Sonographic Evaluation of a Tibial Periosteal Ganglion With an Intraosseous Component

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A periosteal ganglion cyst is a rare condition that can easily be misdiagnosed as other types of surface bony lesions because of cortical erosion and suggestive periosteal reactions on plain radiography. We encountered a periosteal ganglion located over the anterolateral aspect of the metaphysis of the distal tibia, which was connected to an intraosseous ganglion cyst through a cortical defect on the anterolateral surface of the distal end. To our knowledge, such a case has not been reported previously. We present the sonographic features and the magnetic resonance (MR) imaging and computed tomographic (CT) findings of this case. Overall, sonography can be used to characterize the location and cystic nature of a periosteal ganglion.

Case Report

A 32-year-old man had a 1-year 6-month history of pain and swelling over the anterior aspect of the left distal tibia. The patient had no history of trauma. During this period, the patient received no medical treatment. Plain radiography revealed a well-circumscribed lytic lesion with a sclerotic border within the lateral aspect of the metaphyseal end of the distal tibia and minimal extrinsic impression on the lateral cortex of the distal shaft of the tibia. A sonographic examination was performed with a linear 5- to 12-MHz transducer (HDI 5000; Philips Medical Systems, Bothell, WA). Sonography showed a lobulated cystic mass along the anterior lateral cortex of the distal tibia with cortical spiculation and an intraosseous lesion in the immediate distal portion of this lesion (Figure 1). Magnetic resonance imaging showed a cystic mass with septa over the anterior lateral metaphysis of the distal tibia and a subcortical cyst (Figure 2). Multidetector CT showed a cystic mass along the anterior lateral metaphysis of the tibia and an intraosseous cyst with a defect on the anterolateral metaphyseal cortex (Figure 3).
The multiloculated cystic mass that was filled with mucous material attached to the periosteum was excised. An intraosseous cyst below this mass, which had a hole over the cortex covered by the periosteum, was curetted. The cysts did not communicate with the ankle joint cavity. The histologic specimens showed 2 ganglions, 1 of which contained gelatinous materials with a fibrous wall, in the thickened periosteum and another within the metaphyseal end of the distal tibia (Figure 4). The pain was relieved. The patient had follow-up plain radiography 9 months after surgery. There was no evidence of a local recurrence clinically or radiographically.

Discussion

A ganglion cyst arises from tendons, ligaments, muscles, bones, and semilunar cartilage. A periosteal ganglion is a rare lesion. In 1895, Tillman cited Ollier and Poncet as the first to describe a peculiar form of periostitis, which they termed “periostitis albuminosa” or “ganglion periostale.” It was reported that a tenacious mucoid fluid lay either beneath the periosteum, on its outer surface, or within it in the form of a cyst.

The precise pathogenesis of a periosteal ganglion is unclear. Synovial herniation and mucoid degeneration of the connective tissues of the periosteum are two suggested mechanisms for its development. According to the latter theory, fibroblasts produce intercellular mucin, which coalesces to form 1 cyst or many cysts. The surrounding tissue is compressed by accumulating fluid, and the fibroblastic proliferation and collagen formation result in a fibrous wall. In our patient, there was no communication between the ganglion and the ankle joint, which supports the latter theory.
The lesion is most commonly located over the medial proximal shaft of the tibia. Other common sites are the medial malleolus, the distal shaft of the radius, the distal shaft of the ulna, the distal shaft of the femur, and the ilium. Our case was located in the distal lateral side of the tibia and was connected to an intraosseous cyst within the lateral side of the metaphyseal end. Other cases of periosteal ganglion cysts reported usually have not been associated with a soft tissue ganglion or an intraosseous lesion. The radiographic appearance of a periosteal ganglion varies. The cases reported have shown different degrees of cortical erosion with scalloping. There are thick spicules of reactive periosteal bone. These radiographic findings are nonspecific and can mimic other benign tumors such as periosteal chondroma, parosteal lipoma, and a subperiosteal aneurysmal bone cyst or subperiosteal hematoma. In our case, plain radiography did not show any erosion on the cortex. Computed tomography showed a well-defined soft tissue mass attached to the bony cortex with fluid attenuation and a focal defect on the cortex. Magnetic resonance imaging was useful for identifying this lesion over the cortex.

**Figure 2.** A and B, Coronal fast spin echo inversion recovery MR image (A) (repetition time [TR], 5000 milliseconds; echo time [TE], 16 milliseconds; inversion time, 150 milliseconds) and axial proton fast spin echo MR image (B) (TR, 4250 milliseconds; TE, 25.5 milliseconds) at the distal shaft of the tibia show a homogeneous, high-signal intensity mass with septa over the anterior lateral surface of the cortex, extending into the subcortical portion of the lateral metaphyseal end. There are spicules over the tibia cortex on the axial scan. C, Coronal postcontrast T1-weighted MR image (TR, 550 milliseconds; TE, 14 milliseconds) shows only enhancement of the wall as well as septa of the mass along the periosteum and in the intraosseous portion. This corresponds to a cystic mass.
which had homogeneous fluid signal intensity, and the intraosseous ganglion cyst, which usually occurs in the subchondral portion, was eccentrically located. The use of sonography in the diagnosis of a periosteal ganglion has been mentioned in 2 case reports. In those cases, the cysts were located in the proximal anteromedial aspect of the tibia and the anteromedial aspect of the middle portion of the right tibia, respectively. Neither of them had been aspirated under sonographic guidance. Sonography showed a well-defined, lobulated, anechoic, septated, noncompressible cystic mass. The periosteal spicules were visible at the attachments of the cystic septa, which revealed a mass with a periosteal origin perpendicular to the cortex of the tibia. In our case, sonography also showed a focal cortical defect on the metaphyseal end of the distal tibia and the intraosseous component. It is presumed that an intraosseous ganglion might be due to bony resorption, penetration, and the growth of a periosteal ganglion. The subcortical location of the cyst supports this. Kay reported that a periosteal ganglion might produce pressure indentation on the bone, and an intraosseous ganglion might develop.

A periosteal ganglion cyst should be included in the differential diagnosis of any juxtacortical soft tissue mass. The demonstration of the purely cystic aspect of the lesion virtually excludes other diagnoses. Magnetic resonance imaging was helpful in diagnosing the periosteal ganglion. When evaluating a periosteal mass, sonography can be also used to characterize the location and cystic nature of the ganglion.

References
