DOI: https://doi.org/10.30795/scijfootankle.2019.v13.907

CASE REPORT

Scientific Journal of the Foot & Ankle

Case report of a new surgical technique for the treatment of chronic dislocation of the plantar fat pad

Relato de caso de uma nova técnica cirúrgica no tratamento de luxação crônica do coxim plantar

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ABSTRACT

This is a surgical report of chronic traumatic dislocation of the plantar fat pad, with few descriptions in the PubMed, *Web of Science* and Scopus databases. In this study, we seek to describe a surgical technique that may be effective in the treatment of this rare affection. We report a patient who underwent surgery by a foot and ankle specialist who performed a technique in which the plantar fat pad was positioned at its place of origin and fixed with two anchors. After 1 year of follow-up, the surgical outcome was effective.

Level of Evidence V; Therapeutic Studies; Expert Opinion.

Descriptors: Surgical procedures, operative; Calcaneus; Joint dislocations.

RESUMO

Este é um relato cirúrgico de luxação traumática crônica do coxim plantar, com poucas descrições nas bases de dados Pubmed, *Web of Science* e Scopus. Neste trabalho buscamos descrever uma técnica cirúrgica que possa ser efetiva no tratamento deste raro acometimento. É relatado um paciente que foi submetido à cirurgia por especialista de pé e tornozelo que realizou uma técnica em que o coxim plantar é posicionado em seu local de origem e fixado com duas âncoras. Após 1 ano de seguimento, o resultado cirúrgico mostrou-se efetivo**.**

Nível de Evidência V; Estudos Terapêuticos; Opinião do Especialista.

Descritores: Intervenção cirúrgica; Calcâneo; Luxação.

How to cite this article: Buco FHA, Asaumi ID, Apostólico Netto A, Macedo RR. Case report of a new surgical technique for the treatment of chronic dislocation of the plantar fat pad. Sci J Foot Ankle. 2019;13(1):91-4.

INTRODUCTION

Although talalgias are frequent in foot and ankle outpatient clinics, plantar fat pad luxation is rare and difficult to diagnose and treat. The plantar fat pad is a structure formed by layers of adipose tissue, which are kept separated by fibrous septa; these layers are located in the plantar fascia and under the calcaneus and are fixed in its inferior tubercle by the fibrous retinacula[1], having as a primordial function the absorption of shock. Therefore, it is important that they are always in their anatomical place to avoid discomfort to the patient.

This work aims to report and describe a new surgical technique that is effective in the treatment and resolution of chronic traumatic dislocation of the plantar fat pad, in which patient pain and heel deformity were resolved.

Work performed at the IFOR, São Bernardo do Campo, SP, Brazil.

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Conflicts of interest: none. **Source of funding:** none.
Date received: December 18, 2018. **Date accepted:** March 12, 2019. **Online:** March 31, 2019.

CASE REPORT

This study was approved by the Research Ethics Committee with registration in the Brazil Platform under CAAE number: 03951818.2.0000.5625.

C.J.M.S., a 13-year old black male, fell from a wall of approximately 1.5 meters 3 years ago and complained of evolving pain and deformity of the right foot. The patient was referred to our foot and ankle surgery group in a private hospital of great orthopedic demand with the diagnosis of post-traumatic flat foot. After clinical evaluation and radiographic imaging, the patient was diagnosed with a chronic dislocation of the plantar fat pad, and the patient presented with severe pain (grade 8 in the visual analogue scale (VAS)) and severe valgus deformity of the calcaneus.

Initially, conservative treatment was chosen using orthoses and physiotherapies; however, after 3 months of no clinical improvement, the patient was recommended for surgical treatment.

With the patient in lateral decubitus and using a pneumatic tourniquet in the thigh, an extended L-shaped incision was made in the lateral region of the calcaneus, beginning at the region of the Achilles tendon insertion, extending to the calcaneocuboid joint. After dissection, a large area of well-defined fibroelastic tissue (Figure 1) was visualized in the lateral region where the calcaneus is usually found.

Based on the macroscopic appearance, exuberant tissue palpation and disproportion between the subcalcaneal area and the plantar fat pad, resection of the excess tissue was undertaken (Figure 2).

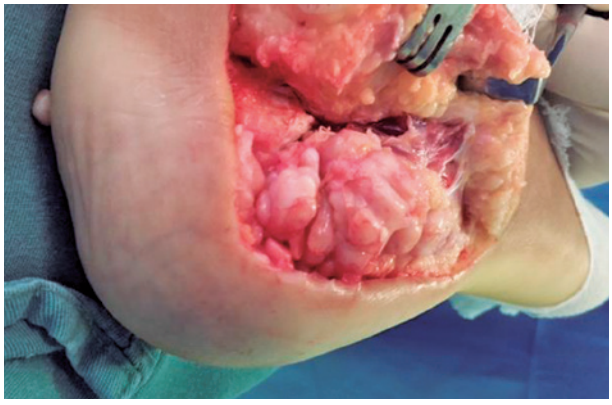

Figure 1. Image showing the extended L-shaped incision and lateralized fibroelastic tissue.
Source: Author's personal archive.

Two 3.5-mm nonabsorbable anchors with 2 wires each were placed in the central line of the calcaneus (Figure 3). A "parachute" type suture was performed with the wires (Figure 4), where the anchor wires transfixed the pad approximately 1 cm deep in a range embracing the entire lateral, posterior and medial pad and placed it in its original anatomical region.

The tourniquet was removed, and good perfusion of the reinserted tissue was visualized (Figure 5). To facilitate the dressing, the pad fixation was reinforced through 2 Kirschner wires, which were placed in the centerline of the calcaneus, perpendicular to it and interspersed with the 2 anchors. The wires were exposed and were removed after 6 weeks.

Figure 2. Image showing the entire resected fibroelastic tissue.
Source: Author's personal archive.

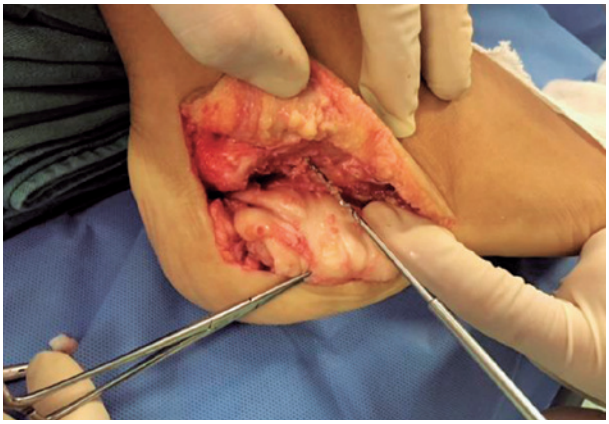

Figure 3. Image showing the central line of the calcaneus where 2 tunnels were made using a rigid drill for the placement of the 2 anchors.
Source: Author's personal archive.

Although the incision was large, there were no complications in the postoperative period such as skin dehiscence or nerve damage. The patient was maintained with a short leg splint for 1 month and 2 weeks and was instructed to have zero load for 2 months after the surgical procedure.

After 5 months, the patient progressed well without disabling pain complaints, evolving to grade 1 on the VAS and with a slight valgus heel (Figure 6). The patient resumed normal activities of daily living.

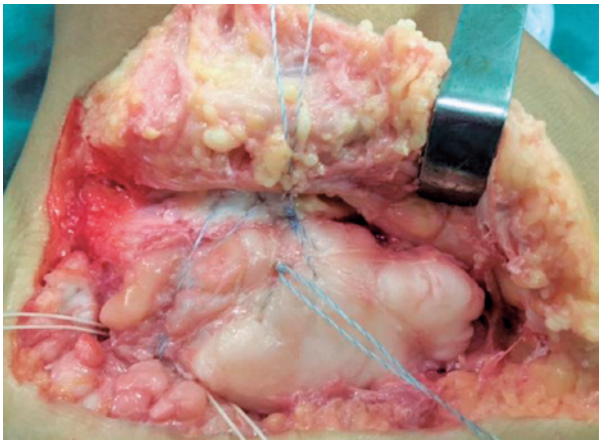

Figure 4. "Parachute" suture where the anchor threads transfix the fat pad 1cm deep in a range embracing the entire lateral, posterior and medial fat pad, securing the pad in its original anatomic region.
Source: Author's personal archive.

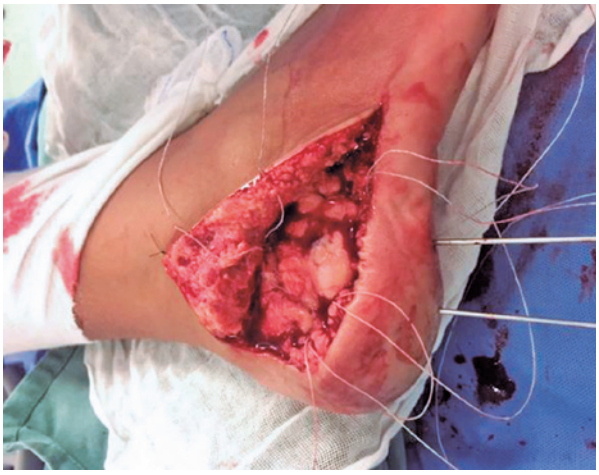

Figure 5. Image showing the immediate postoperative period with good perfusion of the fat pad, which was fixed in its original anatomical site.
Source: Author's personal archive.

DISCUSSION

There are many causes of subcalcaneal pain, and the most common pathologies are plantar fasciitis[2], compression of the abductor nerve of the fifth toe, tarsal canal tunnel syndrome, Sever's apophysitis, medial plantar neuropraxia, stress fracture of the calcaneus and local infectious processes. In the case reported herein, all these pathologies were ruled out through examinations, and it was concluded that the patient's pain and the calcaneal deformity occurred due to changes in the plantar fat pad

The calcaneal plantar fat pad is a specialized structure that supports weight and acts as a natural shock absorber. It is formed by layers of fatty tissue, which are kept separated by fibrous tissues[2,3]. These layers are located in the plantar fascia and under the calcaneus and are fixed in its inferior tubercle by the fibrous retinacula[1]. Trauma or overload conditions can cause the rupture of these fibrous septa and injury of the normal anatomical structure of the fatty pad, causing functional alterations that interfere in the capacity to support weight without pain[4,5].

The literature, in general, states that the main cause of pain in the plantar fat pad is due to a change in adipose tissue, which occurs due to the aging process or ruptures of the fibrous septa due to trauma, leading to changes in the mechanical properties of the fat pad. These changes cause

Figure 6. Five-month postoperative image showing a slight valgus deformity compared to the contralateral side.
Source: Author's personal archive.

severe pain and have little analgesic response with conservative treatment. Affected patients present with significant pain in the plantar region of the hindfoot, decreased pad thickness and increased latero-medial mobility.

Older patients may develop age-related fat atrophy. In young patients, mechanical overload can produce an inflammatory process of the plantar fat, causing symptoms of pain and, consequently, fat degeneration. In these situations, it is possible to observe the replacement of normal fat tissue with fibrous tissue on magnetic resonance imaging[5].

The study patient reported pain, fat pad deformity and difficulty wearing shoes (because they were always "tight" in the lateral region of the calcaneus) after trauma. At the physical examination, he had increased sensitivity in the lower region of the hindfoot, lateralization of the plantar fat and hypermobility of the fat pad. There were no bone changes on the radiographs.

Non-surgical treatment consists of the use of orthoses and physical therapy; however, the results are usually not satisfactory, and surgical treatment is indicated for realignment of the plantar fat pad. Only one surgical technique, which was described by Prado et al.[5], was found in the literature, but there is no standardized technique for this pathology.

The surgery described was beneficial for the patient because at a year of follow-up, the patient's VAS score was reduced from 8 in the preoperative period to 2 after 5 months, and the VAS score remained at 2 at the 12 month follow-up. The deformity, which was severe valgus of the calcaneus in the preoperative period, was a slight valgus at 5 and 12 months.

We considered that in light of the good surgical result, the reinforcement of the fixation with 2 Kirschner wires was essential because it kept the synthesis more rigid and stable in the immediate postoperative period, preventing dislocation from occurring again during dressing changes. It was also very important to maintain zero load for 2 months after surgery to ensure the fat pad was given time to heal at its anatomical site.

The success of the procedure may also benefit the treatment of other patients who present with the same deformity because this is an economical surgical technique that can be performed by other orthopedic surgeons on any patient who has acute or chronic dislocation of the plantar fat pad.

CONCLUSION

Because it is a chronic deformity, the treatment used in this case, with resection of the exuberant tissue and rigid fixation of the fat pad in its anatomic site, proved to be effective, and the patient resumed his sports and activities of daily living.

Authors' contributions: Each author contributed individually and significantly to the development of this article FHAB *(https://orcid.org/0000-0002-4069-5199) conceived and planned the activities that led to the study, performed the surgeries, participated in the review process, interpreted the results of the study, wrote the article; IDA *(https://orcid.org/0000-0002-4074-0412) participated in the review process, interpreted the results of the study, approved the final version; AAN *(https://orcid.org/0000-0001-9237-869X) performed the surgeries, participated in the review process, wrote the article, approved the final version; RRM *(https://orcid.org/0000-0002-2563-2085) interpreted the results of the study, aprovou a versão final. *ORCID (Open Researcher and Contributor ID).

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