

Iatrogenic Lesion of the Lateral Plantar Artery following Plantar Fasciotomy for Cavus Foot Correction – A Case Report

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Learning Point of the Article:

Iatrogenic lesions of the plantar vascular structures during plantar fasciotomy are extremely rare but potentially dangerous. Meticulous attention to surgical technique and careful inspection of the foot the day after surgery, before patient discharge, are recommended

Abstract

Introduction: The aim of this study was to report a patient with a iatrogenic lesion of the lateral plantar artery following plantar fasciotomy (PF) for cavus foot correction, an extremely rare complication.

Case Report: A 13-year-old male patient with bilateral cavus foot was surgically treated at the right foot. At 36 days follow-up, after plaster cast removal, a massive soft plantar bulge was located on the medial aspect of the foot. Once suture stitches removal was performed, a huge blood collection was evacuated, and active bleeding observed. Contrast-enhanced angio-CT revealed a lesion of the lateral plantar artery. A vascular suture was performed. At 5 months follow-up, the patient was pain-free in his foot.

Conclusion: Despite a iatrogenic lesion of the plantar vascular structures following PF is extremely rare, it is a potential complication to consider. Meticulous attention to surgical technique and careful inspection of the foot the day after surgery, before patient discharge, are recommended.

Keywords: Plantar fasciotomy, cavus foot, complication, vascular lesion, lateral plantar artery

Introduction

Plantar fasciotomy (PF), also known as plantar fascia release, represents a surgical treatment for many foot pathologies, the most common being recalcitrant plantar fasciitis [1]. PF may also represent a step for cavus foot correction since the plantar fascia acts a key role in maintaining the height of the plantar arch and varus of the heel. For this reason, PF allows to reduce the height of the longitudinal arch and to increase the deformity flexibility [2].

Different surgical techniques have been described for PF, such as open, percutaneous, and endoscopic approaches.

All of these procedures have been shown to have good and satisfactory results, but complications may occur [1]. Complications after PF range from 3% to 10% [3, 4], the most common being the instability of the lateral column, sinus tarsi pain, metatarsalgia, secondary pes planus, stress fractures, pain due to Baxter's nerve fibrotic entrapment, nerve lesions, and hypertrophic painful scarring [5].

Despite many plantar vascular structures being in the proximity of the surgical site, their injuries after PF are not commonly reported in the literature.

The aim of this paper is to present a case of a 13-year-old male

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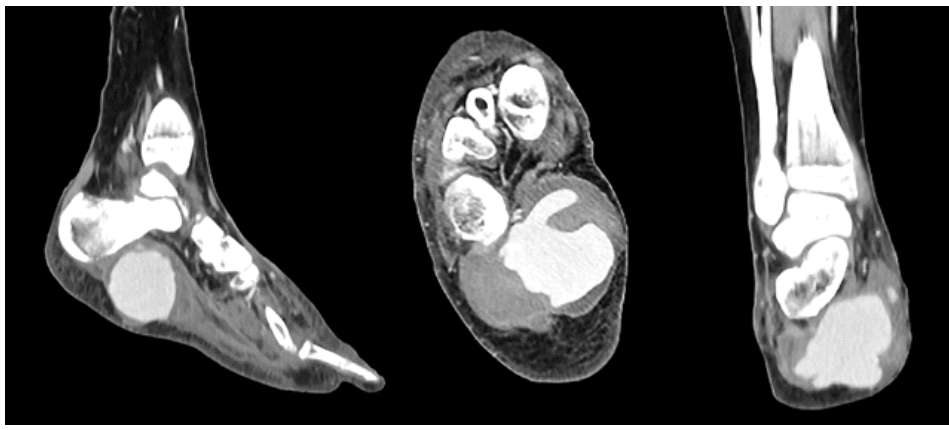


Figure 1: Multiplanar Computed Tomography (CT) reconstruction. Detailed legend – Multiplanar CT reconstruction 36 days after plantar fasciotomy demonstrates a contrast medium blush in the plantar space originating from the lateral plantar artery (9 cm × 6 cm × 7.5 cm).

patient with a iatrogenic lesion of the lateral plantar artery following PF for cavus foot correction, detected 36 days after surgery, at the moment of the plaster cast removal.

Case Presentation

A 13-year-old male patient was diagnosed with bilateral flexible of cavus in suspected Charcot–Marie–Tooth disease, grade 4 according to the Sabir and Lyttle classification [6].

The right foot was firstly scheduled for surgery and operated under spinal anesthesia, with use of tourniquet control. Surgical treatment included PF, naviculocuneiform arthrodesis with closed superolateral wedge resection of articular surfaces, closed superolateral wedge cuboid osteotomy, extensor hallucis longus tendon transfer (Jones procedure), and lesser toes claw deformity correction [2].

The surgical treatment was performed as follows. With the patient under spinal anesthesia, a tourniquet was applied at the bottom of the right lower limb. A 2-cm skin incision was made on the medial aspect of the heel, and the plantar fascia was identified. Tension was applied by dorsiflexing the metatarsophalangeal joint and complete stripping at the origin of the plantar fascia was performed with a scalpel. A hemostatic sponge was applied. Before correcting the cavus deformity, the tibiotalar joint was positioned at 90°, the subtalar joint aligned at 5° of valgus, and they were both maintained with a percutaneous 2.5 mm K-wire.

The tarsectomy involved two different skin incisions. The lateral approach, approximately 3.5 cm long, was centered on the extensor digitorum brevis muscle belly. The cuboid bone was exposed, and a closed osteotomy of a superolateral bone wedge was fulfilled. The medial approach, of approximately 3.5 cm too, was centered slightly distal to the navicular prominence.

The naviculocuneiform joint was exposed and a superolateral bone wedge spanning the articular surfaces was resected. The medial and lateral gaps were closed, thus correcting the deformity in the three planes, and fixed with 2 percutaneous 2.5 mm K-wires, one to stabilize the cuboid osteotomy and one for the naviculocuneiform arthrodesis.

Subsequently, the medial approach was used to perform an extensor hallucis longus tendon transplant to the 1st metatarsal neck and an extensor hallucis longus-extensor hallucis brevis tenodesis (Jones' procedure) was realized.

Finally, a claw deformity correction through a dosed release of the extensor digitorum longus tendon and an arthrodesis of the two proximal phalanges was performed and stabilized with percutaneous K-wires emerging from the tip of the fingers. After the procedure, the tourniquet was released, and a careful hemostasis was realized before layer closure by absorbable sutures.

Post-operative care consisted of immobilization in a plaster cast, applied directly in the operating room at the end of the procedure. The patient was discharged the 1st day after surgery. Plaster cast was well tolerated, and patient general condition was good.

Discharge recommendation was to keep the leg elevated and to avoid any weight-bearing on the operated leg.

At the 36th post-operative day, the plaster cast was removed. A massive soft plantar bulge was found at the level of the medial surgical incision. Once suture stitches removal was performed, a huge blood collection was evacuated together with an important hematoma, which was shortly clinical defined supplied by active bleeding and not manageable with conservative treatment. A blood test was taken and hemoglobin level was 12.9 g/dl.

An urgent contrast-enhanced angio-Computed Tomography was performed, showing a vascular lesion of the lateral plantar artery, a branch of the posterior tibial artery. The dimension of the hematoma was 9 cm × 6 cm × 7.5 cm, associated with a remarkable extravascular spreading of the contrast agent (Figs. 1 and 2) imposed an urgent surgical approach.

The patient was taken to the operating room for surgical procedure the same day.

A medial approach was performed, centered at the level of the



Figure 2: 3D Computed Tomography (CT) reconstruction. Detailed legend: 3D CT reconstruction 36 days after plantar fasciotomy demonstrates a hematoma (red polycyclic shape) in the plantar space.

plantar fascia insertion on the previous scar. A total evacuation of the medial-plantar hematoma was performed. The vascular lesion appeared to be about 2 cm from the plantar fascia origin.

After the lesion exposition, a vascular suture was performed.

The day after surgery, hemoglobin level was 9.3 g/dl. After a 6-day hospitalization, the patient was discharged with a walker boot. His hemoglobin was stably increasing (from 9.3 g/dl the day after surgery to 11.2 g/dl 6 days after surgery).

At 1 month follow-up, the foot was in good condition, and 5 months after surgery, the patient reported no pain or limitations. AOFAS score improved from 63 points preoperatively to 95 postoperatively. SF-36 improved from 78 preoperatively to 97 points postoperatively.

Six-month later, the same surgical correction (PF, naviculocuneiform arthrodesis with closed superolateral wedge resection of articular surfaces, closed superolateral wedge cuboid osteotomy, extensor hallucis longus tendon transfer, and claw deformity correction of the lesser toes) was performed on the contralateral cavus foot.

Discussion

We reported a rare case of iatrogenic lesion of the lateral plantar artery following PF.

PF was firstly described by Steindler in 1921 and, for this reason, it is also known as Steindler stripping [7]. The original procedure consisted of a 2-cm skin incision on the medial aspect of the heel and a complete stripping performed with a scalpel at the plantar fascia origin.

After Steindler stripping, many techniques have been proposed for PF, with different approaches and variations in the amount of fascia to be released [5].

Open techniques are commonly used, but they can lead to several complications, including pain due to Baxter's nerve entrapment in fibrotic tissue and hypertrophic scars [5].

This issue led to the development of new approaches such as percutaneous and endoscopic techniques.

Percutaneous PF, firstly, described by Pilzer et al. in 1983 [8], allows the procedure to be achieved through a very small incision, thus causing minimal injury to adjacent tissues, theoretically reducing complications, and shortening post-operative rehabilitation. As shown by Borrelli et al. [9], common complications such as infections, neuroapraxia, nerve entrapment, or fibroma formations are rarely reported after a percutaneous approach. Despite that, percutaneous PF is performed without direct vision, leading to possible neurovascular injuries.

To reduce the risk of neurovascular lesion, endoscopic techniques for PF were also proposed. Nevertheless, as shown by Ohuchi et al., the primary medial portal, used to introduce the endoscopic cannula deep to the plantar fascia, is close to the proximal branches of the posterior tibial nerve, resulting in an intrinsic risk of nerve-damaging [10].

To the best of our knowledge, the case we described is the first report of iatrogenic lesion of the lateral plantar artery following PF. Previously, only one paper in the literature reported a similar vascular lesion after an endoscopic PF. Gentile et al. [11] described an episode of bleeding encountered during the procedure, at first controlled by cauterization. Following the discharge, recurrent bleedings occurred from the operative site. After a major hemorrhagic episode that required a further hospitalization, a new surgery was performed. Evacuation of a large hematoma on the medial aspect of the foot revealed the source of bleeding to be a pseudoaneurysm of the lateral plantar artery. Both ends of the plantar artery were successfully sutured.

Vascular lesions are frequently not recognized at the time of injury [12]. In our case, the plaster cast was applied in the very same operatory room, right after the skin suture. During his post-operative stay at home, the patient never complained of significant pain, only discomfort in the sole of his foot, in which he considered to be a normal consequence of the surgery performed. Moreover, at the time of the check-up, the plaster appeared in good condition, with no signs of blood. These conditions, together with patient young age, health state, and discharge recommendation, made impossible to notice any bulge at the surgical site level, thus delaying the vascular lesion diagnosis up to 36 days. On the other hand, we may suppose that the plaster cast itself had a role in reducing complications. Its intrinsic inextensibility may have acted as a local hemostatic, rising up the interstitial pressure to value high enough to help reduce the bleeding.

To avoid iatrogenic lesions of the plantar vascular structures

during PF, careful attention to surgical technique is essential. Identification of anatomical landmarks may be helpful [13]. PF should be performed as close as possible to the medioplantar calcaneal tuberosity. As a matter of fact, the lateral plantar artery lesion we described was 2 cm distal to the plantar fascia origin.

Conclusions

It is very important for surgeons to be aware of possible vascular lesions when performing PF. Careful attention to surgical technique can minimize these complications. Surgical site inspection the day after the procedure may help detecting misdiagnosed vascular lesions before patient discharge.

Clinical Message

PF is a widespread surgical technique with multiple indications. Many plantar vascular structures lie in close contact to the surgical site; however, their injuries after PF are not commonly reported in the literature. Our report stresses the importance of a careful surgical technique to reduce possible complication. To promptly detect and repair any vascular damage, it is preferable to release the tourniquet after the completion of the entire surgical procedure, just before closure of the wound, to check for major bleeders and ligate or cauterize them, to prevent such complications. Surgical site inspection the day after the surgery, delaying plaster cast immobilization, should be considered.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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