Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Orthopaedics Surgery

Journal homepage: www.ijos.co.in

Case Report

Osteochondroma of the calcaneum: A case report

Suraj Sood[1*], Ishan Mittal[1], Shristi Singh[1], Akhilesh Saini[1]

[1]Dept. of Orthopaedics, Maharishi Markandeshwar Institute of Medical Sciences and Research, Ambala, Haryana, India

Abstract

Osteochondromas are among the most common benign bone tumours, predominantly affecting individuals under the age of 30. Rather than true neoplasms, they are considered developmental malformations, originating as small cartilaginous nodules within the periosteum. The foot is an uncommon site for these tumours, with the calcaneum being one of the rarest locations of occurrence. Osteochondromas that originate in the calcaneum, especially those that spread to the plantar surface, can seriously hinder walking. Malignant transformation of solitary osteochondromas is rare, occurring in less than 1–2% of cases. Here, we present a case of osteochondroma originating from the calcaneum, which was excised surgically to enhance the patient's mobility. Following a one-year postoperative follow-up, the patient demonstrated significant improvement and is now able to walk comfortably.

Keywords: Osteochondroma, Calcaneum, Surgical excision.

Received: 24-02-2025; **Accepted:** 31-03-2025; **Available Online**: 04-04-2025

1. Introduction

Osteochondromas are the most prevalent benign bone tumours, originating from the physis and covered by a distinct hyaline cartilage cap. These tumours are rarely encountered in the foot and primarily affect the metaphyseal or metadiaphyseal parts of long bones. When osteochondromas do occur in the foot, they most commonly involve the short tubular bones, such as the metatarsals and phalanges, with calcaneal involvement being exceptionally rare. Here, we present a unique case of a calcaneal osteochondroma managed through surgical excision.

Osteochondromas, which are also known as exostoses, are abnormal cartilage-capped bony outgrowths that follow an autosomal dominant inheritance pattern. A higher risk of malignant transformation exists in cases of multiple hereditary exostoses.[1] Calcaneal osteochondromas are extremely rare, and less than 1% of osteochondromas affect the tarsal bones.[2] Clinically, these lesions may present as asymptomatic masses or as part of multiple exostoses. Most osteochondromas remain asymptomatic and are often incidentally detected on radiographic imaging.[3]

Osteochondromas are observed in approximately 2% to 3% of the general population and account for nearly 36% to 41% of all benign bone tumors.[4] They predominantly affect individuals under the age of 30, with a male predominance of about 63%.[2] Diagnosis is primarily based on plain radiographs, which typically reveal a lesion with a continuous cortex and medullary cavity merging into the parent bone. The degree of enchondral ossification can be assessed using bone scintigraphy.[5] Histologically, the cartilaginous cap of an osteochondroma is usually 2–3 mm thick, and any cap thickness exceeding 2 cm raises suspicion for malignant transformation into chondrosarcoma. Additionally, ultrasonography can aid in measuring the thickness of the hyaline cartilage cap to evaluate potential malignancy.[3]

2. Case Report

We present a case of osteochondroma of the right calcaneum in a 12-year-old male who reported swelling over his right heel (**Figure 1**) for the past two and a half months. On examination, a non-tender, firm, and immobile swelling was observed over the right heel. The patient experienced significant difficulty in performing daily activities because of

*Corresponding author: Suraj Sood
Email: surajsood8@gmail.com

https://doi.org/10.18231/j.ijos.2025.016

the lesion, which originated from the plantar aspect of his right foot. There was no history of trauma, fever, or spontaneous regression of the swelling throughout the course of the condition. (**Figure 2** and **Figure 3**)

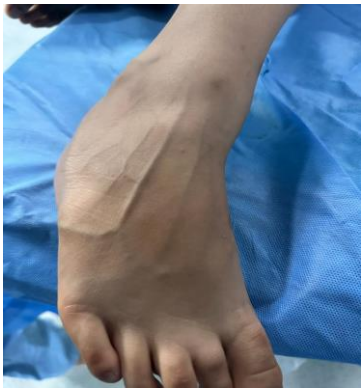


Figure 1: Showing swelling over right heel

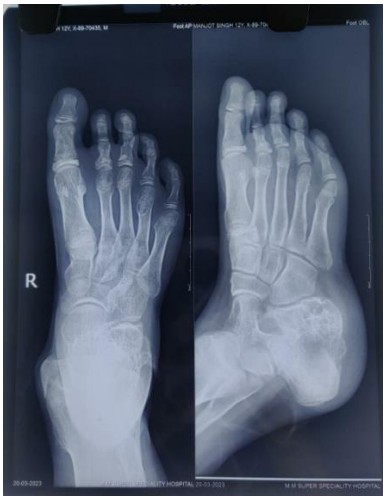


Figure 2: Showing x-ray of right foot suggesting lytic lesion over the calcaneum

Clinical evaluation revealed multiple bony swellings, primarily affecting the long bones, but the patient was symptomatic only on the affected side. Additionally, a family history of similar presentations was noted, as his father had experienced comparable symptoms. Radiographic assessment, including an X-ray and MRI of the affected limb, identified an irregular, sessile mass measuring approximately 3 cm × 2 cm on the plantar surface of the calcaneum. The lesion displayed sclerosis with interspersed lytic areas.

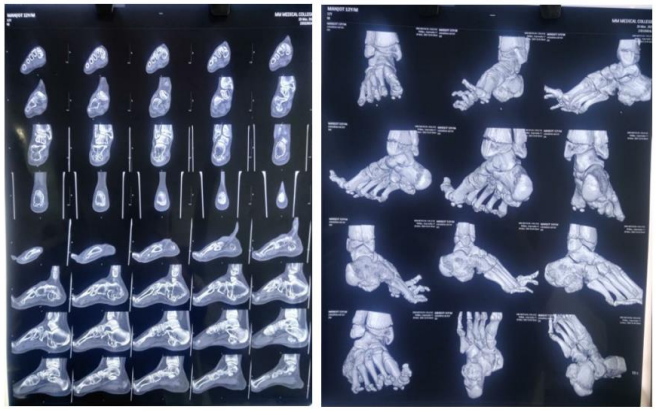


Figure 3: MRI and CT images showing a lesion over the plantar aspect of right calcaneum

Due to the persistence and severity of symptoms, conservative management alone was insufficient, and surgical intervention was deemed necessary to improve the patient's functional abilities. The patient underwent excision biopsy, and histopathological analysis confirmed the diagnosis of osteochondroma. Postoperatively, regular follow-ups demonstrated significant improvement, and the patient is now able to walk comfortably.

2.1. Procedure

Using a Cincinnati incision, the tumour was surgically excised along with its cartilaginous cap, and the specimen was sent for histopathological analysis. (**Figure 4**) The examination confirmed the diagnosis of osteochondroma. (**Figure 5**) Histological findings revealed a cartilaginous cap with chondrocytes embedded within lacunae. The patient was monitored for one year postoperatively, with no clinical or radiological evidence of recurrence. He demonstrated significant improvement in daily functional activities.

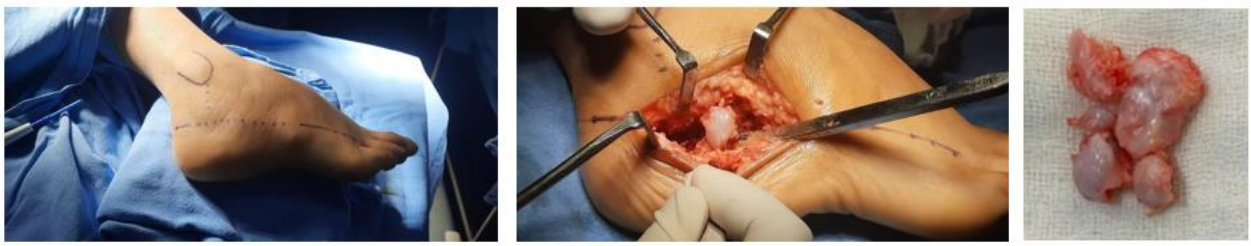
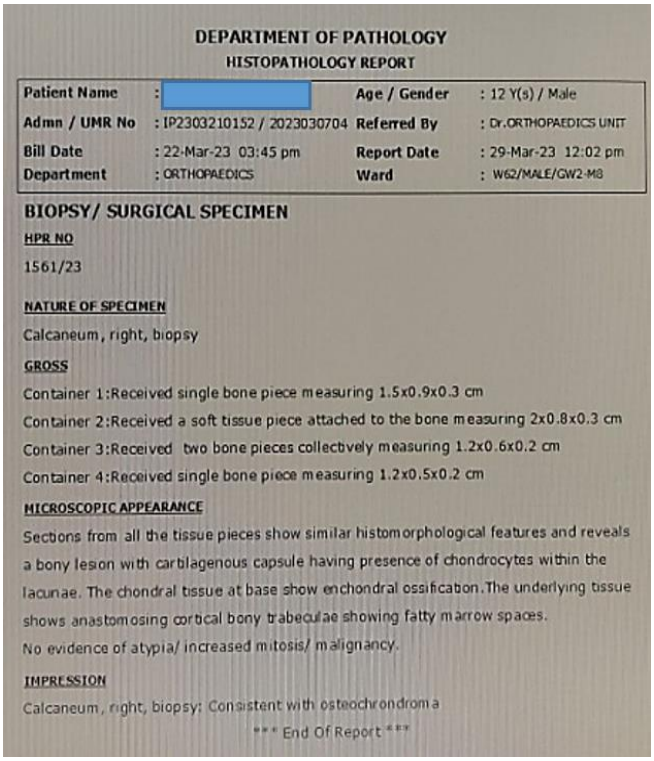


Figure 4: Image showing the Cincinnati incision and the tumour excision



DEPARTMENT OF PATHOLOGY
HISTOPATHOLOGY REPORT

Patient Name	:	Age / Gender	: 12 Y(s) / Male
Admn / UMR No	: IP2303210152 / 2023030704	Referred By	: Dr.ORTHOPAEDICS UNIT
Bill Date	: 22-Mar-23 03:45 pm	Report Date	: 29-Mar-23 12:02 pm
Department	: ORTHOPAEDICS	Ward	: W62/MALE/GW2-M8

BIOPSY/ SURGICAL SPECIMEN

HPR NO
1561/23

NATURE OF SPECIMEN
Calcaneum, right, biopsy

GROSS
Container 1:Received single bone piece measuring 1.5x0.9x0.3 cm
Container 2:Received a soft tissue piece attached to the bone measuring 2x0.8x0.3 cm
Container 3:Received two bone pieces collectively measuring 1.2x0.6x0.2 cm
Container 4:Received single bone piece measuring 1.2x0.5x0.2 cm

MICROSCOPIC APPEARANCE
Sections from all the tissue pieces show similar histomorphological features and reveals a bony lesion with cartilagenous capsule having presence of chondrocytes within the lacunae. The chondral tissue at base show enchondral ossification.The underlying tissue shows anastomosing cortical bony trabeculae showing fatty marrow spaces.
No evidence of atypia/ increased mitosis/ malignancy.

IMPRESSION
Calcaneum, right, biopsy: Consistent with osteochondroma

*** End Of Report ***

Figure 5: Image showing histopathology reports suggesting osteochondroma

3. Discussion

Osteochondromas are considered developmental anomalies rather than true neoplasms and may present as either solitary lesions or multiple lesions associated with multiple hereditary exostoses. Tumours involving the bones of the hands and feet, including the calcaneum, account for only 10% of all osteochondromas.[1] A cartilaginous cap thickness exceeding 1–2 cm in adults and 2–3 cm in growing children raises suspicion for malignant transformation.[3]

In a study by Kinoshita et al., which analysed 83 cases of soft tissue and bone tumours of the foot and the most commonly reported benign tumour was osteochondroma.[1] Their findings indicated a higher prevalence among females under 19 years of age. Radiographically, osteochondromas can present as either sessile or pedunculated lesions. A histological evaluation of the cartilaginous cap exceeding 2 cm suggests potential malignant transformation. While solitary osteochondromas have a malignancy risk of less than 1–2%, the risk increases to 5–25% in cases of multiple hereditary exostoses. Although radiography is often sufficient for diagnosis, additional imaging may be required for surgical planning and to rule out sarcomatous degeneration. MRI remains the most effective imaging technique to assess the hyaline cartilage cap, with mineralized regions displaying low signal intensity on T1- and T2-weighted images.[2,5]

CT imaging provides essential details through multiplanar reconstruction and three-dimensional imaging, aiding in the assessment of these lesions. The management of osteochondromas in the foot depends on the lesion's size and characteristics, with treatment options ranging from conservative observation to surgical excision. Small, asymptomatic lesions are generally managed conservatively. However, surgical intervention is warranted if the lesion becomes painful, continues to grow after skeletal maturity, or exhibits features suggestive of malignant transformation. Marginal resection is typically sufficient and carries a low recurrence rate.[7]

Histological evaluation plays a crucial role in determining recurrence risk, as highlighted by Blitz et al. in their case series. Their findings emphasized the significance of cartilaginous cap thickness in assessing malignancy risk. Although the lesion in our case was sessile—an indicator of potential malignancy—no malignant changes were observed throughout the follow-up period. Karasick et al. underscored importance in excising such tumours when features indicative of malignancy, such as sessile morphology, are present.[7] Nogier et al. advocated for surgical excision in cases where pain persists.[8] In our case, the patient experienced significant pain relief and notable improvement in functional status following surgical excision.

4. Conclusion

Osteochondromas are commonly observed in individuals under the age of 30; however, their occurrence in calcaneum is rare. Usually osteochondroma of calcaneum follow a benign course, literature suggests that giant osteochondromas, have the potential for malignant transformation. Any residual cartilage cap left after surgical excision may lead to recurrence, particularly in actively growing lesions. Therefore, timely and appropriate surgical intervention is crucial to prevent possibility of malignant transformation.

5. Source of Funding

None.

6. Conflict of Interest

None.

References

1. Kitsoulis P, Galani V, Stefanaki K, Paraskevas G, Karatzias G, Agnantis NJ, Bai M. Osteochondromas: review of the clinical, radiological and pathological features. *In Vivo*. 2008;22(5):633–46.
2. Schmale GA, Conrad EU 3rd, Raskind WH. The natural history of hereditary multiple exostoses. *J Bone Joint Surg Am*. 1994;76(7):986–92.
3. Murphey MD, Choi JJ, Kransdorf MJ, Flemming DJ, Gannon FH. Imaging of osteochondroma: variants and complications with radiologic-pathologic correlation. *Radiographics*. 2000;20(5):1407–34.
4. Unni KK, Inwards CY. Dahlin's Bone Tumors: General Aspects and Data on 10,165 Cases. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2010.
5. Resnick D, Kransdorf MJ. Bone and Joint Imaging. 3rd ed. Philadelphia: Elsevier; 2005.

6. Kinoshita G, Matsumoto M, Maruoka T, Shiraki T, Tsunemi K, Futani H, Maruo S. Bone and soft tissue tumours of the foot: review of 83 cases. *J Orthop Surg (Hong Kong)*. 2002;10(2):173-8
7. Karasick D, Schweitzer ME, Eschelman DJ. Symptomatic Osteochondromas: Imaging Features. *AJR Am J Roentgenol*. 1997;168(6):1507–12.
8. Nogier A, De Pinieux G, Hottya G, Anract P. Case reports: enlargement of a calcaneal osteochondroma after skeletal maturity. *Clin Orthop Relat Res*. 2006;(447):260–6.

Cite this article: Sood S, Mittal I, Singh S, Saini A. Osteochondroma of the calcaneum: A case report. *Indian J Orthop Surg*. 2025;11(1):76–79.