localized in the Midsubstance in all cases possible due to the absence of blood supply [15].

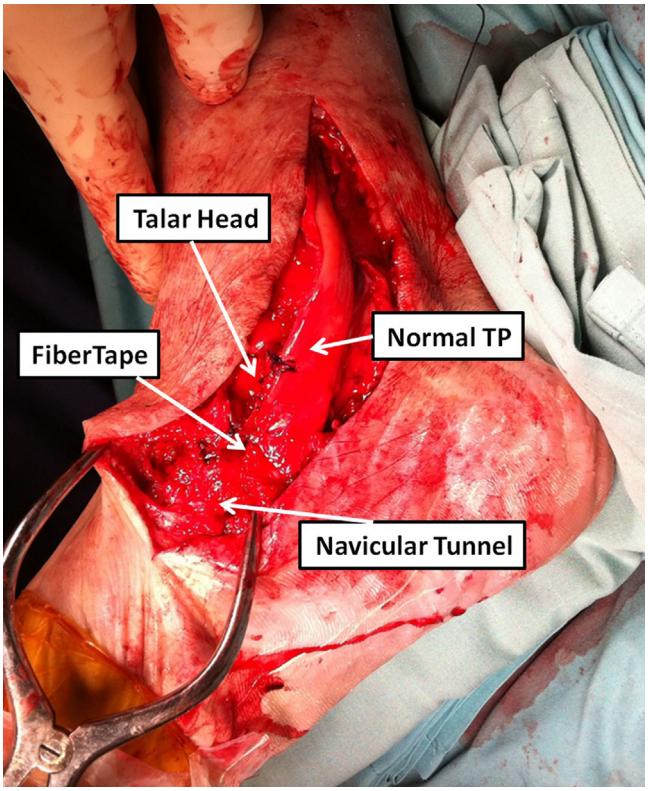

Fig. 2. Spring ligament reconstructed by FiberTape.

The tear was debrided and directly sutured by Vycril 4.0, the SL was reconstructed using MERSILENE® 5 Polyester Fiber Suture. Ethicon in 2 cases and FiberTape® (Arthrex, Inc) in 3 patients in figure of eight manner; passing the Tape through two tunnels, the first anterior to posterior to the navicular bone and the second, proximal to distal thought the Sustentaculum Tali (Fig. 2). The remains Fiber Tape after tied is anchored to medial malleolus [16] (Fig. 3)