

Case 12691

Baxter's neuropathy: Isolated fatty atrophy of the abductor digiti minimi muscle in association with plantar fasciitis

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Diagnóstico por Imágenes Adrogué

Resonance

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Section: Musculoskeletal System

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Patient: 66 year(s), female

Clinical History

A 66-year-old woman with history of chronic recurrent painful heel. On physical examination, there was no evidence of sensory loss.

Imaging Findings

Magnetic resonance imaging of the right foot performed with a high-resolution surface coil. Patient scanned in magnet of 1.5 T. The technical parameters for all magnet strengths were as follows: sagittal, coronal and axial short-tau inversion recovery (STIR) turbo spin echo, coronal turbo spin-echo proton density and T2-weighted and sagittal and coronal turbo spin echo T1-weighted. MR images show marked thickening of the proximal plantar fascia with increased intrasubstance signal intensity. Also perifascial and mild calcaneal marrow oedema.

In association with these findings, there is selective fat tissue replacement of the abductor digiti minimi muscle.

Discussion

Baxter's neuropathy is an entrapment syndrome of the inferior calcaneal nerve (ICN), which is the first branch of the lateral plantar nerve. It accounts for 20% of causes of medial heel pain, occasionally irradiating into the lateral aspect of the foot [1, 2, 3].

Atrophy of the abductor digiti minimi muscle reflects chronic compression of the ICN, which consist of loss of muscular mass of the affected muscle with fat tissue replacement (Fig. 1) [4]. MRI plays a key role since nerve entrapment at the foot and ankle involves thin and complex anatomic structures and is underdiagnosed because clinical symptoms and electrophysiologic findings may not contribute to the diagnosis [1]. In addition, opposite to MRI electromyography may not allow differentiation of lateral plantar nerve entrapment at the level of the tarsal tunnel from ICN entrapment [1].

Entrapment of the ICN occurs at three possible places: (a) adjacent to the fascial edge of a hypertrophied abductor hallucis muscle, (b) as the nerve passes between the deep fascia of the abductor hallucis muscle and the medial caudal margin of the medial head of the quadratus plantae muscle or (c) most commonly where the nerve passes just anterior to the medial calcaneal tuberosity, where it is sometimes related with calcaneal spur and marked thickening of the proximal plantar fascia, as it is shown in our case (Fig. 2) [1, 4].

Compression of the ICN may result from altered biomechanics, reflected by posterior tibial tendon dysfunction or Achilles tendinosis, or may result from direct mechanical compression of the nerve due to plantar fasciitis and/or plantar calcaneal spurs (Fig. 3) [2]. Recht et al reported plantar fasciitis in 37% of cases with abductor digiti quinti atrophy [4].

Plantar fasciitis is referred in the literature as the most common cause of plantar heel pain [5, 6]. This condition generally occurs in obese middle-aged or elderly patients as a result of repetitive trauma from sport activities, excessive standing and walking [5, 6].

In view of the present case, and in order to identify the proper imaging approach to the patient with heel pain, we recommend to assess findings of fatty infiltration of the abductor digiti minimi muscle, since it reflects chronic ICN entrapment.

Final Diagnosis

Baxter's neuropathy associated with plantar fasciitis

Differential Diagnosis List

Intramuscular abductor digiti minimi lipoma, Plantar fibromatosis, Isolated plantar fasciitis, Abductor digiti minimi atrophy associated with plantar fasciitis (Baxter neuropathy: chronic ICN entrapment)

Figures

Figure 1 Abductor digiti minimi quinti muscle: normal and pathologic appearance



Coronal T1 weighted TSE image shows the normal muscle anatomy. ADQ: abductor digiti quinti. FD: flexor digitorum brevis. QP: quadratus plantae. AH: abductor hallucis

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Area of Interest: Extremities; Musculoskeletal soft tissue; Neuroradiology peripheral nerve;
 Imaging Technique: MR;
 Procedure: Diagnostic procedure; Education;
 Special Focus: Inflammation;



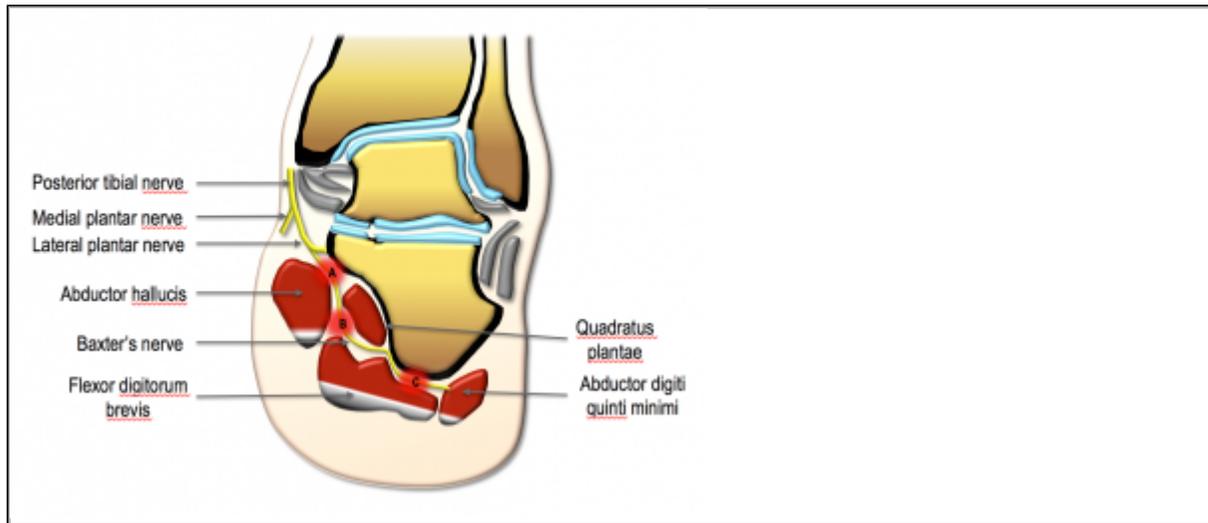
Coronal T1 weighted TSE image showing fatty replacement and atrophy of the abductor digiti minimi (star).

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Figure 2 Sites of entrapment



Sites of entrapment. Adjacent to the medial edge of the abductor hallucis muscle (AHM) (A), between the fascia of the AHM and the quadratus plantae muscle (B) and, anterior to the medial calcaneal tuberosity (C).

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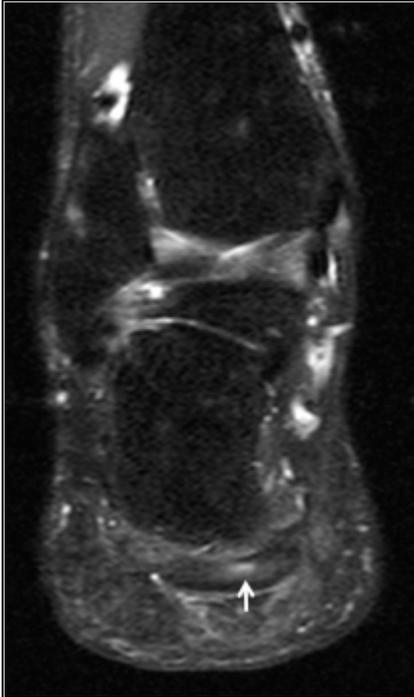
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Coronal Proton Density weighted TSE image showing relation between plantar fasciitis (arrow) and site of entrapment of Baxter's nerve.

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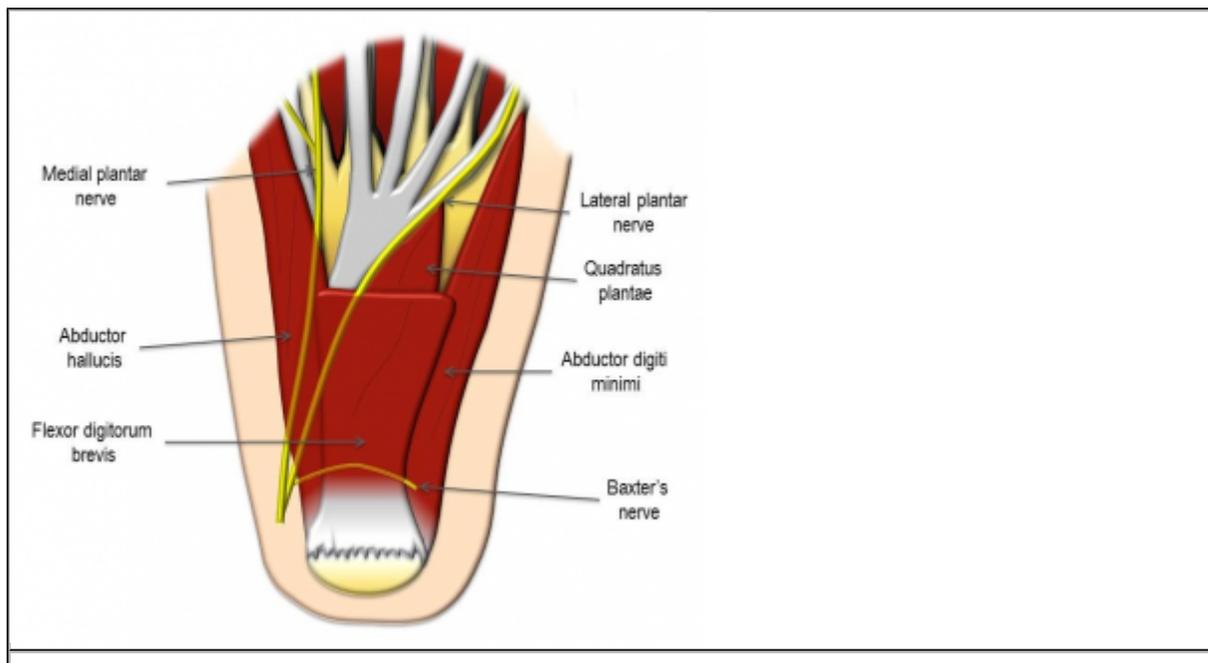


Coronal STIR image showing relation between plantar fasciitis (arrow) and site of entrapment of Baxter's nerve.

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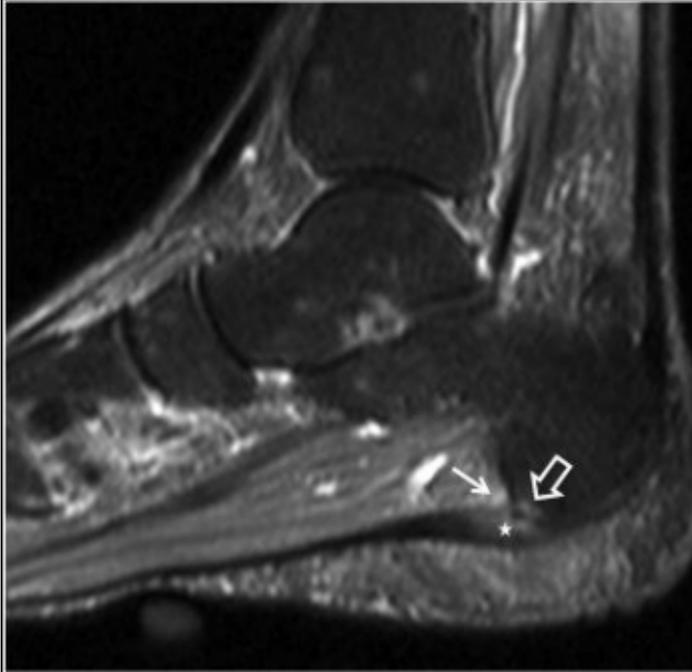
Figure 3 Baxter's nerve and calcaneal spur formation



Drawing showing relation between Baxter's nerve and site of calcaneal spur formation. Note that the flexor digitorum muscle has been partially removed.

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Sagittal STIR image shows plantar fasciitis (star) with bone marrow edema of the calcaneus (open arrow) and edema of the periferic soft tissues at the insertion of the fascia (arrow).

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Sagittal T1 weighted TSE image shows fatty replacement and atrophy of the abductor digiti quinti (star)

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References

- [1] Donovan, Z. S. Rosenberg, C. F. Cavalcanti (2010) MR Imaging of Entrapment Neuropathies of the Lower Extremity. Part 2. The Knee, Leg, Ankle, and Foot. *RadioGraphics* 30:1001-1019
- [2] U. Chundru, A. Liebeskind, F. Seidelmann, J. Fogel, P. Franklin, J. Beltran (2008) Plantar Fasciitis and Calcaneal Spur Formation are Associated with abductor digiti minimi atrophy on MRI of the foot. *Skeletal Radiology* 37:505-510
- [3] Boon, M. Dib (2009) Peripheral Nerve Entrapment and Compartment Syndromes of the Lower Leg Nerve and Vascular Injuries in Sports Medicine 139-159
- [4] Recht MP, Grooff P, Ilaslan H, Recht HS, Sferra J, Donley BG (2007) Selective Atrophy of the Abductor Digiti Quinti: An MRI Study. *AJR* 189:W123-W127
- [5] J. A. Narváez, J. Narváez, R. Ortega, C. Aguilera, A. Sánchez, E. Andia (2000) Painful Heel: MR Imaging Findings *Radiographics* 20:333-352
- [6] D. A. Lawrence, M. F. Rolen, K. A. Morshed, H. Moukaddam (2013) MRI of Heel Pain *AJR* 200:845-855

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