Musculoskeletal case 25. Diagnosis

Morton's neuroma

The axial STIR sequence (Fig. 1) demonstrated a mass (arrow) of mixed intermediate and high signal intensity between the heads of the third and fourth metatarsals (arrowheads). The adjacent bones appeared normal. In particular, there was no evidence of fracture or osteonecrosis. The STIR sequence suppresses signal from fat and marrow and emphasizes the signal from water (edema). A T_1-weighted axial sequence through the same region (Fig. 2) demonstrated a solid low-to-intermediate signal lesion in this area (arrow) that enhanced brightly (though heterogeneously) after the intravenous administration of gadolinium (Fig. 3, arrow).

The magnetic resonance imaging features of a well-defined, solid enhancing lesion located in the third interdigital space between the heads of the metatarsal bones, without adjacent bony abnormality, is characteristic of Morton's neuroma.[1,2]

Morton's neuroma (also known as Morton's metatarsalgia) is believed to be a mechanical entrapment neuropathy usually affecting the third or fourth plantar interdigital nerves at the level of the metatarsal heads. The lesion is not a true neuroma and actually represents perineural fibrosis, which may be associated with local demyelinization and microvasculopathy.[3]

The condition most commonly affects women between 30 and 60 years of age and is associated with the wearing of high-heeled, narrow-toed shoes. Patients present with forefoot pain, aggravated by walking, which may radiate to the toes, dorsal aspect of the foot or even the lower leg. Noticeable swelling or a mass is unusual. Patients may have a positive Mulder's sign: pain and a palpable click produced by squeezing the metatarsal heads together with one hand while simultaneously compressing the involved web space with the thumb and index finger of the other hand.[3]

The differential diagnosis includes stress fracture, lumbar radiculopathy, Freiberg's osteonecrosis, rheumatoid arthritis, ganglion cyst, bursitis and painful plantar callus. When the clinical features are atypical, imaging is useful to rule out other conditions and confirm the presence and site of the neuroma. Plain radiographs are usually normal, although splaying of the metatarsal heads may be seen if the neuroma is large. Magnetic resonance imaging provides a comprehensive view of the foot, useful for excluding other diagnoses. The magnetic resonance imaging features of a well-defined, solid enhancing lesion located in the third interdigital space are classical but not always present. Lesions may occur in other interdigital spaces and do not always show enhancement.[4] Sonography has a reported high sensitivity and specificity

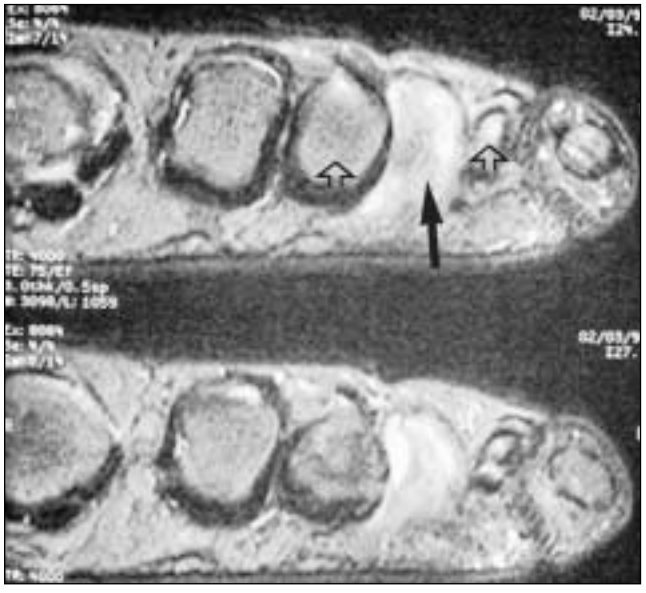

FIG. 1.

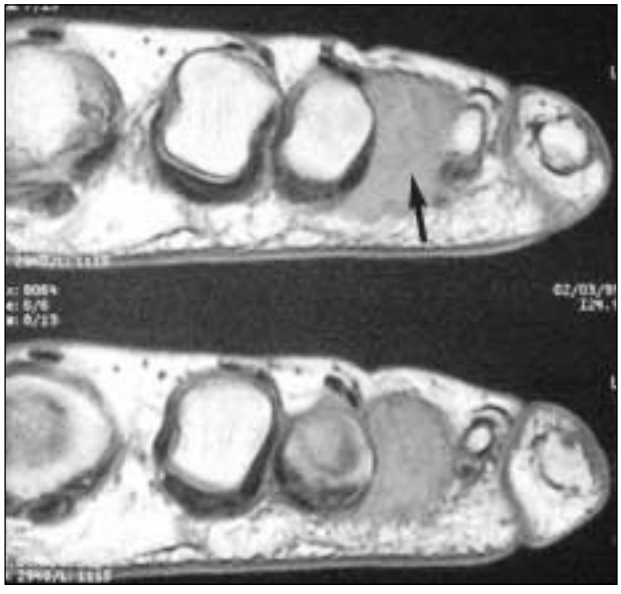

FIG. 2.

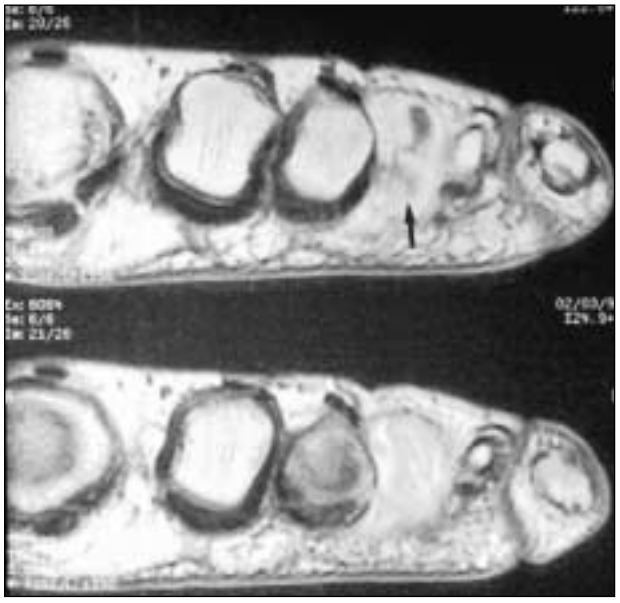

FIG. 3.

FIG. 4.

for the diagnosis of lesions greater than 5 mm in diameter.[5] Fig. 4 demonstrates a transverse (axial) image through the heads of the metatarsals. A well-defined homogeneous, mildly echogenic lesion is noted (arrow) between the heads of the third and fourth metatarsal bones. The lesion may also be hypoechoic. Cross-sectional imaging (primarily ultrasonography or magnetic resonance imaging) is important to accurately localize the lesion if surgery is contemplated, as clinical findings may be misleading.

When describing the lesion in 1876, Morton recommended "vigorous bloodletting" to treat this painful condition. Surgical therapy has been more successful but frequently fails and symptoms recur, so it should only be offered for failed nonoperative care.[6] Aggressive conservative therapy, consisting of footwear modification, metatarsal pads, orthotics, analgesics and steroid injection is the treatment of choice and has a reasonable success rate.

References

1. Resnick D. *Diagnosis of bone and joint disorders.* Philadelphia: W.B. Saunders; 1995. p. 3398-9.
2. Zanetti M, Ledermann T, Zollinger H, Hodler J. Efficacy of MR imaging in patients suspected of having Morton's neuroma. *AJR Am J Roentgenol* 1997;168: 529-32.
3. Wu KK. Morton's interdigital neuroma: a clinical review of its etiology, treatment and results. *J Foot Ankle Surg* 1996;35: 112-9.
4. Williams JW, Meaney J, Whitehouse GH, Klenerman L, Hussein Z. MRI in the investigation of Morton's neuroma: Which sequences? *Clin Radiol* 1997;52:46-9.
5. Quinn TJ, Jacobson JA, Craig JG, Van Holsbeeck MT. Sonography of Morton's neuromas. *AJR Am J Roentgenol* 2000; 174:1723-8.
6. Younger AS, Claridge RJ. The role of diagnostic block in the management of Morton's neuroma. *Can J Surg* 1998;41: 127-30.