Subungual Osteochondroma of the Great Toe

A Case Report

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Bony outgrowths of the distal phalanx of the great toe have been described in the literature but rarely. These subungual bony outgrowths can be caused by subungual exostosis or subungual osteochondromas. Both of these abnormalities are bony outgrowths with differences in the cartilage cap wherein the exostoses have fibrocartilage, and osteochondromas have hyaline cartilage. The subungual exostosis and osteochondroma that are protruding present symptoms of pain, redness, and deformed nail bed, whereas the nonprotruding osteochondromas have only a lump as the presenting symptom. In both conditions, excision of the lesion and curettage of the base helps prevent a recurrence. Curettage at the end of the excision of the bony outgrowth is required to avoid recurrence. After excision, the specimen should be sent for histopathologic examination to differentiate between the exostosis and osteochondromas, which are underreported in subungual locations, and to rule out malignant transformation. We present a 13-year-old girl with an isolated subungual nonprotruding exostosis of the great toe that was treated by excisional biopsy. The histopathologic examination confirmed it as osteochondroma, which is underreported. (J Am Podiatr Med Assoc 114(2), 2024; doi:10.7547/22-208)

Osteochondroma accounts for 10% to 15% of all bone tumors and 20% to 50% of all benign bone tumors. Osteochondromas are the commonest benign bone tumors of the lower extremity. It was Virchow in 1891 who suggested that osteochondroma arises from the cartilaginous growth plate. A defective perichondrial ring of Lacroix is thought to be etiologically responsible for the growth of the osteochondromas from the physis, and the growth stops with skeletal maturity.[1] The other possible etiopathologic cause is the reactive metaplasia that is caused by microtrauma. Recent evidence suggests a neoplastic origin rather than reactive metaplasia because of translocation t(X;6)(q22;q13-14) and rearrangement of collagen genes are being identified in such outgrowths. Along with the repetitive microtrauma and neoplastic origin, the other precipitating factors that can cause reactive cartilaginous metaplasia are chronic irritation and chronic infection.[2-5] They are most common in male patients and can occur either as a solitary lesion or multiple in multiple hereditary exostoses. The symptoms of osteochondroma are mostly attributable to pressure effects on various soft-tissue structures around them, and osseous deformities in the setting of hereditary multiple exostoses. Although osteochondromas have continuity with the parent bone both in the medulla and in the periosteum, they can also occur as soft-tissue extraskeletal osteochondromas that have typical histology as osteochondromas without any osseous continuity with the parent bone. They differ from skeletal osteochondromas in that they occur in the third to sixth decade compared to osteochondromas, which occur in the skeletally immature population. Osteochondromas can be pedunculated or sessile. The risk for malignant transformation is very rare in solitary lesions, and the risk in hereditary multiple exostoses is 1%. They occur mostly in long bones and are rare in the talus and calcaneum, and are even rarer in phalanges.[6-8] In this case report, we present a patient with subungual osteochondroma of the great toe, an osteochondroma arising from the distal phalanx of the great toe that is nonprotruding, and its management. Consent has been obtained from the patient regarding the publishing of intraoperative photographs

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excluding her identity details as a surgical technique for learning purposes.

Case Report

A 13-year-old girl presented to our hospital with complaints of swelling over the tip of the great toe. She noticed a small swelling over the distal phalanx of the great toe on the plantar and lateral side 3 years previously that gradually increased in size to attain a present size of 4 x 3 cm (Fig. 1). The swelling was lobulated and firm on palpation, not tender to touch, and there were no other signs of inflammation. The skin over the swelling was normal. The patient had no history of trauma or any of the constitutional symptoms such as fever, loss of weight, and appetite. There was no history of similar swellings anywhere else in the body. The girl had difficulty wearing shoes. The blood investigations revealed normal total leukocyte counts (6,680/mL^3), and differential counts were as follows: neutrophils, 67%, lymphocytes, 23%; and monocytes, 7%. The renal function tests were within normal limits, as were the liver function tests. Radiography (anteroposterior, oblique, and lateral views) of the left foot was (Fig. 2) suggestive of a bony outgrowth arising from the plantar and lateral aspect of the distal phalanx of the great toe. The magnetic resonance imaging scan of the left foot (Fig. 3) was suggestive of a well-defined bony protuberance with an overlying T2 hyperintense cartilaginous cap arising from the lateral aspect of the distal phalanx of the great toe that showed continuity with the parent bone.



Figure 1. Clinical photographs of the swelling (*above*) with the planned surgical incision (*below*).

Excisional biopsy of the swelling under regional anesthesia was planned for the girl. The girl was operated on in the supine position and under a tourniquet with an incision placed over the swelling. Because the bony outgrowth was nonprotruding and away from the nail bed, the skin incision was placed directly on the skin overlying the prominence of the swelling. The swelling was excised extraperiosteally (Fig. 4) and was sent for histopathologic examination. The wound was closed in layers. The nail and the nail bed were preserved.

Wound inspection was performed on the second postoperative day and the girl was discharged to home. She was followed-up at 2 weeks and suture removal was performed. At 12-month follow-up, there was no recurrence of swelling (Figs. 5 and 6) and she was comfortable wearing shoes. The histopathologic examination (Fig. 7) was suggestive of osteochondroma measuring 3.5 x 2 x 1.8 cm, and the thickness of the cartilaginous cap was 3 mm. No features of malignancy were seen.

Discussion

Bony outgrowths of the distal phalanx of the great toe have been described in the literature but rarely. It was Dupuytren, who in 1817 described a bony growth of the distal phalanx of the great toe that was later called Dupuytren exostosis. These outgrowths are subungual and can be protruding or nonprotruding. The protruding outgrowths elevate the nail bed and the nail, whereas the nonprotruding outgrowths do not and can be excised without damaging the nail bed. However, at the same time, the nonprotruding variant can cause pressure effects on the skin and difficulty in wearing footwear.[2] In our report, the young girl also had a nonprotruding subungual bony outgrowth of the distal phalanx. She had pain over the great toe that was exaggerated on wearing shoes and hampered her daily activities.

These subungual bony outgrowths—also termed exostoses—are osteochondral tumors that can arise from any bone. They are considered a variant of osteochondroma but differ from osteochondroma in that the histology of the covering cartilage cap differs between them, as does the method of ossification. In exostosis, bone directly forms in the fibrous tissue, with a fibrocartilage cap, whereas in osteochondroma a hyaline cartilage cap and enchondral ossification are found. Subungual exostoses mostly



Figure 2. Radiographs of the left foot. Anteroposterior, oblique, and lateral views are suggestive of a bony outgrowth arising from the plantar and lateral aspect of the distal phalanx of the great toe.

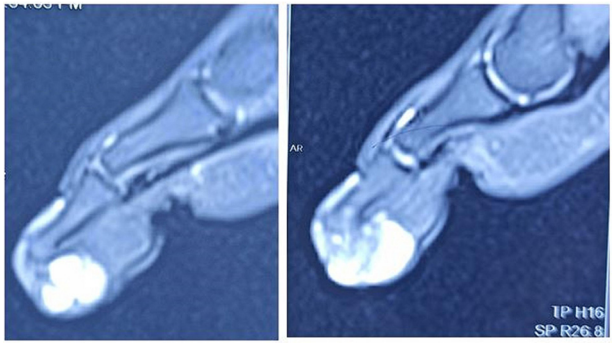


Figure 3. Magnetic resonance imaging scans of the left foot were suggestive of well-defined bony protuberance with an overlying T2 hyperintense cartilaginous cap arising from the lateral aspect of the distal phalanx of the great toe. They show continuity with the parent bone.

occur in the fourth and fifth decades, whereas subungual osteochondromas occur in the skeletally immature population. Subungual exostoses have been classified into four groups, of which the first three groups involve the nail bed (protruding variant) and the fourth group does not involve the nail bed (nonprotruding).[6]

Only a few reports of subungual osteochondromas have been reported, and some of them have been diagnosed and reported as exostoses. Radiologically, subungual exostosis develops from the tuft and grows dorsally or dorsomedially, whereas osteochondromas develop from the juxtaepiphyseal region of the distal phalanx. Apart from the age at presentation, there are no significant differences between subungual exostosis and osteochondromas in relation to the sex and duration of the presentation. Subungual exostosis most commonly occurs in the great toe, whereas subungual osteochondroma most commonly occurs in the lesser toes.[7] The reason for being reported is the lack of histopathologic examination confirmation of the excised mass. In our patient, it was suggestive of osteochondroma because of the overlying hyaline cartilage cap and the medullary continuity with the parent bone.

The subungual exostosis and osteochondromas can be protruded or nonprotruded. The subungual exostosis and osteochondroma that are protruding present with symptoms of pain, redness, and deformed nail bed, whereas the nonprotruding osteochondromas have only a lump as the presenting symptom. When the subungual bony outgrowths—either exostosis or osteochondromas—occur in the lesser

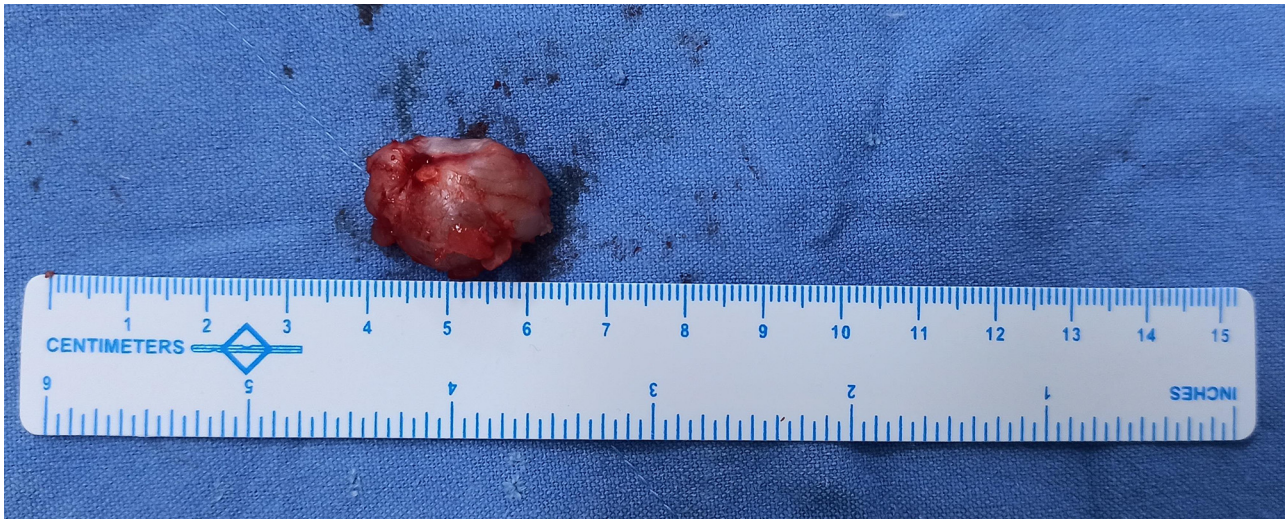


Figure 4. The swelling was excised extraperiosteally.



Figure 5. Postoperative radiographs of the patient.



Figure 6. Postoperative clinical photograph of the patient.

toes, they are mostly nonprotruding. In both conditions, excision of the lesion along with curettage of the base helps in preventing recurrence. Curettage at the end of the excision of the bony outgrowth is required to prevent a recurrence. The recurrence if the tumor was neither completely excised nor the base completely curetted ranges from 6% to 60%. In the protruded variety, it elevates the nail bed and nail and requires a dorsal approach and nail removal. In the nonprotruded variety, the nail bed and nail can be preserved.[9,10]

Our patient had a nonprotruding subungual mass that was excised, saving the nail bed; she was followed up for 1 year and there was no recurrence. Preoperative complete radiologic evaluation, good surgical approach, extraperiosteal mass removal, intraoperative fluoroscopic examination before and after excision of the mass, postexcision soft-tissue assessment during closure, histopathologic evaluation, and regular radiographic follow-up for at least 6 months to monitor and look for recurrence are required. The histopathologic examination helps to differentiate between exostosis and osteochondromas, which are underreported in subungual locations, and also to rule out malignant transformation.

Conclusions

Exostoses are benign bony outgrowths that can affect any bone and are considered as a variant of osteochondroma, but the differences between them are that exostosis develops as ossification in fibrocartilage and has a fibrocartilage cap, whereas an

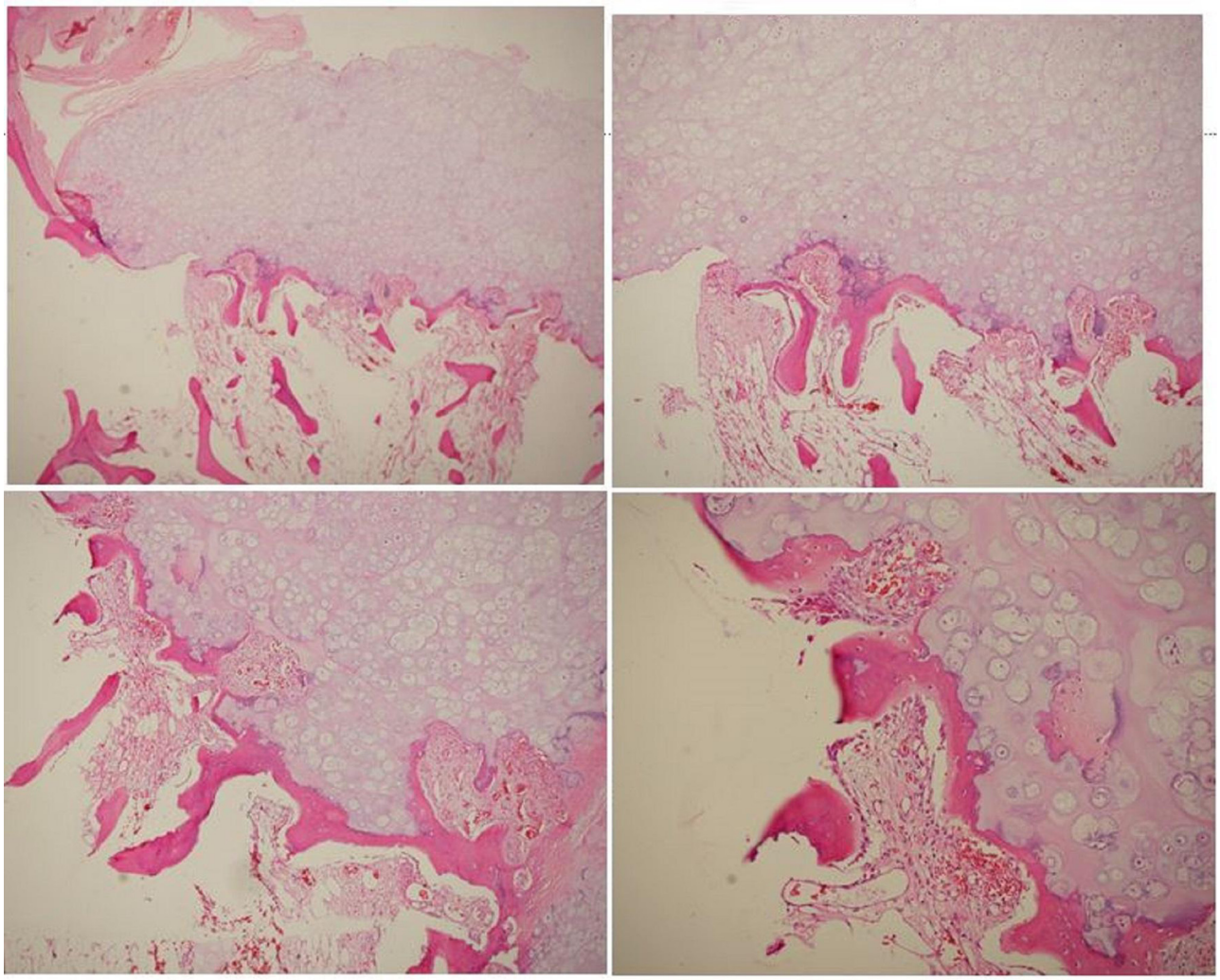


Figure 7. The histopathologic examination was suggestive of an osteochondroma measuring 3.5 x 2 x 1.8 cm, and the thickness of the cartilaginous cap was 3 mm. No features of malignancy were seen.

osteochondroma develops by enchondral ossification, has a hyaline cartilage cap, and has continuity with the parent bone both by means of periosteum and medullary cavity. Subungual exostosis and osteochondromas can be differentiated by histopathologic examination. Any tumor in the subungual region requires histopathologic examination for confirmation of the diagnosis and to rule out any malignant transformation.

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