Case reports

Desmoplastic fibroma of the calcaneus

Joseph S. Yu, M.D. 1, Steve Lawrence, M.D. 2, 3, Mini Pathria, M.D. 3, 4, Donald Resnick, M.D. 3, 4, Parvis Haghighi, M.D. 3, 4

1 Department of Radiology, Ohio State University Medical Center, Columbus, Ohio, USA
2 Department of Orthopedic Surgery, University of California, San Diego, California, USA
3 Veterans Administration Medical Center, San Diego, California, USA
4 Department of Radiology, University of California, San Diego, California, USA

Clinical information

A 21-year old Mexican woman complained of a 2-year history of intermittent pain in her left hindfoot that was exacerbated by weight bearing. Conservative therapy prescribed by a local physician had resulted only in temporary relief of pain. She denied a history of trauma and her past medical history was unremarkable. No constitutional symptoms were present. Laboratory analysis was normal.

On physical examination, mild swelling of the soft tissues about the left hindfoot was noted. She was tender to palpation of both the medial and lateral portions of the calcaneus. Ankle motion was normal; however, the range of subtalar motion was reduced 50%.

Radiographs of the left foot demonstrated a large osteolytic process involving most of the calcaneus, with only the tuberosity maintaining a normal trabecular appearance (Fig. 1). The lesion lacked matrix calcification but prominent trabeculation or septation was present. Endosteal scalloping had resulted in thinning of the cortex, most evident laterally, and a pathologic fracture was identified anteriorly, extending into the calcaneocuboid joint. There was no apparent soft tissue extension. Computed tomography (CT) of the left foot revealed the full extent of the intraosseous mass, which demonstrated several incomplete ridges of bone within the lesion (Fig. 2A). The lateral cortex was violated in several places. Magnetic resonance (MR) images demonstrated a lobulated soft tissue mass confined to the calcaneus with areas of linear low signal intensity correlating to the bony ridges seen on CT images. In transaxial proton-density-weighted MR images (2000/20), the signal from the lesion was isointense to muscle peripherally but hypointense centrally. A thin low-signal-intensity rim surrounded the entire lesion (Fig. 2B). In transaxial T2-weighted MR images (2000/80), a mild heterogeneous increase in signal intensity occurred in the periphery of the lesion; however, its center remained hypointense (Fig. 2C). No fluid levels were present. Administration of intravenous contrast material demonstrated marked enhancement of the periphery of the lesion, whereas the center demonstrated only mild enhancement (Fig. 2D).

A CT-guided needle biopsy was inconclusive. Therefore, the patient underwent an open biopsy. At surgery, no capsule was evident. The tumor was grayish-white in color and had a rubbery consistency. Histologically, a diagnosis of desmoplastic fibroma was suggested on the basis of elongated fibroblast-like cells with small, uniform nuclei lacking atypia, hyperchromatism, or mitotic figures (Fig. 3). A dense matrix of collagen surrounded the cellular components.
Fig. 2. A Transaxial CT section of the calcaneus demonstrates bone ridges that result in a “pseudotrabealated” appearance. These ridges actually are intact residual trabeculae within the tumor. Note that there is disruption of the lateral cortex (arrow). B A transaxial proton-density (TR2000/TE20) MR image through a similar section of the foot demonstrates that the lesion has a heterogeneous signal intensity; the centrally located tissue is hypointense to muscle while the periphery of the mass is slightly hyper- or isointense to muscle. There is tumor protruding from the cortical defect laterally, posterior to the peroneus brevis and longus tendons. There is a thin rim of low signal intensity, suggesting a pseudocapsule (arrow). C A corresponding transaxial T2-weighted (TR2000/TE80) MR image demonstrates that the central region of the mass becomes markedly hypointense while the periphery remains isointense to muscle. D T1-weighted fat-saturated coronal (TR500/TE20) MR image after the administration of intravenous paramagnetic contrast agent shows heterogeneous enhancement of the tumor, with the periphery enhancing intensely while the center enhances less intensely.

Fig. 3. A Photomicrograph of the tissue obtained from the periphery of the tumor illustrating the fibroplastic proliferation associated with fine collagen fibers. No significant pleomorphism or mitotic activity are noted. Hematoxylin-eosin stain (original magnification x160). B Another field showing a less cellular area with thick, mature collagen fibers. Hematoxylin-eosin stain (original magnification x160).

Resection of the tumor posed a dilemma in that structurally the calcaneus became an incompetent osseous “shell”. Reconstruction was achieved by using bone graft harvested from the posterior iliac bone as struts to restore the morphology of the calcaneus, and the remainder of the cavity was filled with crushed cancellous autograft. The foot and ankle were splinted in a mild equinus position to prevent avulsion of the calcaneal tuberosity by the Achilles tendon.

Discussion

Desmoplastic fibroma of bone is a locally aggressive, benign tumor that is histologically indistinguishable from a soft tissue desmoid of the abdominal wall [1-3]; indeed, it is considered by some to be the osseous counterpart to this lesion [4]. It is rare, constituting 0.06% of all bone tumors and 0.3% of benign bone tumors in the Mayo Clinic series [2, 5]. Less than 130 cases have been reported in the world literature, the majority in the form of case reports [1, 2, 5-7]. To our knowledge, only three other cases [5, 8] of calcaneal involvement have been described since Jaffe’s original description of this tumor in 1958 [9].