

Plantar fibromatosis: Place of MRI

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ABSTRACT

Introduction: Plantar fibromatosis or Ledderhose disease is a benign tumor of fibrous tissue of the foot sole, it may be locally aggressive and generate commonly a pain while walking. **Case Report:** We report a case of plantar fibromatosis in a 30-year-old man diagnosed thanks to magnetic resonance imaging (MRI) based on the specific characteristics of this entity. **Surgical excision was required given the character larger and painful of the lesion, with satisfactory evolution.** **Conclusion:** Magnetic resonance imaging is the best modality available for analysis of plantar fibromatosis, it also ensures the differentiation between malignant tumors of the foot.

Keywords: Fibromatosis, Magnetic resonance imaging, Plantar

How to cite this article

Hatim E, Meryem E, Zahrae LF, Leila J. Plantar fibromatosis: Place of MRI. Int J Case Rep Images 2020;11:101096Z01HE2020.

Article ID: 101096Z01HE2020

doi: 10.5348/101096Z01HE2020CR

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Received: 30 November 2019

Accepted: 27 December 2019

Published: 07 February 2020

INTRODUCTION

Plantar fibromatosis corresponds to a benign and local proliferation of fibrous tissue within the superficial plantar fascia, it can be unilateral or bilateral and remains of unknown cause. The diagnosis is clinical and radiological based on ultrasound and especially on MRI, the histological confirmation is required before surgical intervention.

We report a case of plantar fibromatosis in a 30-year-old man diagnosed thanks to MRI, and we underline via this article the specific characteristics of this entity and the importance of MRI in the diagnosis, with a review of the literature.

CASE REPORT

We report the case of a 30-year-old man, with no significant medical or family history, who accused plantar nodule that had increased in size, become painful, and hindered walking. Clinical examination showed a subcutaneous solid, fixed and painless nodule on the medial aspect of the plantar surface of the right foot.

The patient was otherwise healthy and vital signs and laboratory tests were unremarkable. Magnetic resonance imaging was carried out for better characterizing. The right foot MRI was performed using a T1-weighted (Figure 1A), proton density after fat saturation (Figure 1B) and T1-weighted with gadolinium injection after fat saturation sequences in the axial and sagittal plans (Figure 2).

It shows a multinodular mass thickening in the distal part of the superficial plantar aponeurosis regarding the flexor digitorum brevis of the right midfoot, the mass is slightly hypointense compared to the muscle on T1 weighted (Figure 1A), with digitations of a low signal along with the mass. On proton density sequence after fat saturation, the mass is in hyperintense signal relative to muscles and persistently low-signal digitations (Figure 1B), with heterogeneous enhancement after gadolinium injection (Figure 2). There was no associated aponeuroathy.

Our patient had a surgical excision given the character larger and painful of the lesion. A small surgical incision was made regarding the nodule, the careful dissection of the fascia allowed the exposure and the total excision of

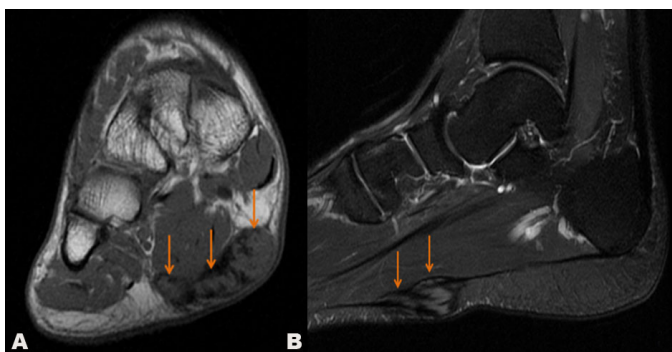


Figure 1: MRI of the left foot in axial section in T1-weighted sequence (a) and in sagittal section in proton density weighting after saturation of the fat (b), the images demonstrate a multinodular thickening in the distal part of the plantar fascia in T1-weighted hyposignal and hypersignal in DP, the lesion presents multilobulated and regular outline, it bombs in the underlying muscle and skin without signs of involvement.

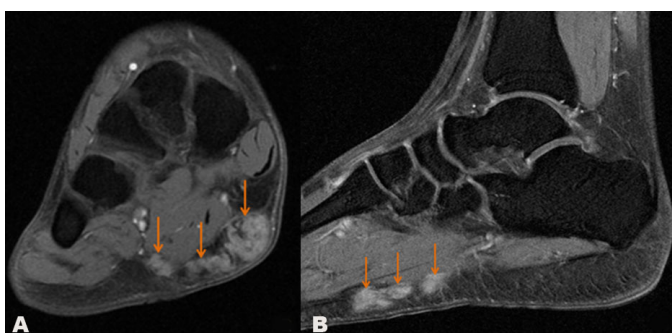


Figure 2: MRI of the left foot in axial (a) and sagittal (b) sections in T1-weighted sequence with fat saturation and gadolinium injection, we notice an intense and heterogeneous enhancement of the lesion after gadolinium injection. The underlying muscle is respected.

the nodule. The skin flaps were sutured with a favorable postoperative evolution. The diagnosis was confirmed by histological analysis.

DISCUSSION

Plantar fibromatosis or Ledderhose disease was first described in 1897 by Georg Ledderhose [1]. It is a rare locally benign proliferation of fibrous nodular tissue within the plantar aponeurosis, it occurs most frequently between the ages of 30 and 50 years. Men are more often affected than women with bilateral involvement seen in 20–50% of cases [2, 3]. These lesions concern most commonly the medial aspect of the plantar aponeurosis. We find usually one or multiple subcutaneous nodules that are typically firm and fixed and may involve the skin or the deep structures of the foot.

It has been hypothesized that the nodule form is a result of the hyperactivity of mature fibroblasts. Some studies have reported growth factors to play a role in

increasing fibroblastic activity causing the formation of the fibromas.

These growth factors that have been identified include platelet-derived growth factor, transforming growth factor- β , free oxidized radicals, and interleukin-1 α [3–5].

Clinically, plantar fibromatosis is often asymptomatic until the lesion increases in volume and causes mass effect or involves adjacent muscles or neurovascular structures.

The diagnosis of plantar fibromatosis can often be evoked before the use of imaging; however, imaging is useful to rule out other diagnoses and for surgical planning.

Plain radiography is very limited in aiding with the diagnosis of plantar fibromatosis; also, the computed tomography (CT) is limited because of the fact that the appearance of the plantar fibroma is very nonspecific on CT scan [3, 6].

In ultrasound, the lesion appears as a fusiform or multinodular thickening regarding the superficial slope of the plantar fascia, which is hypoechoic or heterogeneous and may present a vascularization to the color Doppler specially in pain phase. Ultrasound does not give a certain diagnosis especially in the involving form of plantar fibromatosis [7].

Currently, MRI is the best modality for assessment of a plantar fibroma, it is useful for the mass characterization and evaluating its extension into the surrounding tissue. On the T1-weighted sequence, areas of dense collagen within the fibroma present a low signal intensity comparing to the muscle (Figure 1A), and on T2-weighted sequence it appears with low to intermediate signal intensity, lesions involving deeper structures demonstrate usually high signal intensity on T2-weighted images, and lesions with high collagen content present generally a low signal intensity appearance in T2-weighted images [8, 9].

We find typically a high intensity in proton density sequence after fat saturation (Figure 1B), and the contrast injection reveals variable enhancement that is often marked and heterogeneous (Figure 2) and may extend along the plantar aponeurosis [7, 10]. In a series of 15 patients, fibromatosis nodule was not enhanced for one case (7%), a mild enhancement was found in five cases (33%), and it was marked in nine (60%) [11]. Despite the cost, MRI is crucial in surgical planning by the determination of the margins of the lesion and its extension into adjacent structures, allowing for better surgical resection [7].

There are other benign and malignant tumors that are considered as the differential diagnoses of plantar fibromatosis. Benign masses include neurogenic tumors (e.g., neurofibromas), intermetatarsal neuromas, ganglion cysts, and leiomyomas. The malignant lesions are evoked in front of aggressive clinical and imaging presentations, the malignant tumors to evoke in fist are the rhabdomyosarcomas and liposarcomas. Thanks to MRI we can confirm the plantar fibromas and differentiate

it from the above differential diagnoses. The histological confirmation is required before surgical intervention [12].

Numerous therapeutic approaches for plantar fibromatosis are described, the conservative methods include anti-inflammatory treatment, intralesional steroid, and radiation therapy. The surgical treatment is requested if the lesion is larger, painful, or demonstrating a neurovascular involvement [4, 12].

The prognosis of plantar fibromatosis depends on the quality of the surgical exeresis to avoid local recidivism.

Recidivism is frequently objectified in case of bilateral involvement, family history of plantar fibromatosis, or the development of a postoperative neuroma [4, 12]. Our patient had a surgical excision with satisfactory evolution.

CONCLUSION

Plantar fibromatosis is a benign condition that often results in pain, functional disability, and decreased quality of life. Magnetic resonance imaging is the best imaging modality for diagnosis of a plantar fibromatosis, for above differential diagnoses and planning the surgery. The prognosis of the disease depends on the quality of the surgical exeresis to avoid local recidivism.

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Author Contributions

Essaber Hatim – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Echchikhi Meryem – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Laamrani Fatima Zahrae – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Guarantor of Submission

The corresponding author is the guarantor of submission.

Source of Support

None.

Consent Statement

Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.

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