

Plantar Fibromatosis

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Plantar fibromatosis is a benign disorder of unknown etiology characterized by neoplastic proliferation of immature fibroblasts within the plantar fascia or aponeurosis. Also known as Ledderhose disease, it may present as a single fusiform or exophytic nodule (fibroma), multiple nodular thickenings (multiple fibromas), or an infiltrating mass (fibromatosis) extending along the plantar and/or dorsal aspects of the foot.

Plantar fibromas classically arise along the medial and central aspects of the plantar fascia, most often in non-weight-bearing regions (Figure 1). Superficial fascial lesions are smaller, better defined, and less aggressive than the deeper musculoaponeurotic variety. They often present as painful, firmly palpable masses along the plantar aspect of the foot (Figure 2).¹ Bilateral involvement is seen in 20%-50% of patients, and these lesions are thought to never metastasize.¹ Other types of superficial fibromatosis, such as Peyronie disease and Dupuytren contracture, are associated with fibromas in 10%-65% of cases.^{2,3}

Infiltration of adjacent musculature is characteristic of deep or aggressive fibromatosis.³ Deeper lesions are large and poorly defined at presentation but clinically more subtle, usually going undetected until they exert mass effect on adjacent muscles or neurovascular bundles.²⁻⁵

Magnetic resonance imaging (MRI) is excellent at fully delineating the extent of disease.⁴ Fibromas classically appear as intermediate- to low-signal intensity masses on T₁- and T₂-weighted images (Figure 2). However, MRI signal intensity has an inverse relationship with the collagen content of the lesion. Deeper lesions are more cellular and therefore demonstrate higher T₂-signal intensity (Figure 3). Superficial non-aggressive lesions have higher internal collagen content and therefore demonstrate lower T₂-signal intensities.^{1,4-6} Gadolinium contrast enhancement is variable, with marked enhancement seen in 50% of lesions.^{4,6}

Ultrasound is a quick and relatively inexpensive way to diagnose these lesions. They usually appear as isoechoic or hypoechoic fusiform nodules or masses along the

central and medial aspects of the plantar fascia, with variable internal vascularity on color or power Doppler sampling depending on the aggressiveness of the tumor (Figure 4).⁷

The appearance, location, and morphology of the lesions on ultrasound and MRI usually allow diagnosis of plantar fibromatosis to be made with certainty. However, scar formation (keloid), plantar fasciitis, gout, and, rarely, other tumors, such as clear-cell sarcoma (malignant melanoma of soft tissues), can show similar characteristics.⁶ Therefore, plantar fibromatosis is more confidently diagnosed when the clinical presentation is correlated with the imaging findings.

Treatment of plantar fibromatosis ranges from foot orthotics, for superficial nonaggressive lesions, to surgical resection and radiation therapy in recalcitrant cases. Simple surgical excision can be associated with up to 60%-100% recurrence rates, and therefore wide marginal excision is

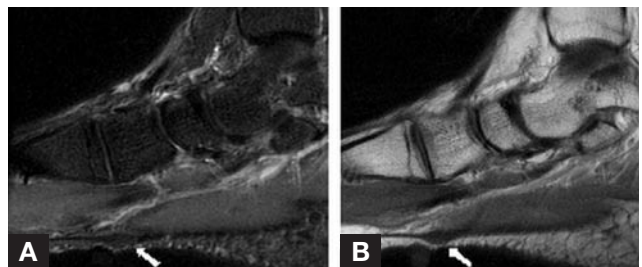


Figure 1. Sagittal inversion recovery (A), sagittal (B), and coronal (C) proton density-weighted images demonstrate a discrete excentric nodule (arrows) within the medial aspect of the plantar fascia consistent with a plantar fibroma.

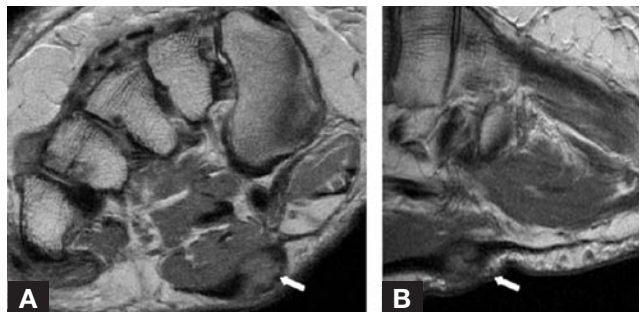


Figure 2. Coronal (A) and sagittal (B) proton density-weighted images demonstrate a fusiform mass medially within the distal plantar fascia consistent with a plantar fibroma. The central area of increased signal intensity reflects higher internal cellular content.

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Figure 3. Sagittal inversion recovery (A), sagittal (B), and coronal (C) proton density–weighted images demonstrate a large mass within the plantar fascia consistent with a plantar fibromatosis.

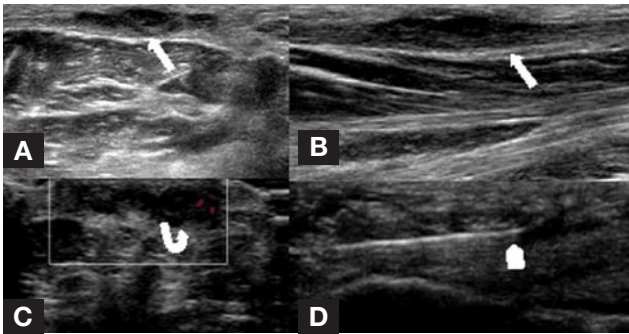


Figure 4. Transverse (A) and longitudinal (B) ultrasound images through area of foot with palpable abnormality demonstrate a superficial fusiform hypoechoic mass within the plantar fascia, reflecting a plantar fibroma (straight arrows). (C) Power Doppler sampling demonstrates increased eccentric internal vascularity (curved arrow). (D) Ultrasound-guided steroid and anesthetic injection was performed for temporary pain relief (arrowhead shows needle tip).

often necessary.⁸ Ultrasound-guided steroid and anesthetic injection can be used for temporary local pain relief.

AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

REFERENCES

1. Robbin MR, Murphey MD, Temple HT, Kransdorf MJ, Choi JJ. Imaging of musculoskeletal fibromatosis. *Radiographics*. 2001;21(3):585-600.
2. Lee TH, Wapner KL, Hecht PJ. Plantar fibromatosis. *J Bone Joint Surg Am*. 1993;75(7):1080-1084.
3. Yu JS. Pathologic and post-operative conditions of the plantar fascia: review of MR imaging appearances. *Skeletal Radiol*. 2000;29(9):491-501.
4. Wetzel LH, Levine E. Soft-tissue tumors of the foot: value of MR imaging for specific diagnosis. *AJR Am J Roentgenol*. 1990;155:1025-1030.
5. Sharma S, Sharma A. MRI diagnosis of plantar fibromatosis—a rare anatomic location. *The Foot*. 2003;13:219-222.
6. Morrison WB, Schweitzer ME, Wapner KL, Lackman RD. Plantar fibromatosis: a benign aggressive neoplasm with a characteristic appearance on MR images. *Radiology*. 1994;193:841-845.
7. Pham H, Fessell DP, Femino JE, Sharp S, Jacobson JA, Hayes CW. Sonography and MR imaging of selected benign masses in the ankle and foot. *AJR Am J Roentgenol*. 2003;180(1):99-107.
8. Wapner KL, Ververeli PA, Moore JH Jr, Hecht PJ, Becker CE, Lackman RD. Plantar fibromatosis: a review of primary and recurrent surgical treatment. *Foot Ankle Int*. 1995;16(9):548-551.