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Case Report

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Osteochondroma of the distal tibia with associated varus deformity of ankle

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ABSTRACT

Osteochondroma or exostosis is a bony developmental anomaly, which arises from exophytic outgrowth on bone surfaces characteristically. The most common site is the distal femur followed by the proximal humerus and proximal tibia. It is made up of a bony protrusion that is covered by a cartilage cap. Osteochondroma is asymptomatic and grows away from the nearby joint. It is very common in kids and young adults. Sometimes patient comes in 2nd decade with complaints of pain and swelling. This paper reports a presentation of osteochondroma present over the right distal tibia.

Keywords: Excision, Fibula, Osteochondroma, Osteotomy, Tibia

INTRODUCTION

Osteochondroma is the primary bone tumor most frequently encountered, making up 20-50% of benign bone tumors and 9% of all bone tumors. It arises from abnormal bone development, forming a bony growth with a cap of cartilage on the surface of growing bones. These growths can be fixed or have a stalk-like attachment. Approximately 85% of osteochondromas are solitary, typically appearing in the first decade of life. The remaining 15% are associated with hereditary multiple exostoses (HME), an inherited genetic condition.

While these growths may increase in size during childhood, they do not develop or enlarge after puberty. Osteochondromas are more common in males, with a ratio of 2:1. They frequently occur near the ends of long bones, close to the metaphysis. Although most cases in children are managed conservatively until skeletal maturity, those affecting the lower end of the shinbone (tibia) or outer leg bone (fibula) may require surgical removal to prevent ankle deformities, syndesmotic lesions, or fractures due to the expanding nature of the tumor.[2] The preferred sites for these growths are the lower end of the thigh bone (femur) at 30%, the upper end of the shinbone (proximal tibia) at 15-20%, and the upper arm bone (humerus) at 10-20%, followed by the feet and hands at 10%. In less than 5% of cases, these tumors can also appear in unusual places, especially on flat bones like the breastbone (sternum), shoulder blade (scapula), ribs, and hips. Intra-articular exostosis, a rare occurrence, may be found in joints with large surrounding capsules, such as the kneecap-to-thigh bone joint (patellofemoral joint).[3]

While often showing no symptoms, issues may arise from pressure on nearby vessels or nerves, fractures, bone deformities, bursa formation, or potentially malignant changes. In adults, a cartilage cap thicker than 2 cm, or thicker than 3 cm in children, as well as new-onset pain or rapid growth after the growth plate has closed, could indicate a potential malignancy.[4] Malignant transformation is more likely in cases of HME compared to solitary osteochondromas, with secondary chondrosarcoma being the most common form. There are

two distinctive features used to confirm the diagnosis: the connection of the growth to the parent bone's cortex and marrow, and the presence of a cartilage cap.[5] Asymptomatic growths are typically observed, while those causing symptoms or exhibiting concerning imaging findings may necessitate surgical removal.[6] Surgical intervention is more frequent in cases of HME due to the higher risk of cancerous transformation and bone deformities.

CASE REPORT

The present case report was about a 35-year-old female patient who came to the hospital due to pain and swelling over their right lower limb pain for 2 months and bony hard swelling over their right leg for the last 15 years. There was a history of pain and heaviness while walking and during the night. Physical examination showed swelling over the right distal tibia over the posterolateral aspect. There were no dilated veins, and no scar marks over the distal leg. There was an associated varus deformity visible at the distal tibia. On palpation, there was palpable bony swelling over the posterolateral aspect of the distal leg. It was nonmobile, minimally tender, and attached to the underlying bone. The swelling was extended to the distal fibula leading to the thinning of its cortical continuity on palpation. The posterior tibial and dorsalis pedis artery pulsation were normal in rate and volume. The sensations over the lateral aspect of the distal leg and ankle were normal. The movements of the ankle were normal.

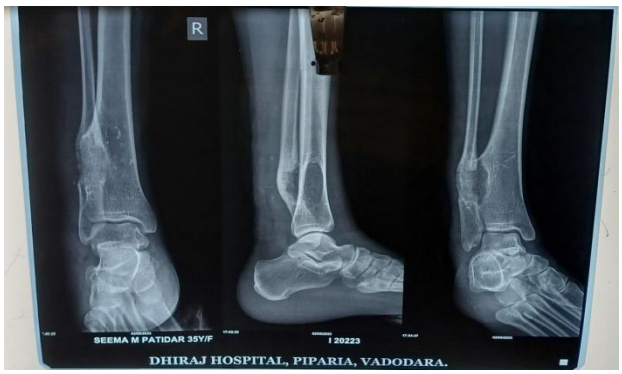

Figure 1: Pre-op X-ray of right distal tibia suggestive of large bony mass presented over medial metaphysis of right distal end femur.

Radiographic study

There was focal bony outgrowth seen arising from the posterolateral aspect of the right side distal tibia shaft with the continuation of the cortex and medullary cavity with parent bone. The lesion measures 23×20 mm axial and 30×32 mm coronal with an inferior margin of approximately 3 cm proximal to the right tibiotalar joint.

The lesion caused compression of the distal shaft fibula causing its buckling around the lesion. The lesion had no neuro-vascular involvement.

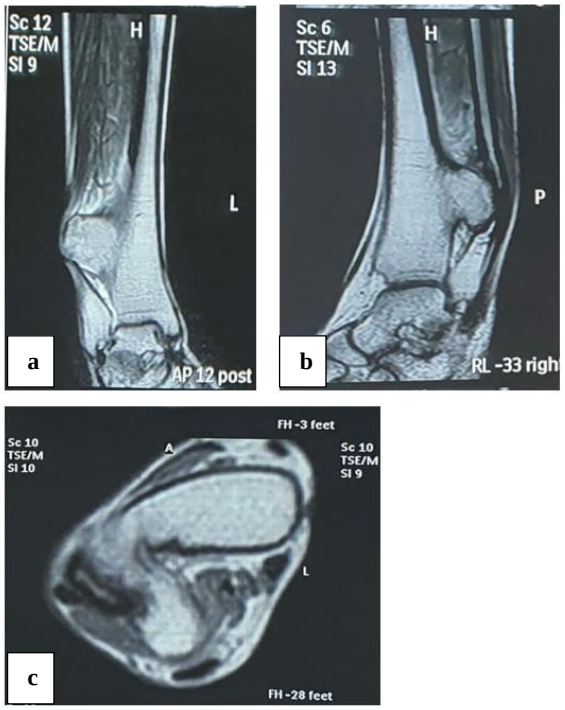

Figure 2 (a-c): MRI of right distal tibia seeing bony mass lesion over distal tibia.

Intra op procedure

The patient was given a prone position after induction. An incision was marked over the lobulated part identified over the posterolateral surface of the distal tibia. Then skin and subcutaneous tissue were cut followed by Tendo Achilles which was identified and retracted medially. Thereafter, a well-defined lobulated, pink, and firm bony mass lesion was seen arising from the metaphysis of the distal tibia. The tumor was resected medially and laterally from the tibia after drilling the margins with K wire and the tumor was resected *en bloc* from beneath the fibula and sent for histological evaluation.

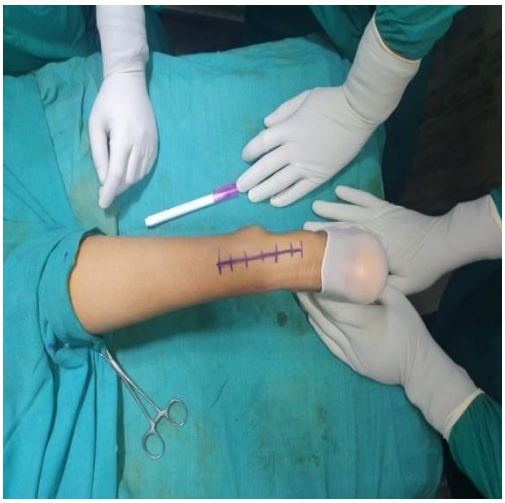

Figure 3: Intra-op incision site.

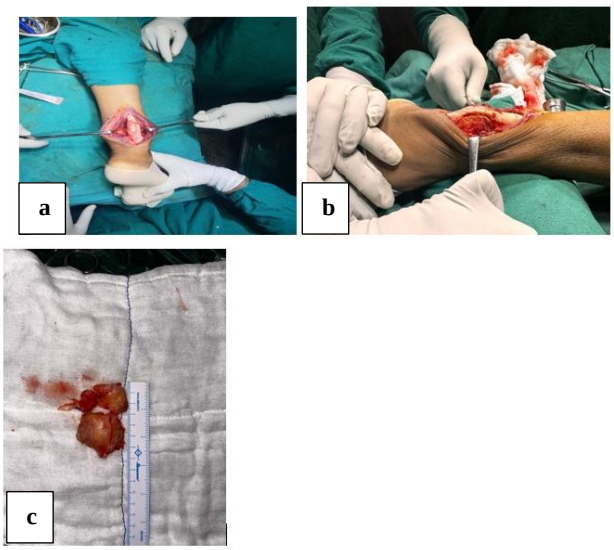

Figure 4: Intra op mass.

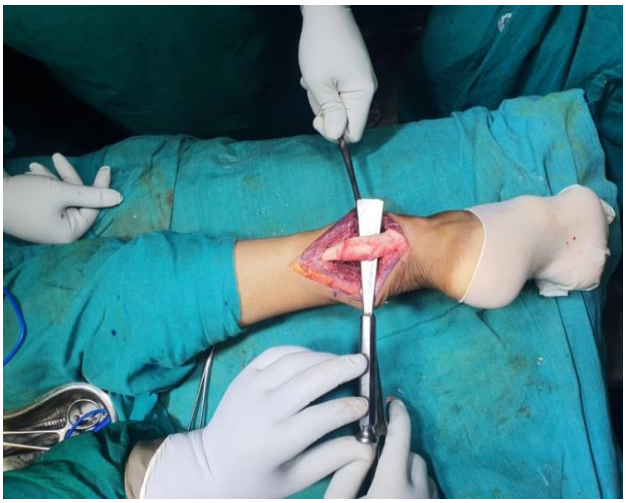

Figure 5: Clinical photo after mass resection.

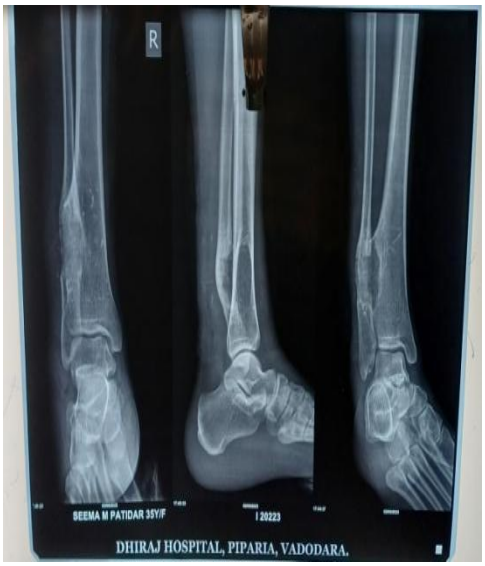

Figure 6: Immediate post-op X-ray.

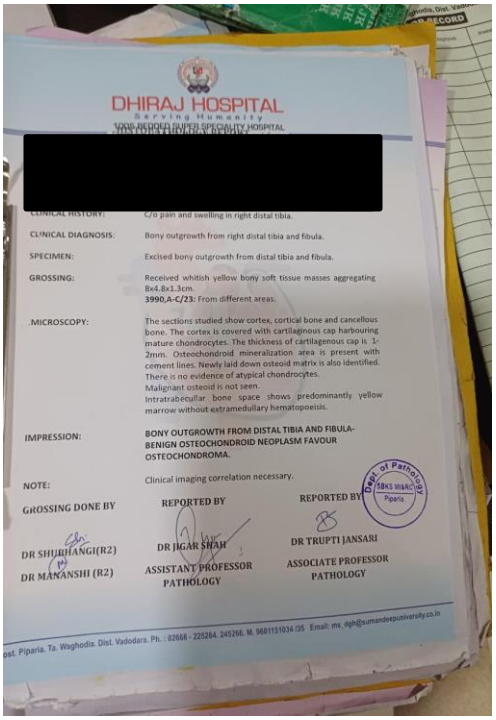

Figure 7: Biopsy report.

Pathological study

On cutting the gross section, whitish-yellow bony soft tissue masses were seen. The cortex was covered with a cartilaginous cap harboring mature chondrocytes. The thickness of the cartilaginous cap was 1-2 mm. Malignant osteoid not seen. Bony outgrowth from the distal tibia and fibula benign osteochondroid neoplasm favor osteochondroma.

DISCUSSION

Osteochondromas are usually thought to be benign bone tumors although they are more correctly thought of as developmental anomalies. They present commonly in an autosomal dominant manner as solitary (85% of cases) or multiple lesions in the context of hereditary multiple exostoses (in 15% of cases). Most solitary osteochondromas are found in children and adolescent age groups and symptomatic lesions usually occur in younger patients. Osteochondroma develops faster in younger age than in the elderly. The most common site for osteochondromas are rapidly growing long bone metaphysic and have a predictable natural course. They are typically asymptomatic and are discovered incidentally. Clinical features of osteochondroma include a non-tender, painless, slowly growing mass. Localization of osteochondromas of the diseased may give rise to obstructions in motion, degenerative changes, and neurovascular suppression in shaking even more health problems.

This was a case of distal tibia osteochondroma deforming the adjoining part of the fibula.

Some surgeons resected the lesions through anterolateral or posterolateral approaches without fibula osteotomy. The problem with osteochondroma resection without osteotomy of the fibula is its limited access to the lesion; thus, identifying the borders of osteochondroma is hard, and its complete resection is difficult.

Danielsson et al. reported recurrence after resection through a posterior approach without fibula osteotomy.[7] As in our case we have not yet encountered recurrence in 6 months follow up.

The posterolateral approach used in the patients of a similar case by Sen et al did not carry the risk of injury to the anterior neurovascular bundles or extensor tendons and provided easy access to posteriorly located tumors.[8] It can be interpreted as the posterolateral approach for surgery is better because it avoids important neurovascular structures.

All three patients of Mehraj had gradual improvement in symptoms of compression neuropathy over a period of 4 weeks and complete resolution of symptoms over 3 months which soever was not our case as our patient did not have any symptoms of compression neuropathy.[9] This should be interpreted as a definitive indication for surgery.

The patient underwent excision of the osteochondroma through an anterior approach without fibular osteotomy. Intra-operatively, the fibula was found to be quite thin and weak. However, its outer cortical shell was intact. This was a case by Wani et al similar to ours with a different surgical approach.[10] This can be interpreted as the anterior approach is also an approach preferred by surgeons according to the site of osteochondroma. Also, the fibular osteotomy is only necessary for the proper visualization of osteochondroma while the posterolateral approach and not needed in anterior approach.

Surgical resection was planned in view of cosmetic deformity, mild movement restriction around ankle (mechanical block) and to prevent any pathological fracture. Marginal resection of the swelling was done using the posterolateral approach preserving neurovascular structures. Intra-operative, we found a pedunculated growth resembling a cauliflower with fibular synostosis. Tendoachillies were not adhered to the bony swelling Histopathology was sent which confirmed an osteochondroma. The below knee cast was given for 6 weeks. This was a similar case by Dua et al with similar findings but lesions varying in size which is bigger than ours for which the postoperative management of the patient varied.[11] It can be interpreted in contrast to our study that osteochondroma excision is an elective and low-risk rare surgery and only needs to be excised when symptoms occur or there is a need for cosmetic correction for the patient.

Radiographic findings include a focal bony outgrowth seen arising from the posterolateral aspect of the right side distal tibia shaft with continuation of cortex and medullary cavity with parent bone. The lesion measures 23×20 mm axial and 30×32 mm coronal with an inferior margin of approximately 3 cm proximal to the right tibiotalar joint.

Sessile and pedunculated types with a broad-based attachment to the cortex and pedunculated ones with a long and thin stalk and bulbous tip are the two types of osteochondroma. In our case, there was a sessile bony swelling attached to the distal tibia. In general, lesions point away from the nearby joint and toward the diaphysis.

The radiographic presentation of this osteochondroma is unusual due to its different growth direction, in contrast to the typical exostosis.

There were some complications associated with osteochondroma including nerve or vascular injury, bursa formation, configuration of a pseudoaneurysm, and malignant transformation. The frequency of malignant degeneration is approximately 1% for solitary type and 5-25% for hereditary multiple exostoses.

Any alterations in radiological appearance, especially with ill-defined margin evolution and thickening of the cartilage cap >15 mm, are highly suggestive of chondrosarcoma.

Prognosis

Osteochondromas are benign lesions, and thus the prognosis is excellent. The reported local recurrence is less than 2%. The estimated risk for cancerous degeneration is 1% and 10% for solitary osteochondromas and HME, respectively. Florez et al. studied 113 solitary osteochondromas treated between 1970 and 2002. The tumors recurred in 6 patients, while in 2 patients they transformed into secondary chondrosarcomas. The authors noted that the recurrence of exostoses is a rare happening in about 2% of the resections.

CONCLUSION

Osteochondroma is a benign cartilage tumor projecting from the external surface of the bone. It is the most common benign bone tumor and usually occurs in the metaphyseal region of the long bones. In the vast majority of cases, it appears as a solitary lesion, while in 15% of cases, it presents as multiple lesions due to HME. Although most lesions are asymptomatic, symptoms may result from nerve or vein compression, fractures, bursa formation, osseous deformities, or even malignant transformation. It is estimated that the latter occurs in approximately 1% of solitary osteochondromas and 10% of HME. New onset of pain, growth of tumor after skeletal maturity, irregular margins, irregular or scattered calcifications, internal lytic areas, erosion of adjacent bones, and cartilage cap thickness >2 cm in adults or >3 cm in children are signs of cancerous degeneration. Even though plain radiography is usually sufficient for the

diagnosis of osteochondromas, cross-sectional imaging modalities are useful in the assessment of lesions situated in complex areas, complications, and cartilage cap thickness. Asymptomatic lesions require no treatment, whereas surgical indications encompass symptoms, complications, cosmetic reasons, malignant transformation, or uncertain diagnosis. If complete resection is achieved, the recurrence rate is less than 2%.

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