An Enlarging Distal Tibia Osteochondroma in the Adult Patient

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Osteochondroma is the most common benign tumor of bone and the involvement of the distal end of the tibia is relatively uncommon, accounting for only 4% of the excised lesions. The lesion usually enlarges during skeletal growth and only a small amount of growth occurs after physeal closure. Extensive enlargement of an osteochondroma in a skeletally mature patient may indicate its malignant transformation. Indeed, very few reports describing the active enlargement of benign osteochondromata after skeletal maturity have been published to date. As far as the treatment of osteochondroma is concerned, surgical excision is required in the case of symptoms resulting from mechanical irritation of neighboring structures, fracture through the stalk of a pedunculated lesion, or malignant transformation. The excision of osteochondromata in the distal and lateral aspect of the tibia might injure neurovascular structures and cause postoperative ankle instability. Resection of lesions in this area can be performed either by an anterior or posterior approach. More recently, an alternative technique to remove distal tibial osteochondromata in young patients through fibular ostotomy has been described. To the best of our knowledge, this technique has never been used to remove actively growing osteochondromata of the distal tibia in adults. We present the case of a 30-year-old patient suffering from a rare osteochondroma that was still growing after skeletal maturity. The tumor arising from the posterolateral distal tibia was successfully excised using a transfibular approach with fibular reconstruction. No signs of recurrence were noted 2 years after surgery.

Case Report

A 30-year-old woman was referred to Mater Domini Hospital, Catanzaro, Italy, because of a 10-month history of progressive pain and swelling in her left ankle. The pain had gradually become continuous and presented even at rest; it was exacerbated by walking. The physical examination revealed a firm and painful lump over the posterolateral aspect of the left ankle. No loss of motion nor neurovascular deficit was present in the ankle, but its diameter, as measured at the lateral malleolus, was increased in comparison with the contralateral side (25 cm and 22 cm, respectively). There was not loss of motion nor neurovascular deficit.

Standard radiographs of the ankle showed a wide exostosis arising from the posterolateral aspect of the distal end of the tibia (Fig. 1A and B). The lesion had deformed the fibula, eroded its medial cortex, and had thinned the distal shaft of the bone to 3 mm. No tibiofibular diastasis was detected. Magnetic resonance imaging (MRI) (Achieva 1.5T, Philips Medical Systems) confirmed that the lesion was a complete osteochondroma extending from the distal end of the tibia.

The extensive enlargement of a solitary osteochondroma in a skeletally mature patient is rare and might result from malignant transformation. Excision of such a lesion in the distal and lateral aspect of the tibia is difficult because of the risk of injury to the neurovascular structures and the possible functional consequences with respect to ankle stability. We present a case of an active osteochondroma arising from the posterolateral distal tibia in an adult patient. The tumor was successfully excised by using a transfibular approach with fibular reconstruction. No signs of recurrence were noted 2 years after surgery. (J Am Podiatr Med Assoc 99(2): 157-161, 2009)
Systems, Andover, Massachusetts) showed a broad-based lesion with a cartilage-like cap arising from the posterolateral aspect of the tibia. The bone marrow space appeared to be continuous with that of the tumor (Fig. 2). While the signal intensity of the medial component of the mass was heterogeneous on T2-weighted and low on T1-weighted images, its external cap showed high intensity on T2-weighted and low signal on T1-weighted images. An angio-MRI showed that the anterior tibial artery and deep peroneal nerve were anteriorly displaced by the osteochondroma. A technetium-99m methylene diphosphonate bone scan demonstrated an increased uptake of tracer into the left ankle (Fig. 3).

A transfibular approach was used to remove the osteochondroma. The distal fibula was isolated with two osteotomies, the first one located 3 cm proximal to the lesion and the second one just proximal to the tibiofibular joint. Once the interosseous membrane was detached, the osteotomized segment was reflected anteriorly and the tibial osteochondroma was excised using a micro-oscillating saw (Fig. 4). The fibula was repaired with a molded semitubular plate. The lesion, measuring $5 \times 4 \times 3$ cm, was sent for histologic examination. Abnormal architecture of the trabecular bone and sparse hemorrhagic areas were present at the base of the tumor (Fig. 5A). The thickness of the overlying cartilaginous cap varied from 0.8 cm to 1.2 cm. At higher magnification, the cap showed increased cellularity with chondrocytes organized in clusters, maturing in an enchondral process (Fig. 5B). The chondrocytes were hypertrophic with no atypia or necrosis. According to the Enneking’s classification system—which describes the biologic behavior of benign tumors as localized, latent or static, inactive

Figure 1. Anteroposterior (A) and lateral (B) radiographs of the left ankle showing a large posterolateral bony lesion protruding from the underlying tibia and deforming the fibula.

Figure 2. Preoperative axial T2-weighted magnetic resonance image reveals the cortical (arrows) and medullary (asterisk) continuity with the underlying bone.
lesions (stage I); localized, active lesions (stage II); and aggressive, invasive lesions (stage III)—the final
diagnosis was stage II osteochondroma.11

At the 2-year follow-up, the ankle had full pain-free
range of motion that appeared equal to the opposite
side. The patient walked normally and played sports
without limitation. Radiographs showed consolidation
of the fibula without signs of recurrence (Fig. 6A
and B).

Discussion

Extensive enlargement of benign osteochondromata
after skeletal maturity is rare and has been the object
of only single case reports.4, 5 Indeed, in adults with a
bone mass that started to enlarge after skeletal matur-
ity, malignant transformation should be considered a
possible diagnosis. Sarcomatous transformation of
solitary osteochondromata occurs in less than 1% of
these lesions, and most of the malignancies are chon-
drosarcomata.12

In our patient, the rapid and progressive swelling
of the ankle and local pain raised the possibility of a
malignant transformation of the osteochondroma of
the distal tibia, despite the absence of serial radi-
ographs demonstrating its growth over time.

Radiographic examination showed a sessile lesion
with evidence of a definite continuity between the

Figure 3. Technetium-99m methylene diphosphonate
bone scan fails to detect multiple distribution of skele-
tal lesions.

Figure 4. Intraoperative photograph showing resec-
tion of the tumor. The thinned and weakened fibula
(asterisk) is gently removed to gain full access to the
lesion (arrow). Widening of the fibula at the site of de-
formation is noticeable.

Figure 5. A, Low power view showing trabecular bone at the base of the lesion (arrows) and overlying cartilage cap
(indicated by an asterisk). B, High-power view of cartilage cap showing normal-appearing nuclei in the hyper-
trophic chondrocytes (H&E, ×4; phosphate-buffered saline, ×40).
the distal tibia without compromising the stability of the ankle. It also enabled us to carry out complete resection of the osteochondroma. Indeed, no recurrence of the tumor was noted 2 years after surgical excision and the ankle biomechanics were preserved, obtaining full range of motion equal to the opposite side, without residual joint instability at the final follow-up.

To the best of our knowledge, the complete excision of a distal tibia osteochondroma through a transfibular approach has never been documented in a skeletally mature patient. Gupte et al.10 extensively described the technique, originally proposed by Crenshaw,17 in two patients aged 11 and 15 years. In their series, Chin et al.6 reported on three patients, aged 15, 10, and 15 years, who were treated by the transfibular approach. The current report demonstrates that this approach can be successfully used even in adults, but a thorough operative technique should be used to prevent nonunion of the osteotomized fibula. Alternative approaches have been proposed; however, the posterolateral distal tibia is difficult to reach through an anterior approach. Danielsson et al.8 reported three cases of excision of metaphyseal osteochondromata by this latter approach, but in one patient he needed to use combined anterior and posterior approaches to completely remove the tumor. Moreover, the neurovascular bundle could be injured when an anterior incision is used.10 Because of the juxtaposition of the fibula, a posterior approach offers only limited access to the posterior osteochondromata of the distal tibia, and a

cortex and spongiosa of the lesion with those of the host bone. Sessile osteochondroma can be difficult to radiologically differentiate from parosteal osteosarcoma, juxtacortical chondrosarcoma, and myositis ossificans.2 General radiographic features suggesting malignancy include growth of a previously unchanged osteochondroma in a skeletally mature patient, an irregular or indistinct lesion surface, focal regions of radiolucency in the interior of the lesion, erosion or destruction of the adjacent bone, and a soft-tissue mass containing scattered or irregular calcification.13 As for the specific differential diagnosis with parosteal osteosarcoma, in osteochondroma, typically the lesional sclerosis tends to be located peripherally, with the central portions composed of lucent normal marrow (Fig. 1A and B). In contrast, parosteal osteosarcoma is usually more sclerotic centrally at the site of attachment of the tumor and remains separated from the cortex by a clear space producing the radiographic string sign.14

The lack of tibiofibular diastasis in the presence of such a large mass growing between the tibia and fibula,15 increased radionuclide uptake in the lesion,13 thickness of the hyaline cartilage cap,13 and absence of ischemic necrosis into the lesion16 all were suggestive of an active growing process of the osteochondroma taking place after skeletal maturity. Given the suspicion of malignant transformation, we needed to gain full access to the osteochondroma. The transfibular approach was selected to obtain wide exposition of the distal tibia without compromising the stability of the ankle. It also enabled us to carry out complete resection of the osteochondroma. Indeed, no recurrence of the tumor was noted 2 years after surgical excision and the ankle biomechanics were preserved, obtaining full range of motion equal to the opposite side, without residual joint instability at the final follow-up.

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Figure 6. Anteroposterior (A) and lateral (B) weightbearing radiographs of the left ankle show consolidation of the osteotomized fibula with no regeneration of the tumor 2 years postoperatively.
section of fibula has been suggested to warrant full access to the tumor.9

Conclusions

We report the first adult patient in whom a transfibular approach was used to remove an active symptomatic osteochondroma of the distal tibia. Although extensive growth of an osteochondroma after completion of skeletal growth usually prefigures malignant change, the current report demonstrates that late growth of a benign lesion can occur. The presence of an actively growing osteochondroma-like lesion with possible malignant transformation advises the physician to gain full access to the tumor; the transfibular approach appears to be more suitable to expose lesions of the distal tibia located in the posterolateral aspect. In our case, this approach produced a satisfactory outcome, with normal functionality of the ankle and no signs of recurrence of the osteochondroma 2 years later.

Financial Disclosure: None reported.
Conflict of Interest: None reported.

References