Morton Neuroma

Paul D. Clifford, MD, and Rachel B. Hulen, MD

Morton neuroma, a non-neoplastic lesion occurring at the level of the metatarsal heads, is characterized histologically by neural degeneration, vascular hyalinization, and perineural fibrosis. Several theories have been advanced as to the etiology of Morton neuroma, including repetitive trauma and mechanical compression by the adjacent transverse intermetatarsal ligament just dorsal to the nerve.[1] The lesion occurs most often at the third intermetatarsal space and then at the second. Most patients with Morton neuroma are women. Excessive weight-bearing on the forefoot, related to high-heel footwear, has been implicated as a causal factor. Clinically, the mass presents with forefoot tingling or paresthesias and a pain described by patients as an electric or burning sensation.

"MR diagnosis of Morton neuroma does not imply symptomatology..."

Magnetic resonance (MR) is useful in the diagnosis of Morton neuroma when the pain or presentation is atypical and when preoperative imaging is desired.[2] MR diagnosis of Morton neuroma does not imply symptomatology, as masses may be found in asymptomatic volunteers. Lesions larger than 5 mm in the transverse dimension tend to exhibit symptoms, but imaging findings should always be correlated with clinical examination and history.[3]

The short-axis axial T_1-weighted sequence (sliced perpendicular to the long axis of the metatarsal bones) is most useful for detecting a Morton neuroma (Figure 1A). The mass is isointense to muscle, discrete, and situated plantar to the transverse intermetatarsal ligament along the neural bundle between the metatarsal heads. The lesion imparts a convex rather than a concave margin to the plantar aspect

Dr. Clifford is Assistant Professor of Clinical Radiology and Chief, Musculoskeletal Section, Department of Radiology, University of Miami Miller School of Medicine, Miami, Florida.
Dr. Hulen is Fellow, Musculoskeletal Radiology, Henry Ford Health System, Detroit, Michigan.

Requests for reprints: Paul D. Clifford, MD, Department of Radiology, Applebaum Outpatient Center, University of Miami, 1115 NW 14th St, Miami, FL 33136-2106 (tel, 305-243-5449; fax, 305-243-8422; e-mail, pclifford@med.miami.edu).

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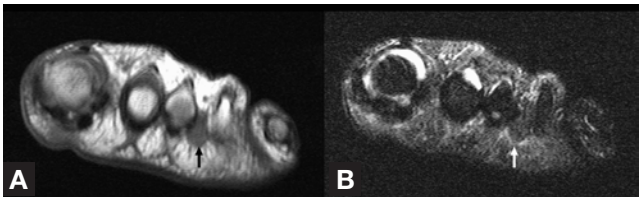

Figure 1. **(A)** Short-axis axial T_1-weighted image shows a mass isointense to muscle in the third intermetatarsal space—representing a Morton neuroma. Note the convex plantar margin imparted to the involved interspace by the mass and the concave plantar margin at the adjacent interspaces without a mass. **(B)** Short-axis axial STIR (short-tau inversion recovery) image at the level described in Figure 1A shows the Morton neuroma to be of low signal intensity relative to the bright fluid in the adjacent first and second metatarsal phalangeal joints.

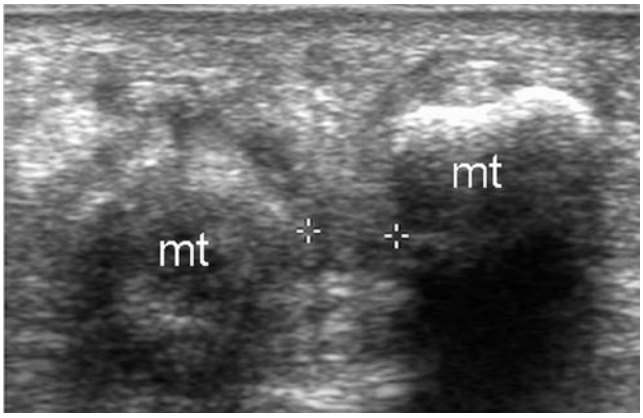

Figure 2. Short-axis axial ultrasound shows a 4-mm hypoechoic Morton neuroma (inside calipers) between the metatarsals (mt).

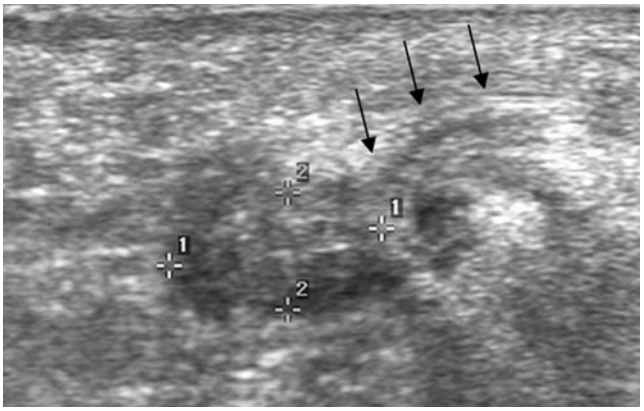

Figure 3. Sagittal image through the intermetatarsal space provides a longitudinal view of the Morton neuroma (inside calipers). A linear structure extending from the mass at the 2-o'clock position represents the neurovascular bundle (arrows).

of the intermetatarsal space. The margins of the mass are well delineated by adjacent bright high-signal fat. Most lesions are of primarily low signal intensity on T_2-weighted images because of the histologic presence of fibrous tissue (Figure 1B). True neuromas and fluid within the intermetatarsal bursa, unlike Morton neuromas, characteristically exhibit high/bright signal on T_2-weighted sequences, and these signal characteristics may be helpful in the differential diagnosis.

Ultrasound can detect Morton neuromas with accuracy (85%-98% of lesions detected prospectively). The masses are well-defined, primarily hypoechoic masses at the level of the metatarsal heads (Figure 2). Identification of the plantar nerve in continuity with the mass improves diagnostic confidence[4] (Figure 3). Dynamic ultrasound using lateral compression of the metatarsal heads (sonographic Mulder sign) makes the plantar mass more evident.[5]

Authors' Disclosure Statement

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

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