Case Report

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Oncology Section

Solitary Osteochondroma of the Calcaneum: A Rare Case Report

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ABSTRACT

Solitary osteochondroma is the most common benign bone tumour, but its occurrence in the calcaneum is extremely rare, representing less than 1% of reported cases. Because of its location in a weight-bearing bone, calcaneal osteochondroma may mimic more common heel disorders and contribute to delayed diagnosis. This case is notable for the unusually large size of the lesion, its 20-year duration, and the requirement for a combined medial-lateral surgical approach, which is infrequently described in literature. A 39-year-old woman presented with a gradually enlarging, painful swelling on the plantar aspect of her left heel that progressively limited weight-bearing. Examination revealed a firm, immobile bony mass measuring approximately 5×5 cm. Diagnostic evaluation included radiographs, Computed Tomography (CT), and Magnetic Resonance Imaging (MRI). Imaging demonstrated a well-defined osseous outgrowth with corticomedullary continuity, while MRI showed stretching of the plantar fascia without abnormal signal and absence of a cartilage cap, supporting a benign osteochondroma and excluding malignant transformation. Routine biochemical investigations were within normal limits. The patient underwent complete excision of the lesion using a dual medial–lateral approach to achieve adequate exposure, with intraoperative fluoroscopy confirming total removal. Histopathology revealed mature trabecular bone with a cartilage cap and endochondral ossification, consistent with benign osteochondroma. Postoperative recovery was uneventful, and the patient regained full mobility with pain-free weight-bearing. This rare case highlights the importance of considering osteochondroma in the differential diagnosis of chronic heel swellings, the value of multimodal imaging for accurate characterisation, and the effectiveness of tailored surgical approaches for large calcaneal lesions.

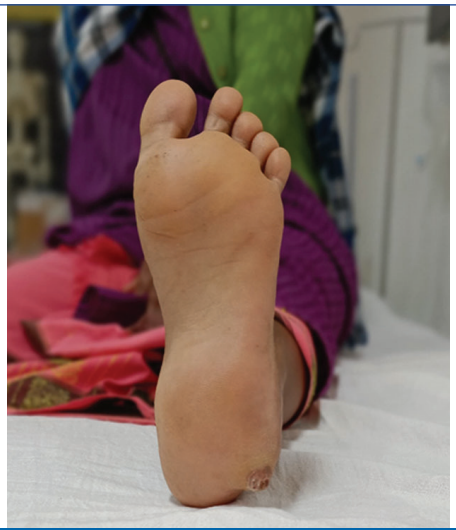
Keywords: Benign bone tumour, Calcaneum, Heel mass, Osteochondroma

CASE REPORT

A 39-year-old female reported with a gradually enlarging mass over the left heel, which she had first observed two decades earlier. Over time, the swelling became painful and caused discomfort, particularly during standing and walking, eventually limiting her ability to bear weight [Table/Fig-1]. She had no history of preceding trauma, systemic illness, or similar complaints among family members

Clinical Findings

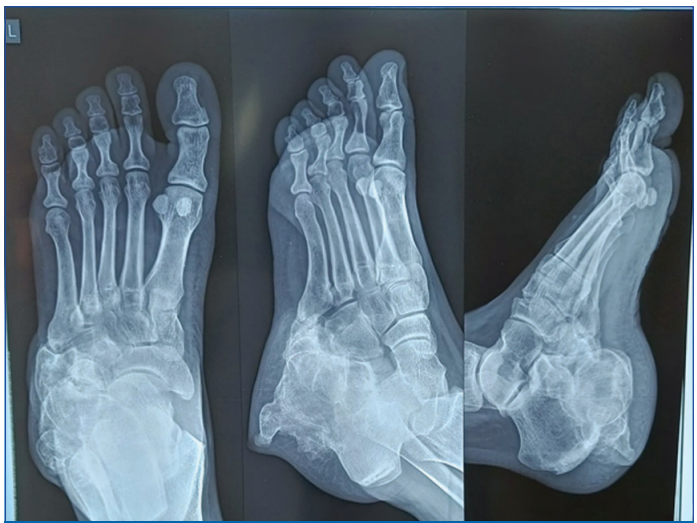
On physical examination, a firm, immobile, and tender bony mass measuring approximately 5×5 cm was palpable on the plantar aspect of the calcaneum [Table/Fig-1]. The overlying skin appeared healthy with no evidence of ulceration or necrosis. Movements at the ankle and subtalar joints were preserved and within normal limits.



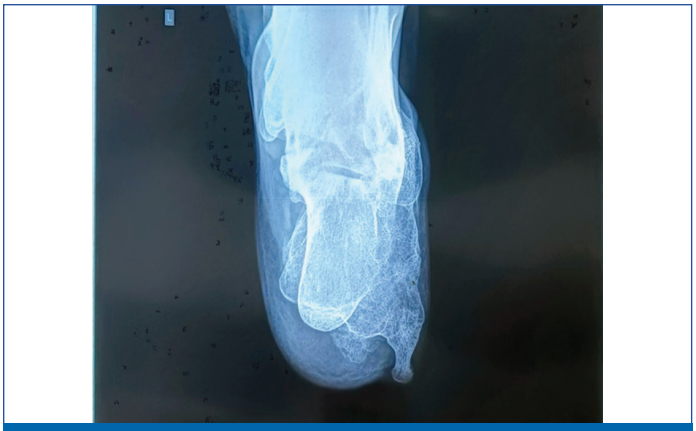
[Table/Fig-1]: Clinical photograph showing firm swelling over the plantar aspect of the left heel.

Diagnostic Assessment

Imaging investigations, including plain radiographs, CT, and MRI, revealed a well-defined, irregular bony mass arising from the inferior surface of the anterior and middle third of the calcaneum, measuring approximately 6.4×5.3×5.6 cm. The radiographs (AP and lateral views) demonstrated a circumscribed osseous outgrowth [Table/Fig-2], while CT scans provided clearer delineation of its cortical and medullary continuity with the parent bone, confirming its calcaneal origin [Table/Fig-3]. MRI further characterised the lesion, showing stretching of the plantar fascia without signal alterations, and absence of a cartilage cap or abnormal contrast uptake, findings consistent with a benign osteochondroma. Careful evaluation excluded the possibility of multiple hereditary exostoses.



[Table/Fig-2]: Plain radiograph (AP and lateral views) of the left foot showing a well-circumscribed bony outgrowth from the calcaneum.



[Table/Fig-3]: CT scan demonstrating an irregular mass arising from the calcaneum.

Differential Diagnosis

The differential diagnoses considered included:

- Subungual exostosis
- Dysplasia epiphysealis hemimelica (Trevor disease)
- Turret exostosis
- Bizarre parosteal osteochondromatous proliferation (Nora lesion)
- Parosteal osteosarcoma
- Juxtacortical chondroma
- Subperiosteal haematoma

Biological Investigations

As part of the patient's evaluation, routine blood tests were performed to assess her overall health and to rule out any systemic condition that might explain or contribute to the swelling. Her haematological profile, including haemoglobin levels and total blood counts, was entirely normal, indicating that there was no underlying infection or inflammatory process at the time of presentation.

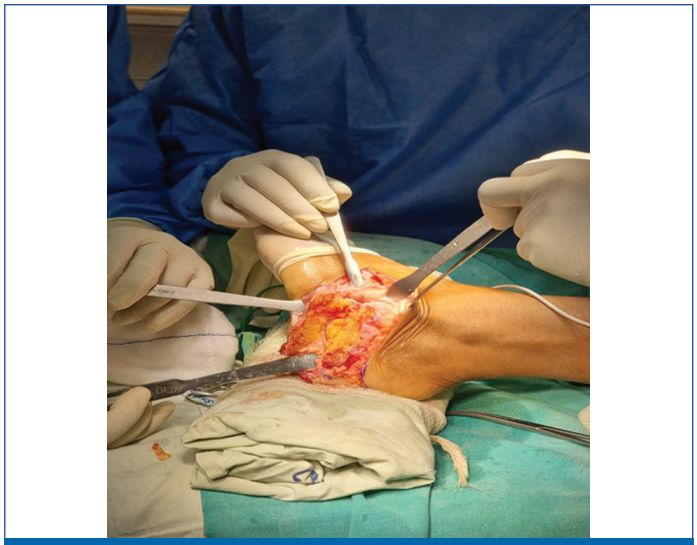
Biochemical markers such as serum calcium, phosphorus, and alkaline phosphatase were also within normal limits. This was particularly important, as abnormalities in these values could suggest metabolic bone disorders, which may mimic benign bony lesions. Similarly, her liver and kidney function tests showed no derangements, confirming that she had no systemic illness that could influence bone metabolism or complicate surgical planning.

Inflammatory markers, including Erythrocyte Sedimentation Rate (ESR) and C-Reactive Protein (CRP), were not elevated. Their normal values further supported the impression that the lesion was non-infective and had a slow, benign course rather than an aggressive or inflammatory nature.

Taken together, the biological investigations provided reassurance that the mass was unlikely to be associated with any metabolic, infectious, or malignant process. These findings, when interpreted alongside the imaging results, strengthened the clinical suspicion of a benign solitary osteochondroma and supported the decision to proceed with planned surgical excision.

Therapeutic Intervention

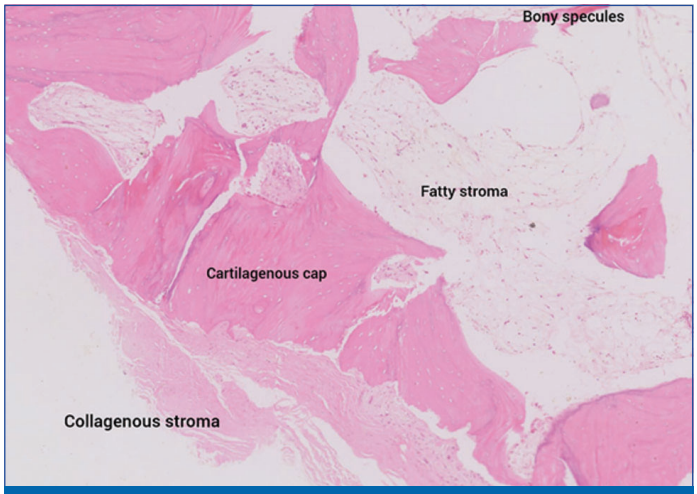
The patient underwent complete surgical excision of the lesion under spinal anaesthesia. Initially, a lateral incision was made over the heel, followed by a careful dissection to protect the neurovascular structures. During the procedure, it was noted that the tumour extended towards the posteromedial aspect of the calcaneum, requiring the addition of a medial incision for better access. The lesion was successfully excised in its entirety, with intraoperative fluoroscopy confirming the complete removal without any residual bony projections [Table/Fig-4]. After ensuring haemostasis, the surgical site was thoroughly irrigated, and the wound was closed in layers.



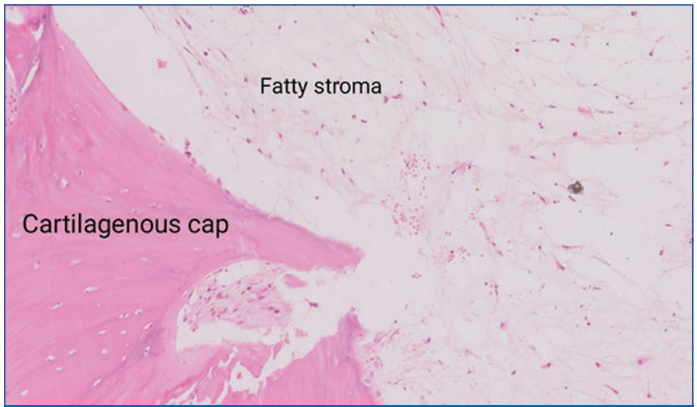
[Table/Fig-4]: Intraoperative photographs demonstrating exposure and excision of the calcaneal osteochondroma.

Histopathological Examination

Histopathological examination of the excised lesion revealed features characteristic of a benign osteochondroma. The section showed a well-formed hyaline cartilaginous cap composed of uniformly distributed chondrocytes within lacunae, arranged in an orderly pattern without cytological atypia [Table/Fig-5a]. Beneath the cartilage cap, there was clear evidence of endochondral ossification, with a gradual transition into mature bony trabeculae and bony specules, confirming the typical architectural pattern of osteochondroma [Table/Fig-5b].



[Table/Fig-5a]: Histopathological section (H&E stain) showing a well-formed cartilaginous cap with underlying bony specules, along with intervening fatty and collagenous stroma, consistent with benign osteochondroma.

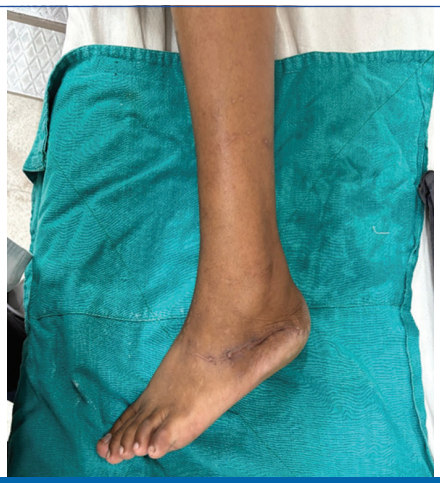


[Table/Fig-5b]: High-power histopathological section (H&E stain) showing the cartilaginous cap composed of chondrocytes embedded in a hyaline matrix, transitioning toward underlying fatty stroma. The interface demonstrates orderly endochondral ossification without cytological atypia, supporting the diagnosis of benign osteochondroma.

The intertrabecular spaces contained a mixture of fatty marrow elements and collagenous stroma, representing normal medullary components incorporated into the lesion. No features suggestive of malignant transformation, such as cap thickening, nuclear pleomorphism, or permeative growth, were identified. These histological findings correlated well with the imaging characteristics and confirmed the diagnosis of a benign solitary osteochondroma of the calcaneum.

Follow-up and Outcomes

Histopathological examination of the excised specimen confirmed the diagnosis of a benign osteochondroma. The postoperative course was uneventful, with no complications reported during the hospital stay. The patient was discharged one week after surgery in a stable condition. Sutures were removed at the end of the second postoperative week. At follow-up, she reported marked improvement in heel pain, regained full mobility, and was able to bear weight comfortably, reflecting an excellent functional outcome [Table/Fig-6].



[Table/Fig-6]: Postoperative scar and healed foot.

Timeline: The patient's clinical course is presented in the [Table/Fig-7]. The swelling was first noted nearly 20 years ago and progressively enlarged, becoming painful over time. At presentation, a 5 × 5 cm plantar mass was confirmed as a benign osteochondroma on CT and MRI. The lesion was excised using a dual medial–lateral approach, and the postoperative period was uneventful. The patient regained full weight-bearing within a week, and follow-up assessments showed improved mobility with no recurrence.

Stage	Details	Timeframe
Initial symptoms	Patient notices swelling in the heel	~20 years ago
Progression	Swelling gradually enlarges, becomes painful	Over the years
Presentation	5 × 5 cm swelling noted, pain during walking/standing	Age 39 years (now)
Preoperative	Imaging (CT/MRI) confirms benign osteochondroma	Pre-surgery
Surgery	Complete excision with dual approach	During surgery
Postoperative	Uncomplicated recovery, full weight-bearing restored	One-week post-surgery
Follow-up	Patient reports improved mobility and no recurrence	2 weeks, 3 months post-surgery

[Table/Fig-7]: Timeline of the patient's clinical presentation, management, and follow-up.

DISCUSSION

Osteochondromas are benign, cartilage-capped bony projections arising from the metaphyses of long bones, accounting for nearly 30-40% of all benign skeletal tumours [1]. Their presence in the calcaneum is uncommon, representing <1% of cases and fewer than 50 have been documented in published literature [1-3]. Because of the location in a weight-bearing region, calcaneal lesions often present with heel pain, difficulty in ambulation, or pressure-related symptoms, unlike long-bone osteochondromas, which may remain asymptomatic for years [2].

Several earlier reports describe calcaneal osteochondromas presenting with symptoms resembling plantar fasciitis or heel spur syndrome, frequently resulting in diagnostic delay. Gaikwad R et al., reported a lesion that closely mimicked plantar fasciitis, emphasising the overlap in clinical features and the importance of imaging for exclusion of soft-tissue pathologies [3]. Similarly, Ali SA et al., described a symptomatic plantar lesion in a middle-aged adult that produced significant discomfort during weight-bearing [4]. Our case parallels these findings, as the patient also experienced chronic plantar pain attributed to a long-standing mass.

Radiological evaluation remains central to diagnosis. Continuity of cortex and medulla with the parent bone on CT and MRI remains the hallmark feature, enabling differentiation from other benign bony conditions and preventing misinterpretation as aggressive lesions. MRI is particularly helpful for assessing cartilage cap thickness and ruling out secondary chondrosarcoma, especially in long-standing cases [5]. In the present case, MRI demonstrated stretching of the plantar fascia without abnormal signal intensity and absence of a cartilage cap, findings consistent with benignity. Comparable imaging profiles have been documented by Ghosh A et al., in an adolescent patient with a plantar calcaneal osteochondroma [6].

Larger plantar osteochondromas may require broader surgical exposure to ensure complete removal. While smaller lesions can often be excised through a single medial or lateral incision [7], deeper or extensive masses demand wider access. Koplay M et al., reported recurrence in a skeletally mature patient due to inadequate excision, emphasising the importance of complete removal in such lesions [8]. In our case, the size and plantar extension of the tumour necessitated a combined medial–lateral approach, which allowed safe dissection and ensured total excision. The patient's smooth recovery and absence of recurrence reflect the effectiveness of this method for managing large calcaneal osteochondromas.

Complications such as bursitis, tendon irritation, or neurovascular compression have been documented, especially in prominent lesions [9]. Interestingly, despite its size, the present case showed no compression-related changes on imaging or clinical examination, similar to the observations of Ali SA et al., and Ghosh A et al., who also reported uneventful recoveries following excision [4,6]. Restoration of normal mobility after surgery in our patient aligns with the favourable outcomes consistently described in literature, reaffirming that complete excision is usually curative with minimal recurrence risk when the lesion is adequately exposed and removed.

Biological investigations also supported benign pathology. Normal haematological and inflammatory markers (haemoglobin, leukocyte count, ESR, and CRP) excluded acute infection or inflammatory disorders, while normal metabolic parameters (serum calcium, phosphorus, and alkaline phosphatase) ruled out metabolic bone disease. Avramidis K et al., reported similar findings in their review, noting that osteochondromas typically do not demonstrate biochemical abnormalities unless complicated by fracture or malignant transformation [10]. The normal profile in our patient, therefore, further strengthened the diagnostic impression of a non-aggressive lesion.

Differential diagnosis of surface-based osseous lesions is crucial, particularly in atypical locations such as the calcaneum. As highlighted by Alabdullrahman LW et al., corticomedullary continuity is the key distinguishing feature separating osteochondroma from mimicking conditions [11].

Subungual Exostosis: Also known as Dupuytren exostosis, this lesion typically arises from the dorsal aspect of the distal phalanx near the nail bed. It is usually associated with trauma

or infection and presents as a painful superficial mass. The absence of corticomedullary continuity helps distinguish it from osteochondroma.

Dysplasia Epiphysealis Hemimelica (Trevor Disease): A rare developmental disorder producing multiple epiphyseal osteochondromas, predominantly affecting boys (3:1 ratio). It commonly involves the lower limb and may cause gait abnormalities or deformity. Unlike solitary osteochondroma, the lesions originate from the epiphysis rather than the metaphysis.

Turret Exostosis: A reactive, extracortical ossified mass occurring on the dorsal aspect of the phalanges, often post-traumatic. It lacks medullary continuity, helping differentiate it from osteochondroma.

Bizarre Parosteal Osteochondromatous Proliferation (Nora Lesion): A benign but locally recurrent surface lesion affecting the hands and feet. Although resembling osteochondroma on imaging, it lacks medullary continuity and is characterised histologically by disorganised cartilage, bone, and fibrous tissue proliferation.

Parosteal Osteosarcoma: A low-grade malignant bone tumour typically arising from the metaphysis of long bones, most frequently the posterior distal femur. It appears as a densely ossified lobulated mass without early medullary involvement; however, advanced cases may show medullary extension. Lack of corticomedullary continuity and more aggressive imaging features help differentiate it from osteochondroma.

Juxtacortical Chondroma: A benign cartilage tumour that causes cortical saucerisation and periosteal reaction. It typically occurs in adults aged 20-40 years. Its lack of corticomedullary continuity and characteristic scalloping of cortex distinguish it from osteochondroma.

Subperiosteal Haematoma: A post-traumatic surface lesion appearing as an elliptical collection beneath the periosteum, often showing internal heterogeneity (cystic spaces, fibrosis, or mineralisation). It lacks medullary continuity and may mimic surface bone tumours in early stages [11].

Their review emphasises that features such as irregular mineralisation, absence of medullary continuity, or periosteal reaction should prompt consideration of alternative diagnoses. In the present case, CT clearly demonstrated a smooth, uninterrupted continuation of the cortex and marrow with the parent calcaneum, strongly supporting the diagnosis of a benign solitary osteochondroma over these differentials.

However, comparison with earlier reports demonstrates that this case is unique due to the unusually prolonged 20-year history, the large size of the lesion, and the successful use of a combined medial-lateral surgical approach, which is rarely described. Each additional case such as this contributes valuable insight into variations in presentation, imaging findings, and operative strategies for managing calcaneal osteochondromas.

CONCLUSION(S)

Solitary osteochondroma of the calcaneum remains a rare entity. This case underlines the importance of considering osteochondroma in the differential diagnosis of heel masses, particularly when conservative treatments fail. Multimodal imaging is crucial for accurate diagnosis and surgical planning. The dual medial-lateral approach presented in this case ensures complete excision of large lesions and supports the notion that timely surgical intervention can yield excellent functional outcomes.

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