

# Excision of a Calcaneal Osteochondroma via Medial Approach: A Case Report

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## ABSTRACT

Osteochondromas are the most common benign bone tumours, typically arising from the metaphyses of long bones, while involvement of the calcaneus is rare. When present in the hindfoot, these lesions may become symptomatic due to mechanical irritation or proximity to Neurovascular (NV) structures, posing both diagnostic and surgical challenges. Hereby, the authors report the case of a 30-year-old male patient who presented with a one-year history of progressive medial heel pain and a palpable bony mass. Radiographs, Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) demonstrated a pedunculated osteochondroma arising from the medial aspect of the calcaneus with continuity of the medullary canal and a thin cartilage cap. Due to persistent symptoms and concern for NV compression, surgical excision was performed using a medial approach. The lesion was removed en bloc with complete excision of the cartilage cap while preserving adjacent NV structures. Histopathological examination confirmed a benign osteochondroma. The patient experienced complete resolution of symptoms and returned to normal activities, with no recurrence at 12-month follow-up. The present case highlights the importance of considering calcaneal osteochondroma in patients with persistent heel pain and demonstrates that a medial surgical approach offers safe exposure, effective NV protection and favourable functional outcomes when anatomically feasible.

**Keywords:** Benign bone tumour, Foot and ankle surgery, Heel pain

## CASE REPORT

A 30-year-old male presented with a one-year history of progressive pain over the right heel, associated with a gradually enlarging hard mass on the medial aspect of the heel. The pain was insidious in onset, dull aching in nature and aggravated by prolonged standing, walking and shoe wear. There was no history of trauma, fever, or constitutional symptoms. The patient had no significant past medical or surgical history, did not report any addictions and had no family history suggestive of hereditary multiple exostoses.

On physical examination, a firm, immobile bony swelling measuring approximately 3 cm was palpable over the posteromedial aspect of the right calcaneus, just inferior to the medial malleolus. The swelling was mildly tender on palpation and appeared to cause local irritation near the tarsal tunnel region. The overlying skin was intact without erythema, ulceration, or callosity. Sensory examination of the plantar aspect of the foot was normal, distal pulses were palpable and ankle and subtalar joint movements were full and pain-free. Systemic examination was unremarkable.

Based on clinical findings, a provisional diagnosis of a benign calcaneal bone tumour was considered. Standard weight-bearing radiographs of the right foot demonstrated a pedunculated bony outgrowth arising from the medial aspect of the calcaneus with continuity of the cortex and medullary canal, characteristic of an osteochondroma [Table/Fig-1].

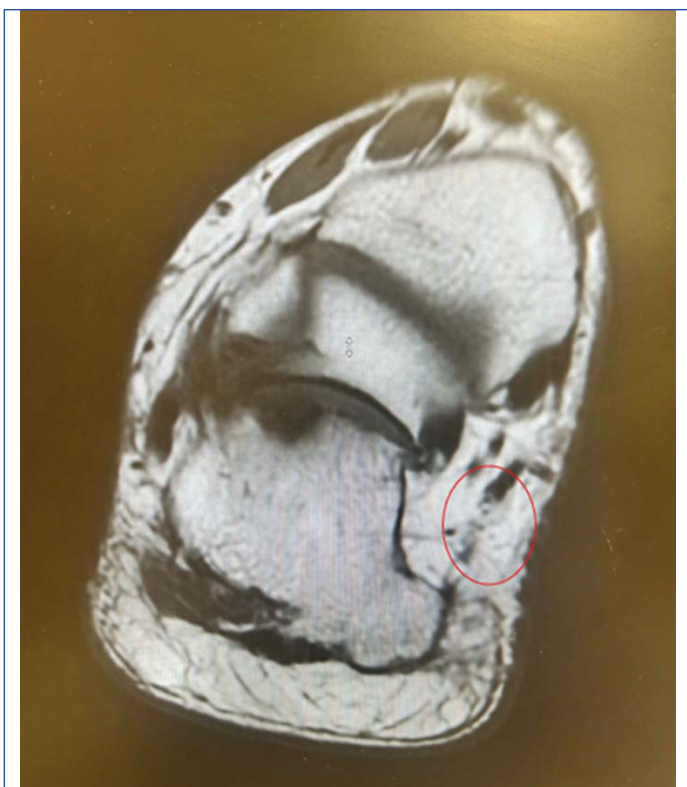
On the radiograph, the lesion appeared pedunculated and projected away from the calcaneus. A CT scan provided better delineation, confirming a 28x25 mm osseous mass originating from the posteromedial calcaneal cortex with continuity of the medullary canal, consistent with an osteochondroma (exostosis). MRI revealed a thin cartilage cap measuring approximately 6-7 mm, with no irregular calcification, soft-tissue mass, or marrow oedema, thereby excluding malignant transformation. No bony destruction or reactive changes were noted in the adjacent calcaneus [Table/Fig-2]. Differential diagnoses included calcaneal spur, enchondroma, osteoid osteoma, plantar exostosis and low-grade chondrosarcoma.



**[Table/Fig-1]:** Lateral radiograph of the hindfoot demonstrating a bony protuberance arising from the inferior-medial calcaneus, characteristic of a calcaneal osteochondroma.

The imaging findings supported the provisional diagnosis of a solitary medial calcaneal osteochondroma.

These imaging findings corroborated the final diagnosis of a solitary medial calcaneal osteochondroma. All the findings and severity of symptoms and the condition of patients was analysed and given the patient's symptoms and the lesion's proximity to the posterior tibial NV bundle, conservative management was not sufficient alone and surgical removal was advised for functional improvements. The lesion was excised en bloc via a medial approach with complete removal of the cartilage cap. The patient's excision biopsy and histopathological examination demonstrated a benign osteochondroma with a thin hyaline cartilage cap and underlying trabecular bone, with no evidence of malignancy. This confirmed the radiologic diagnosis and ruled out chondrosarcoma. The patient was under regular follow-ups up to 12 months with significant physical and clinical improvements. The patient remained pain-free and had returned to all daily activities including recreational exercise.



**[Table/Fig-2]:** Preoperative axial MRI of the right hindfoot showing a well-defined bony outgrowth arising from the medial aspect of the calcaneus, continuous with the parent cortex and medullary bone. The lesion is consistent with an osteochondroma, displacing adjacent soft-tissues without evidence of malignant transformation.

### Surgical Decision-making and Medial Approach Technique

After multidisciplinary discussion, surgical excision of the osteochondroma was planned. The key decision was choosing a “medial approach” to the calcaneus versus a direct plantar (inferior) approach.

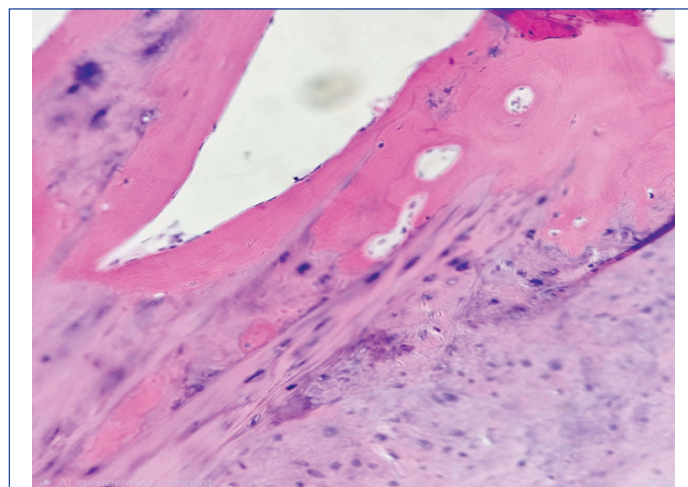
**Surgical technique:** The operation was performed under general anaesthesia with the patient in a supine position and a bump under the ipsilateral hip to slightly evert the foot, allowing access to the medial hindfoot. A tourniquet was applied to the thigh for a bloodless field. A curvilinear incision (~6 cm) was made along the medial aspect of the heel, centered over the palpable osteochondroma. The incision was placed just posterior to the course of the posterior tibial nerve to avoid direct injury. Dissection was carried directly down to the periosteum in a full-thickness fashion, minimising flap undermining to preserve blood supply (an approach that also helps avoid skin edge necrosis). The NV bundle in the tarsal tunnel was identified and gently retracted; notably, the tibial nerve and posterior tibial artery were displaced slightly posteriorly by the mass. The abductor hallucis muscle origin was partially released to improve exposure to the medial calcaneal wall.

Once the bony lesion was exposed, its cartilaginous cap was visualised and preserved during dissection. An osteotome and mallet were then used to osteotomise the base of the osteochondroma flush with the normal calcaneal cortex. The mass was excised en bloc and removed (measuring approximately 3 cm in length). A high-speed burr was used to smooth the calcaneal surface and ensure no residual cartilage cap or bony spicule remained, as incomplete resection of the cartilage cap can lead to recurrence. Haemostasis was achieved; bone wax was applied to the osteotomy site on the calcaneus for bleeding control from cancellous bone. The wound was irrigated and closed in layers. The deep fascia and muscle were reapproximated and the skin was closed with interrupted absorbable sutures to avoid suture removal and reduce tension on the skin edges. A sterile compressive dressing and posterior splint were applied.

### Intraoperative Findings and Postoperative Outcome

**Intraoperative findings:** The surgery proceeded as planned via the medial approach without complications. The osteochondroma was found to be a pedunculated, mushroom-shaped outgrowth arising from the inferior-medial calcaneal tuberosity. It was covered by a cartilage cap and was displacing the surrounding soft tissue. The posterior tibial nerve was intact and draped over the mass but was successfully protected and left unharmed. There was no abnormal calcaneal bone destruction at the base of the lesion. The excised mass measured approximately 3.0×2.5×2.0 cm, consistent with preoperative imaging. A frozen section analysis of the lesion confirmed benign cartilage and bone, reassuring the surgical team during the procedure.

**Pathology:** Final histopathological examination {Haematoxylin and Eosin (H&E)} demonstrated a benign osteochondroma with a thin hyaline cartilage cap and underlying trabecular bone, with no evidence of malignancy and cellular atypia. This confirmed the radiologic diagnosis and ruled out chondrosarcoma [Table/Fig-3].



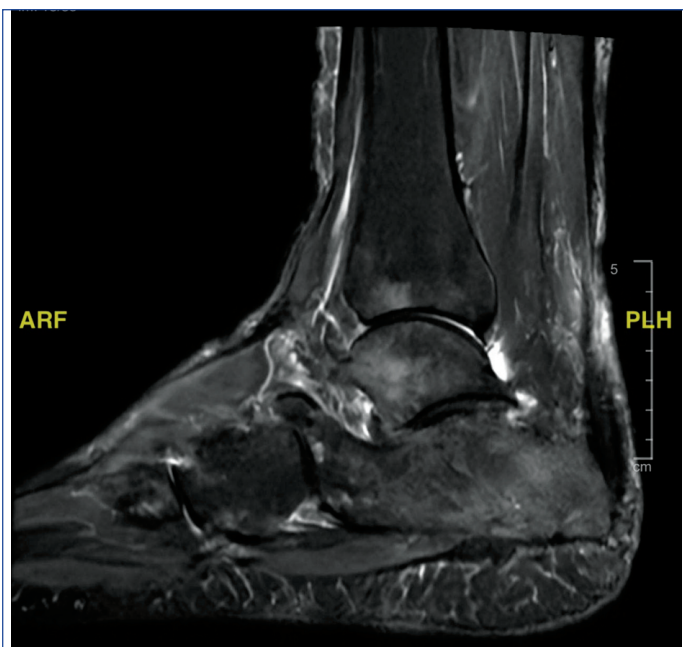
**[Table/Fig-3]:** High power microscopic histopathological images of fibrous tissue (cartilage) at edge of bone, demonstrated a benign osteochondroma with a thin hyaline and underlying trabecular bone, with no evidence of malignancy and cellular atypia (H&E).

**Postoperative course:** The patient was kept non weight-bearing for two weeks. At two weeks, wound healing was satisfactory with no signs of infection. Progressive weight-bearing was initiated at three weeks. By six weeks, the patient reported marked pain relief and full, pain-free ankle and subtalar motion. At three months, he resumed walking in regular footwear without discomfort.

Postoperative radiographs at two months demonstrated complete excision with restoration of normal calcaneal contour [Table/Fig-4]. Follow-up MRI at five months confirmed complete removal of the lesion without residual cartilage cap or recurrence [Table/Fig-5].



**[Table/Fig-4]:** Postoperative (two months after surgery) standing lateral radiograph of the right ankle and hindfoot showing complete excision of the medial calcaneal osteochondroma. The calcaneal contour appears smooth with no residual bony outgrowth, and the joint alignment is maintained.



**[Table/Fig-5]:** Postoperative (five months after surgery) sagittal MRI of the right ankle and hindfoot demonstrating complete excision of the calcaneal osteochondroma. The calcaneal contour is restored with no residual bony mass or cartilage cap. Surrounding soft-tissues show postoperative changes without evidence of NV compromise or recurrence.

At final follow-up at 12 months, the patient remained asymptomatic, had returned to all daily and recreational activities and showed no evidence of recurrence clinically or radiographically. The medial surgical scar was well healed and non tender, with no NV complaints. The outcome was excellent, highlighting the effectiveness of surgical excision via a medial approach in symptomatic medial calcaneal osteochondroma.

## DISCUSSION

Osteochondromas are the most common benign bone tumours, accounting for ~35-40% of benign bone neoplasms [1-3]. They typically arise from metaphyses of long bones during growth and lesions in the foot and ankle are relatively uncommon (less than 10% of cases) [4-7]. Calcaneal osteochondromas are particularly rare [6-8], with only a handful of cases reported in the literature. Patients often present in adolescence or early adulthood with a painless mass; however, in the confined space of the foot, even small exostoses can become symptomatic due to shoe friction, weight-bearing stress, or NV impingement [9]. Heel pain is the most frequent symptom, sometimes accompanied by swelling, callus formation, or nerve compression signs, if the lesion is near the tarsal tunnel or plantar nerves [10]. Calcaneal osteochondromas, though rare, should be considered in patients with persistent heel pain and a palpable bony mass. Similarly, in the present case the patient, reported a 1-year history of progressive right heel pain and a hard mass on the inner side of the heel. The pain was aggravated by prolonged standing and shoe pressure.

Surgical excision is generally indicated for calcaneal osteochondromas that cause significant pain, functional limitation, or NV compromise, as well as those demonstrating suspicious growth after skeletal maturity [8,11]. In the weight-bearing foot, careful surgical planning is required to minimise complications. The present report describes a case of a medial calcaneal osteochondroma excised through a medial approach, which was selected for several reasons. First, the tumour was predominantly medial, making it accessible through a medial incision directly overlying the lesion's base. Second, a medial incision would avoid the weight-bearing plantar skin of the heel pad, reducing the risk of a painful scar or wound breakdown. Plantar incisions on the heel are known to heal slowly and can lead to hypertrophic, painful scars due to constant pressure. By using a medial approach, we

could also better visualise and protect the posterior tibial artery, vein and tibial nerve (which runs through the tarsal tunnel behind the medial malleolus) during tumour resection. In contrast, a plantar approach would have required dissection through the thick heel pad and could endanger the medial and lateral plantar nerves or their calcaneal branches that run within the plantar fascia and fat pad. Finally, the medial approach allowed a more extensile exposure if needed, whereas a plantar incision would be limited in length and placed directly under the heel, making postoperative care more challenging. The considerations in approach selection are further compared in [Table/Fig-6] below.

Factor	Medial Approach	Plantar Approach
Protection of Neurovascular (NV) structures	Direct visualisation of the tarsal tunnel contents (posterior tibial nerve and vessels) allows the surgeon to identify and safely retract or decompress these structures during tumour removal. Risk to the main NV bundle is low with careful dissection along anatomical planes. Small sensory branches (medial calcaneal nerve) are also more easily preserved from a medial vantage.	Requires dissection through the thick heel pad where multiple small nerve branches (medial and lateral calcaneal nerves) and vessels. These plantar nerve branches are at risk of inadvertent injury or entrapment during a plantar incision. Moreover, a plantar approach provides no direct access to the posterior tibial nerve; if the osteochondroma is compressing the nerve from below, the plantar route makes protection or release of the nerve more difficult.
Healing time and recovery	Incision is in a non weight-bearing area, allowing for relatively faster wound healing. Patients can often begin gentle weight-bearing once soft tissues heal (usually ~2 weeks) with less concern for wound stress. Overall recovery tends to be quicker because normal walking does not directly tension the incision site.	Incision is on a weight-bearing surface, necessitating strict offloading. Prolonged non weight-bearing (often ≥3 weeks) is required to prevent wound dehiscence. Even with offloading, plantar wounds heal more slowly. The return to normal footwear and activities is delayed compared to a medial approach due to the need for the incision to mature without excessive pressure.
Surgical exposure (extensile capacity)	The medial approach can be extended proximally or distally along the hindfoot if needed for better visualisation or if a larger exposure is required. It provides an adequate operative field to work around the calcaneus and can be combined with a slight plantar or posterior extension (in a "hockey-stick" fashion) to access the inferior aspect of the calcaneus. This flexibility makes it an extensile approach for various tumour sizes.	A plantar approach is limited by the boundaries of the weight-bearing sole. Surgeons avoid excessively long incisions on the bottom of the foot, so exposure is confined to the immediate area of the lesion. Visualisation can be challenging in the depth of the heel pad and extending the incision carries high cost (larger area of weight-bearing wound). Thus, the plantar route is generally reserved for lesions that cannot be reached from another trajectory.
Risk of wound complications	Lower risk of wound complications. The medial skin has good vascularity and is not subjected to constant pressure. Wound dehiscence or infection rates are low with proper technique. Scarring is typically asymptomatic as it lies on the side of the foot (less friction).	Higher risk of complications at the incision site. Plantar incisions are prone to wound dehiscence, haematoma and hypertrophic scar formation, especially if prematurely subjected to pressure. The heel pad's thick tissue can develop a painful scar that may trouble the patient with every step. Meticulous postoperative care (drain placement, pressure relief, prolonged rest) is required to mitigate these risks.

**[Table/Fig-6]:** Comparison of medial vs. plantar surgical approaches for calcaneal osteochondroma excision, with respect to protecting Neurovascular (NV) structures, healing/recovery, surgical exposure and wound complication risks.

## Comparison of Medial vs. Plantar Surgical Approaches

To highlight the rationale for choosing a medial approach in the present case, [Table/Fig-7] compares the medial and plantar approaches for excising a calcaneal lesion across several key factors:

Study	Key findings	Surgical approach/outcome	Comparison with present case
Blitz NM and Lopez KT (2008) [4]	40-year-old female; Case of a giant calcaneal osteochondroma causing heel pain and shoe wear difficulty. Surgical excision led to resolution.	Medial approach used to avoid weight-bearing heel pad. No recurrence or NV complication.	Similar approach and rationale; the present case reinforces their conclusions on medial approach safety and efficacy.
Sella EJ and Chrostowski JH (1995) [6]	Six-year-old male and 71-year-old female were reported two calcaneal osteochondroma cases causing mechanical irritation and heel pain.	Not explicitly stated, but emphasised need for excision in symptomatic cases.	Current case adds imaging and surgical technique clarity; confirms symptom resolution post-excision.
Koplay M et al., (2009) [11]	25-year-old female with Calcaneal osteochondroma recurrence in adult due to inadequate primary excision.	Emphasised complete cartilage cap removal to prevent recurrence.	The present case achieved complete excision with burr and had no recurrence at 12 months.
Zamzami MM et al., (2024) [10]	28-year-old female; Case of recurrent plantar calcaneal osteochondroma excised via plantar approach.	Plantar approach led to delayed healing and postoperative discomfort.	Confirms the medial approach advantage in the present case: faster healing, less scar-related morbidity.
Present case	30-year-old with right medial heel pain, confirmed calcaneal osteochondroma. Medial approach used; full recovery at 12 months.	Medial approach avoided weight-bearing zone; NV structures preserved; complete excision with cartilage cap.	Supports prior evidence; adds detailed imaging, intraoperative technique and long-term follow-up to the literature.

**[Table/Fig-7]:** Comparative studies on calcaneal osteochondroma excision approaches [4,6,10,11].

Malignant transformation of an osteochondroma into chondrosarcoma is rare (<1%) [10,12], continued enlargement or new onset of pain in an adult warrants intervention to relieve symptoms and to obtain a definitive histology [8]. Similarly, in the present case no evidence of malignant transformation was noticed in post-histopathological analysis.

Surgical excision is often curative for symptomatic cases, providing significant pain relief and functional improvement. The choice of surgical approach is critical in the foot, where incisions must heal under the stresses of weight-bearing. In the present case, the medial approach proved highly advantageous for removing a medial calcaneal osteochondroma. In comparison to a direct plantar approach, the medial approach in this scenario offered superior outcomes with minimal morbidity [Table/Fig-7] [4,6,10,11].

## CONCLUSION(S)

The case highlights that for accessible calcaneal osteochondromas, a medial surgical approach can maximise safety (especially regarding nerves and vessels) and minimise postoperative issues like scar pain or dehiscence. As there is paucity of comparative studies, more comparative studies are needed to support this statement. Complete excision with removal of the cartilage cap is essential to prevent recurrence and careful handling of soft-tissues is paramount for optimal healing. In summary, the medial approach to calcaneal osteochondroma excision provided excellent results in the present case, underlining its value as the preferred technique when anatomically feasible. This approach ensures that the benefits of surgical treatment - definitive symptom relief and tumour removal - are achieved while the risks are kept as low as possible for the patient.

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