ORIGINAL ARTICLE

# Relapses of traumatic peroneal tendons subluxation already treated surgically: a new surgical approach

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## ABSTRACT

**Aim** To illustrate the surgical treatment of relapses of traumatic peroneal tendons subluxation.

**Methods** We came across a young woman, who sustained a sprain in her dominant ankle after a trauma; we noticed subluxation of the peroneal tendons during eversion and extension of the foot. She referred to a previous accident some years before with peroneal tendon subluxation treated by superior peroneal retinaculum (SPR) sutures with a synthetic braided absorbable material. We prescribed conventional radiography, magnetic resonance imaging (MRI) and performed surgery: we removed scar tissue, reattached the retinaculum using suture anchors strengthening it with an acellular dermal matrix allograft patch.

**Results** Periodic clinical follow-ups until 24 months were performed evaluating the stability of the ankle, checking the range of movement, and the Visual Analogic Scale (VAS) and American Orthopedic Foot and Ankle Society Score (AOFAS) was administered. At the first check the subluxation was resolved and the ankle was stable. The VAS scale had the value of 0 at the 3-month follow-up maintained until the final check.

**Conclusion** Relapsing traumatic peroneal tendons subluxation is rare, as well as the possibility of a re-intervention years later. This technique seems to guarantee an excellent result even in the long term, allowing resolution of pain and joint stability. In fact, the use of acellular dermal patch is an already commonly described technique for the augmentation in rotator cuff and hip capsular repair; no reports are available in literature in relation to the use of graft for the repair of the superior peroneal retinaculum.

**Key words**: ankle sprains, allografts, suture anchors, suture techniques, tendon injuries

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## INTRODUCTION

Instability of the peroneal tendon complex is a fairly uncommon pathology, mostly involving young athletes. The pathology consists of an acute or chronic condition of subluxation or luxation of the peroneal tendons, often imputable to a rupture of the superior peroneal retinaculum (SPR), a thin fibrous structure the binds the tendons and keeps them located on the postero-lateral aspect of the fibula (1).

*Peroneus longus* (PL) and *Peroneus brevis* run on the postero-lateral shape of the fibula and curve anteriorly towards their insertions on the malleolus, passing through a fibrocartilaginous groove. They share a common sheath proximally, while distally they own their proper. At the level of the SPR, PB runs anteriorly and slightly medial to the PL, and its mio-tendinous junction is usually more distal than that of the PL. (2)

The most studied mechanisms that lead to acute peroneal dislocation are spontaneous powerful reflex contractions of peroneal muscles, while the foot is set in dorsiflexion or a forced dorsiflexion in the everted foot (1).

Predisposing factors for dislocation are a flattened or convex shape of the peroneal groove, a congenital ligamentous laxity, an overcrowding of the fibular groove (3-5). Ankle sprains are common events, especially in young athletes (1). The injury mechanism, sometimes common to those described above, can provoke the disruption of the SPR, beyond other lesions to peroneal tendons complex (6). While lesions of the tibio-tarsal ligament complex are usually well recognised and diagnosed, an acute peroneal tendon instability is often misdiagnosed at the onset leading to chronic pathologic conditions (7). The disruption of the SPR may be associated with a small avulsion fracture at the attachment of the retinaculum to the fibula, or to the rupture of the fibrocartilage ridge of the groove (8). In acute settings patients often describe a "pop" or snapping sensation, followed by tenderness and swelling on the posterior profile of lateral malleolus (1,9). If associated ankle ligament or osseous lesions are present, the patient could be unable to weight bearing. Physical examination reveals variable pain and swelling depending on the acuteness of the injury, functional impotence in active evertion. Dislocation or subluxation may be observed through manoeuvres of ankle rotation or forcing the foot from a position of inversion and plantar flexion to a position of eversion and dorsiflexion (10). The diagnosis is essentially clinical. Further radiologic studies that corroborate the diagnosis are dynamic ultrasound and MRI. Radiographs could show an avulsed fragment from the fibular insertion of the SPR, but are normally not needed in chronic cases (11). Tendoscopy may be beneficial, and should be reserved, in absence of positive findings in ultrasound and MRI imaging (12). The most well-known and shared classification of SPR lesion has been purposed by Oden (13). A well-timed diagnosis and a prompt treatment in the acute/early stage is important as it is useful to avoid the long-term sequelae as chronic tendinopathy or tendon tears (the PB is more often involved). In addition, acute injuries have a better healing tendency, and while it is assessed that chronic lesions of the SPR need surgical treatment, in acute settings it is advisable to attempt a conservative treatment even if it has a recurrence of tendon instability rate of about 50% (7,14). Since in chronic injuries a shortening of the tendon is often observed, the first-line treatment includes a deepening of the peroneal groove, allowing for a greater stability and a theoretically inferior risk of recurrence. The aim of the intervention is to prevent further peroneal dislocation, repairing the SPR or correcting the predisposing factors increasing the volume or continence of peroneal tunnel. Many techniques have been described to fix the SPR, including periostal flap retinaculplasty (15,16), open or tendoscopic simple or anchor suture repair (17-19), grafting (20), transposition (21,22). Although first surgical attempt failure is not rare and already described eventuality, we found just one study in literature facing up the issue, purposing an antero-medial rerouting of the PB tendon (23).

The aim of this study was to describe a new surgical procedure in case of relapses of traumatic peroneal tendons subluxation already treated surgically with a SPR suture. This occurrence is quite rare and not described in the literature. In particular we have introduced the use of graft for the repair of the superior peroneal retinaculum.

## PATIENTS AND METHODS

### Patient and study design

We came across a 39-year old woman, who was referred in the outpatient clinic of Orthopaedic and Trauma Unit of "S. Croce e Carle" Hospital

(Cuneo, Italy) in January 2019. She presented with pain in the right dominant ankle after a sprain one week before. She reported "shooting sensation" during different ankle movements as well as severe pain that made walking impossible. No fractures history was referred but a previous accident sixteen years before after a fall with peroneal tendon subluxation. At that time she was surgically treated by superior peroneal retinaculum (SPR) sutures with a Panacryl© and immobilized with cast for 30 days. After this treatment she referred a good functional outcome, the absence of pain and subluxation symptoms; a complete return to work after about two months and sport activities like skiing and running six months later.

Physical examination showed swelling and ecchymosis around the ankle joint especially on lateral side. Also significant tenderness on lateral malleolus was noted on palpation of the ankle joint. Neurovascular function of the foot and ankle was normal. On passive dynamic evaluation we noticed the subluxation of the peroneal tendons during eversion and extension of the foot (Figure 1). Conventional radiography, including standing lateral, dorsoplantar, anteroposterior and oblique views of the ankle, did not show fractures, bone loss or avulsion; MRI showed the injury to the SPR and the presence of greatly altered tissue (Figure 2), probably as a sign of previous surgery.


**Figure 1. Magnetic resonance (MRI) right dominant ankle: evidence of previous suture scar tissue in sagittal (A, B) and coronal (C) planes; in axial plane (D) the peroneus longus dislocation can be observed (1), peroneus brevis (2) and previous superior peroneal retinaculum remnant (3)** (Tomarchio A, 2019)

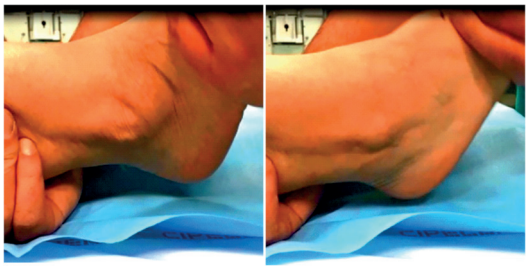

**Figure 2. Physical examination: subluxation of the peroneal tendons during eversion (right) and extension (left) of the foot and their reduction during the opposite movement** (Tomarchio A, 2019)

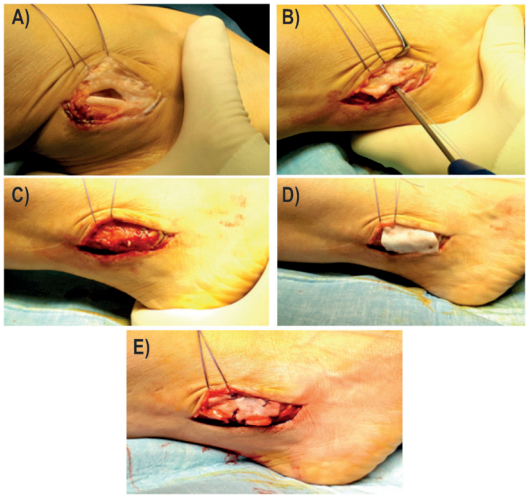


**Figure 3. A) Superior peroneal retinaculum (SPR) longitudinal lesion; B) After removing synovial-like scar tissue, during the placement of the Arthrex mini corkscrew; C) Suture of SPR; D) Acellular dermal matrix allograft patch positioning; E) First modelling and start of suture, then finished and modelled** (Tomarchio A, 2019)

## Methods

A surgical treatment was performed twelve days after the trauma in spinal anaesthesia under tourniquet control: the patient was placed supine with a bolster under the ipsilateral buttock. A slightly curvilinear skin incision was made, extending from about 4 cm proximal to 1 cm beyond the tip of the lateral malleolus along the posterolateral edge of the fibula and along the course of the peroneal tendons (almost on the previous surgical wound).

After removing synovial-like scar tissue and after doing a meticulous subcutaneous preparation, the SPR and peroneal tendon sheaths were explored.

The SPR complete longitudinal injury was visualized and the peroneal tendons were dislocated running passive dynamic evaluation in eversion and extension of the foot. The tendons returned to the site performing the opposite movements. After reducing the tendons the repair was easily perfor-

med; sutured the SPR using suture anchors (Arthrex Mini Corkscrew FT 2.7 mm x 7 mm) to its fibular insertion reinforcing it and then sutured the two heads of the SPR (knots tied on lateral edge of trough and same suture passed through anterior portion of SPR). Finally it was strengthened with an acellular dermal matrix allograft patch sutured between SPR and subcutaneous tissue. Immediately after surgery a short leg cast with the foot in neutral to slight inversion was applied holding the ankle in 90°, maintained for 4 weeks. The patient was kept non-weight-bearing for 4 weeks and then started to wean out the patient from boots with indication for the dressing after 7 days and the removal of the stitches after 15 days. At the removal of the short leg cast, structural physical therapy program was started, focusing on the range of motion followed by proprioceptive training and strengthening exercises. We performed periodic clinical follow-ups at one month post-operatively, as well as 3, 6, 12 and 24 months.

A range of movement, the stability of the ankle was evaluated using the Visual Analogic Scale (VAS) that is a psychometric response scale consisting of a 100-mm horizontal line on which the patient's pain intensity is represented by a point between the extremes of "no pain at all" and "worst pain imaginable (24) and the American Orthopedic Foot and Ankle Society Ankle-Hindfoot Score (AOFAS) that is among the most commonly used instruments for measuring the outcome of treatment in patients who sustained a complex ankle or hindfoot injury. It combines a clinician-reported and a patient-reported part (25).

## RESULTS

The surgical scar was perfectly healed and the stitches were removed fifteen days after the surgery. At the first check the subluxation was resolved and the ankle stable; subluxation of peroneal tendons was no longer caused by active or passive movement of the ankle and foot. Similar results were obtained by administering the AOFAS scale. After one month, immediately after the cast removal, VAS was 2 and AOFAS 68. During the follow-up, according to the progress of physical therapy, we observed a progressive improvement of the AOFAS score and decrease in pain. The improvements observed at the follow-up in the third month were maintained until the final check at 24 months (Vas score: 0; AOFAS 90) (Table 1).

**Table 1. Results of clinical follow-ups: Visual Analogic Scale (VAS) and American Orthopedic Foot and Ankle Society Ankle-Hindfoot Score (AOFAS) Scale, ankle stability**

| Follow up time | VAS score | AOFAS score | Peroneal tendons subluxation |
|---|---|---|---|
| 1 month | 2 | 68 | NO |
| 3 months | 1 | 83 | NO |
| 6 months | 0 | 86 | NO |
| 12 months | 0 | 89 | NO |
| 24 months | 0 | 90 | NO |

The patient returned to office work 2 months after surgery. We decided not to perform X-ray, CT scan or MRI during the follow up. Overall, the result of surgery was considered excellent as confirmed by the degree of satisfaction reported by the patient. No adherence of the tendons and recurrence of the subluxation were observed until the final follow-up.

## DISCUSSION

Dislocating or subluxing peroneal tendons is a relatively infrequent injury, even rarer being faced with relapses of dislocation after years from the first episode treated surgically (1). Clinical assessment, X-ray and MRI help to elaborate the correct diagnosis (5,11)

Surgical treatment attempts to restore structural stabilization of the peroneal tendon and retinacular complex (26). The surgical techniques vary and depend largely on the surgeon's clinical experience and preference, even if there is no experience described in literature. In our case before repairing the SPR, we had removed synovial-like scar tissue, probably due to the use of specific type of synthetic braided absorbable material (Panacryl). This is considered as a long-term suture; it is a slow degradable suture with high concentration of polylactide acid. In international literature the question has been asked about the possible synovitis determined by this material but no scientific evidence has ever been highlighted (27,28). We have introduced the use of the grafting. There are many classes of biological matrices currently available, including dermal allografts, dermal xenografts, resorbable and nonresorbable fabrics, and numerous other collagen and synthetic products (29 ). Our choice, considering previous clinical patient's history was the use of an acellular dermal matrix allograft patch. This is an acellular cryopreserved human dermal graft prepared by removing the epidermis and all cellular components: the letter is compo-

sed of several types of collagen, chondroitin sulfate, elastin, proteoglycans composing a matrix suitable for an early revascularization and with a high load resistance (30,31). In fact, the use of acellular dermal patch is an already commonly described technique for the augmentation in rotator cuff repair (32-34) and hip capsular repair (35). Many studies indicate that it improves tendon healing and clinical outcomes compared with repair without graft (30). No reports or data are available in literature in relation to the use of any kind of graft for the repair of the superior peroneal retinaculum.

The surgical technique described in this article is largely successfully used with a high satisfaction rate.

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## TRANSPARENCY DECLARATION

Competing interests: None to declare.

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