REPORT OF A CASE
An 11-year-old girl presented with a 2-year history of a growing, painful lesion under the fourth toenail of her right foot. She could not recall any preceding trauma to the toe and was in good general health.

Findings from her physical examination disclosed a 6-mm pearly, firm, subungual papule protruding from the distal edge of the right fourth toenail (Fig 1). The lesion was firm and fixed on palpation, with discrete margins and overlying telangiectasia. There was no ulceration. The remainder of her digits and nails were normal. A diagnostic test was performed (Fig 2), followed by excision. Representative pathologic sections are shown in Figs 3 and 4.

What is your diagnosis?

Figure 1.

Figure 2.

Figure 3.

Figure 4.
DIAGNOSIS: Subungual exostosis (SE).

HISTOPATHOLOGIC FINDINGS

Tissue sections stained with hematoxylin-eosin showed a fragment of bone capped by cartilage (Fig 3). The cartilage had numerous chondrocytes with variably shaped nuclei within the bony matrix. Beneath the matrix were irregular bony trabeculae separated by fatty tissue (Fig 4).

DISCUSSION

Subungual exostosis is an acquired, benign, osteoarticular growth of the distal phalanx, first described by Dupuytren in 1817 (Dupuytren's exostosis). Subungual exostoses usually present as firm, fixed growing nodules just under or adjacent to the nail plate. Most (80%) occur on the dorsal medial aspect of the hallux, although they can occur on any digit. Virtually all cases are solitary. Sixty percent occur in patients between 20 and 30 years of age. The color of the early lesions is flesh-to-pink. As SEs grow, they may lift the nail plate, ulcerate, or cause subungual hyperkeratosis. Lesions may be pigmented or telangiectatic. Periungual lesions may be present without nail changes. Clinically, SE may resemble numerous other lesions such as osteochondroma, enchondroma, subungual verruca, squamous cell carcinoma, pyogenic granuloma, and glomus tumor. The correct diagnosis, however, can be easily and accurately made by roentgenogram.

Firm, fixed, subungual lesions showing a radiodensity should suggest either SE, osteochondroma, or enchondroma. Early SEs show soft-tissue densities (fibrocartilage) without attachment to the phalangeal bone. As the lesions mature, calcification and a trabecular bone pattern develop.

Fully developed SEs show trabeculated bone extending from the terminal phalanx at a site distant to the epiphysial line (Fig 2). The lesions may be broad based, tapered, and then expanding or narrowly based with gradual widening. No defined cortex is present. With SE, there are no destructive changes of the distal phalanx or periosteal reaction. The growth is capped by fibrocartilaginous tissue that is radiolucent and accounts for the ill-defined margins on roentgenograms (Fig 2). Subungual exostoses are most likely not true neoplasms but represent inflammatory hyperplasia of cancellous bone arising from the periosteum. No cases have been reported of SEs undergoing malignant transformation.

Osteochondromas (solitary osteocartilaginous exostosis— the most common benign bone tumor, accounting for 40% of all benign bone neoplasms) differ in several respects from SE. They arise from the juxtaepiphysial plate and are formed from hyaline cartilage—not fibrocartilage. Radiographically, osteochondromas show well-defined, bony growth in the area of the epiphysis with a sharply outlined hyaline cartilage cap. Ten percent of patients with multiple osteochondromata develop chondrosarcomas, a rare occurrence in patients with solitary lesions.

Enchondromas are very rare cartilaginous neoplasms arising within the medullary cavity. Radiologic examination shows loculated cysts within the bone, flecks of calcium, and bony expansion. The histologic features of early subungual exostoses include fibrosis near the nail bed, focal calcification, and metaplasia of cartilage. Then, within calcified cartilage, foci of enchondral ossification develop that eventually in lamellar bone trabeculae (Figs 3 and 4). In older lesions, there is continuity between the trabecular bone and the distal phalanx. The cartilage cap may have multinucleated chondrocytes, pleomorphic nuclei, and marked cellularity, suggesting chondrosarcoma. However, orderly maturation of trabecular bone mark subungual exostoses as benign.

Simple excision of an SE is the treatment of choice (90%-curative). Excision may be done as an outpatient procedure with a digital block, nail plate avulsion, and dissection at the base of the lesion with chisel and hammer or osteotomy. Care in removing the entire fibrocartilaginous cap must be done to prevent recurrence. Misdiagnosis may result in inappropriate therapy for patients (ie, digital amputation or radiation therapy).

The cause of SE is unknown. Several large series cited preceding trauma (ie, toe shoes in ballet dancers or bicyclists who use toe clips) in approximately 25% of cases. However, there is no history of trauma in the majority of cases and no associated bony dysplasia, eg, multiple hereditary exostosis.

In summary, SEs are benign, reactive growths of fibrous and cartilaginous tissue that undergo enchondral ossification. The lesions may clinically mimic malignant neoplasms, but roentgenograms are diagnostic and allow appropriate local excisional surgery to be the initial and therapeutic procedure.

References