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Pedunculated Osteochondroma of the Right Foot Following Traumatic Injury: A Rare Case Report

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ABSTRAK
Osteochondromas are the most common benign bone tumors but rarely occur in the foot (3-10% of cases). This case report describes a 37-year-old female with progressive right foot pain following a traumatic fall. Examination revealed a 5 cm firm, non-mobile lateral foot mass that had enlarged from 2 cm to 4 cm over three months, with restricted ankle motion. Pedunculated osteochondroma was diagnosed clinically and radiologically. Complete surgical excision using the osteoclasis technique was performed, with histopathology confirming benign osteochondroma and uneventful recovery. The temporal relationship between trauma and tumor identification raises questions about whether trauma triggered secondary development or revealed a pre-existing lesion. Post-traumatic osteochondromas may arise from displaced growth plate cartilage fragments. The progressive enlargement in this skeletally mature adult was concerning for malignancy, but clinical and histopathological features confirmed its benign nature. Plain radiography demonstrating cortical and medullary continuity with the parent bone remains the primary diagnostic modality, with cross-sectional imaging reserved for atypical cases. Osteochondroma should be considered in the differential diagnosis of post-traumatic foot masses presenting with hard swelling and restricted motion. Complete surgical excision achieves excellent outcomes with low recurrence. Timely diagnosis through appropriate imaging and multidisciplinary collaboration ensures optimal management.

Keywords: Osteochondroma, pedunculated osteochondroma, benign bone tumor, foot tumor, post-traumatic osteochondroma, surgical excision

Introduction

Osteochondromas are the most common benign bone tumors, accounting for approximately 20-50% of all benign osseous neoplasms and representing about 10-15% of all bone tumors combined (Hakim et al., 2015). These cartilage-capped bony projections arise from the external surface of bones and are characterized by two pathognomonic features: continuity of the cortex and medulla with the underlying parent bone, and the presence of a cartilaginous cap (Osteochondromas An Updated Review of.pdf). Morphologically, osteochondromas are classified into two distinct types: pedunculated lesions, which project from the bone through a narrow stalk, and sessile lesions, which attach to the bone with a broad base (Tepelenis, Papathanakos, et al., 2021).

The majority of osteochondromas (approximately 85%) present as solitary, nonhereditary lesions, while the remaining 15% occur in the context of hereditary multiple exostoses (HME), an autosomal dominant genetic disorder (Beltrami et al., 2016). These tumors typically manifest during the first four decades of life, with approximately 75% of cases diagnosed before the age of 20 years, demonstrating a male predominance. The lesions most commonly affect the metaphyseal regions of long bones, particularly around the knee, with the

distal femur (30%), proximal tibia (15-20%), and proximal humerus (10-20%) being the most frequently involved sites (Willeumier et al., 2016).[1,2]

Osteochondromas involving the foot and ankle are considerably rare, accounting for only approximately 3-10% of all osteochondromas (Calogero et al., 2024). The infrequency of pedal osteochondromas makes each case clinically significant, as their superficial location in the foot often renders them more readily apparent and symptomatic compared to lesions in other anatomical regions (Mundorff, 2023). Most osteochondromas are discovered incidentally on radiographic examinations performed for other reasons, as they remain largely asymptomatic (Afonso et al., 2019). However, when symptomatic, patients may present with pain, palpable masses, restricted range of motion, or complications arising from compression of adjacent neurovascular structures (FAHEY, 2016).

The natural history of osteochondromas involves growth during childhood that typically ceases after skeletal maturity and closure of the growth plates (Staal et al., 2016). Any continued growth or morphological changes after skeletal maturity should raise suspicion for malignant transformation to chondrosarcoma, which occurs in approximately 1% of solitary osteochondromas and up to 3-10% of cases with HME (Gazendam et al., 2023). Diagnostic evaluation typically begins with plain radiography, which is often sufficient for diagnosis, although cross-sectional imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI) may be indicated to assess the cartilage cap thickness, evaluate for complications, or confirm medullary continuity in complex anatomical locations.

Treatment strategies for osteochondromas are primarily conservative, with observation recommended for asymptomatic lesions showing no concerning features (Bailescu et al., 2022). Surgical excision is indicated for symptomatic lesions causing pain or functional impairment, cosmetic concerns, complications such as neurovascular compression, or when malignant transformation is suspected(Chopra et al., 2019) . Complete resection of the lesion, including the cartilaginous cap and perichondrium, is the treatment of choice, with local recurrence rates of less than 2% when complete excision is achieved (Xie et al., 2024).

Trauma has been documented as a potential precipitating factor for the development of secondary osteochondromas (Sferopoulos, 2022). Post-traumatic osteochondromas can develop following various types of skeletal injuries, including fractures, though the exact mechanism remains incompletely understood (Elgazzar, 2024). The relationship between trauma and subsequent osteochondroma formation adds complexity to the clinical evaluation of patients presenting with osseous masses following traumatic events (Tepelenis, Skandalakis, et al., 2021).

In this particular case, a 37-year-old female patient presented with a 3-month history of progressive right foot pain and swelling following a traumatic fall down stairs (Waterford, 2020). The patient reported falling down 5 steps, resulting in a twisted right ankle with the lateral aspect of the right foot impacting the stairs (Hyodo et al., 2017). Initial presentation revealed a palpable, hard, immobile mass measuring 5cm x 5cm x 2cm on the lateral aspect of the right foot, with tenderness (VAS 6) and limited ankle range of motion due to pain. The mass had progressively enlarged from an initial diameter of 2cm x 2cm to 4cm x 4cm. Clinical examination demonstrated restricted ankle movement, and there were no associated neurological deficits or systemic symptoms. Osteochondroma pedis dextra of the pedunculated

type was diagnosed clinically and radiologically after other causes were excluded, and surgical excision was planned for definitive management.

In clinical practice, diagnosing pedunculated osteochondroma of the foot is often challenging, particularly when distinguishing it from other soft tissue masses or post-traumatic complications. The superficial location and palpable nature of pedal osteochondromas can lead to misdiagnosis or delayed diagnosis, especially when clinical symptoms overlap with more common post-traumatic conditions. Additionally, the relationship between recent trauma and the subsequent identification of osteochondroma raises important questions about whether the trauma triggered the development of a secondary lesion or simply brought attention to a pre-existing asymptomatic tumor.

Therefore, it is important to consider osteochondroma in the differential diagnosis of painful masses in the foot, particularly when there is a palpable hard swelling with restricted range of motion following trauma. Timely diagnosis through appropriate imaging modalities and multidisciplinary collaboration between orthopedic surgeons, radiologists, and pathologists are crucial to ensure accurate diagnosis and optimal surgical treatment, thereby preventing complications and achieving excellent functional outcomes. This case emphasizes the importance of maintaining a high index of suspicion for benign bone tumors in atypical locations and highlights the successful management of pedunculated osteochondroma through surgical excision.

This case report aims to present the clinical presentation, diagnostic approach, and surgical management of a rare pedunculated osteochondroma of the right foot following traumatic injury in a 37-year-old female patient. The purpose of this report is to contribute to the limited literature on pedal osteochondromas and to explore the complex relationship between trauma and osteochondroma development. The clinical significance of this case lies in its potential to enhance diagnostic awareness among clinicians when evaluating post-traumatic foot masses, particularly in distinguishing osteochondromas from other soft tissue pathologies. Furthermore, this report provides valuable insights into the optimal surgical management of symptomatic pedal osteochondromas and reinforces the importance of multidisciplinary collaboration in achieving favorable patient outcomes. By documenting this unusual presentation and successful treatment approach, this case contributes to the broader understanding of benign bone tumor management in atypical anatomical locations and may guide clinical decision-making in similar challenging scenarios.

RESEARCH METHOD

This study employed a descriptive case report design to document the clinical presentation, diagnostic evaluation, and management of a rare case of pedunculated osteochondroma of the right foot. The case was managed at [Nama Institusi] orthopedic department during October 2025.

Case Report

A 37-year-old female presented with a three-month history of progressive pain in her right foot. The pain was worse with weight-bearing activities and was associated with a gradually enlarging lateral foot mass. She gave a history of falling down five stairs three months prior, during which her right foot was twisted and struck the lateral edge against the stairs. Shortly after the trauma, she noticed a small firm swelling measuring approximately 2cm × 2cm

at the impact site. This progressively increased in size over the ensuing months to reach 4cm × 4cm. She denied constitutional symptoms, weakness, syncope, visual disturbances, nausea, vomiting, or any bowel or bladder dysfunction. Her past medical history was unremarkable.

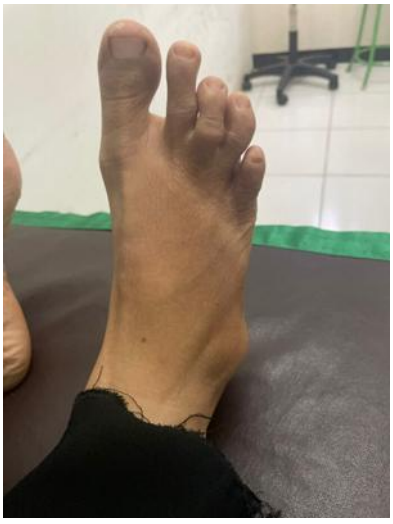

Figure 1. Preoperative photograph showing a mass on the dorsum of the right foot
Source: Personal documentation of the author

On examination, she was alert and oriented. Vital signs were notable for blood pressure of 132/89 mmHg, pulse rate of 90 beats per minute, respiratory rate of 20 breaths per minute, temperature of 36°C, and oxygen saturation of 99% on room air. Systemic examination revealed no conjunctival pallor or scleral icterus. Cardiovascular examination demonstrated dual heart sounds with regular rhythm and no added sounds. Respiratory examination was unremarkable with bilateral vesicular breath sounds and clear lung fields. The abdomen was soft and non-tender with normal bowel sounds. Peripheral examination showed warm extremities with brisk capillary refill and no edema.

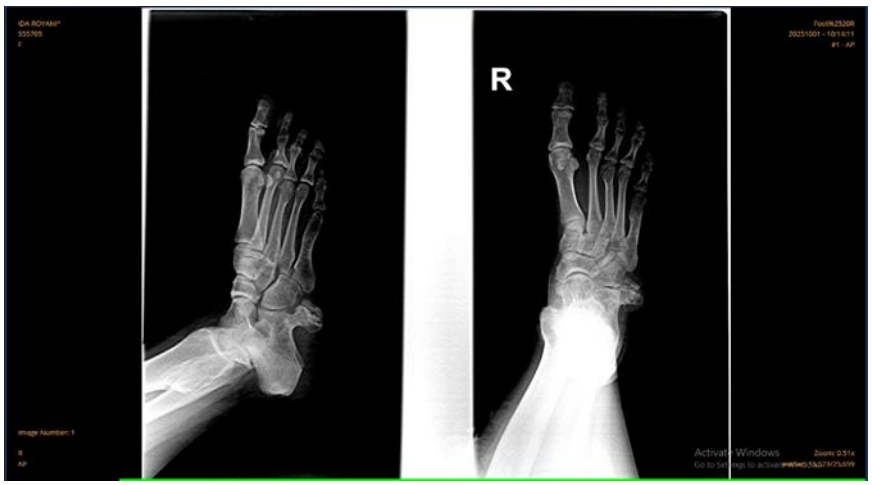

Figure 2. **Preoperative radiograph of the right foot showing a bony mass**
Source: Hospital radiology archive

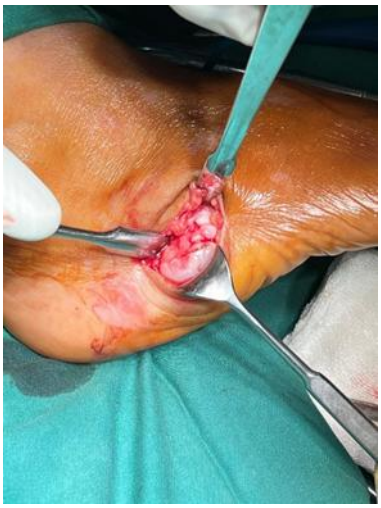

Figure 3. Intraoperative view showing excision of a pedunculated osteochondroma
Source: Intraoperative documentation

Local examination of the right foot demonstrated a 5cm × 5cm × 2cm firm, non-mobile mass on the lateral aspect. There was no overlying skin changes or erythema. The lesion was tender to palpation with a pain score of 6 out of 10 on the visual analogue scale. Active and passive range of motion at the ankle joint was limited by pain. Based on these findings, a working diagnosis of osteochondroma of the right foot was made.

Laboratory investigations obtained two days prior to surgery showed hemoglobin of 11.4 g/dL, hematocrit of 35%, and a mild reduction in erythrocyte count at 3.7×10^6/µL. White blood cell count was 7.9×10^3/µL with relative neutrophilia (74.7%) and lymphopenia (19.2%). Platelet count was adequate at 331×10^3/µL. Coagulation parameters including clotting time (6 minutes) and bleeding time (2 minutes) were within normal limits. Random blood glucose was 98 mg/dL.

The patient was counseled regarding surgical excision and provided informed consent. Pre-operative preparation included intravenous crystalloid hydration, analgesics with ketorolac, gastroprotection with ranitidine, and appropriate pre-anesthetic and medical clearance. Prophylactic antibiotics with ceftriaxone 2g were administered 30 minutes before incision.

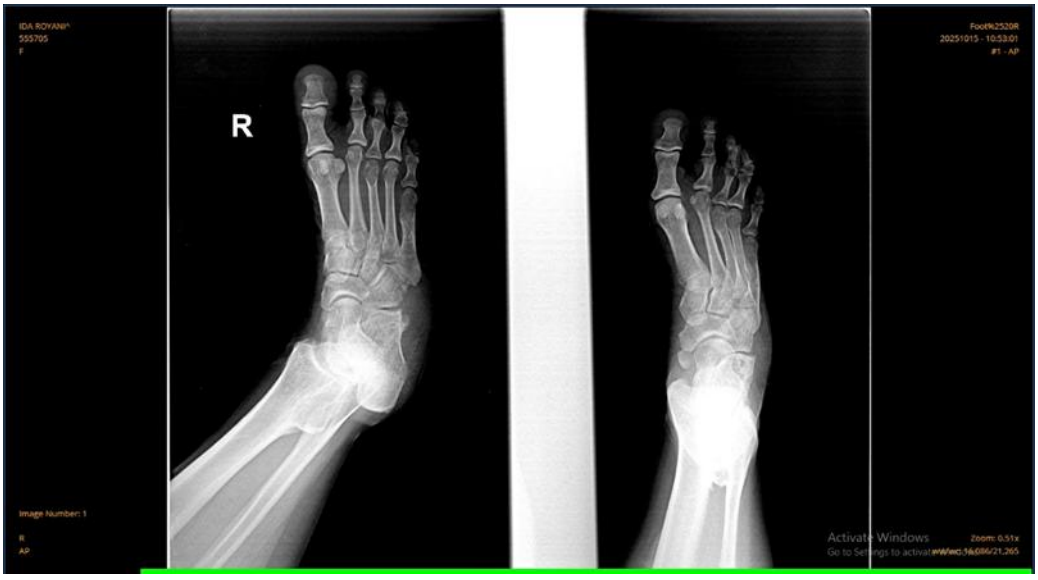

Figure 4. Postoperative radiograph of the right foot showing complete lesion removal

Source: Hospital radiology archive

The patient underwent excision of the bone tumor on October 15, 2025, under general anesthesia. She was positioned supine and standard sterile preparation and draping were performed. A lateral approach to the right foot was utilized. Intraoperatively, a bony excrescence was identified arising from the distal aspect. Complete excision was performed using osteoclasis technique. Hemostasis was achieved and stability was confirmed. The wound was irrigated and closed in layers. The total operative time was 60 minutes with minimal blood loss. The procedure was uncomplicated.

Post-operatively, she was prescribed ketorolac 30mg three times daily, gentamicin 80mg twice daily, ceftriaxone 1g twice daily, and ranitidine 50mg twice daily. Post-operative radiographs of the right foot were obtained. She tolerated the procedure well with an uneventful immediate post-operative course. The final diagnosis was osteochondroma pedis dextra, pedunculated type, corresponding to a benign neoplasm of the short bones of the lower limb.

DISCUSSION

This case report describes a 37-year-old female who presented with a pedunculated osteochondroma of the right foot following traumatic injury, representing a rare presentation of the most common benign bone tumor in an atypical anatomical location. Several aspects of this case merit detailed discussion, including the relationship between trauma and osteochondroma development, the clinical presentation and diagnostic approach, the choice of surgical management, and the implications for clinical practice.

One of the most intriguing aspects of this case is the temporal relationship between the traumatic fall and the subsequent identification of the osteochondroma. The patient reported a definite history of falling down five stairs with direct impact to the lateral aspect of the right foot, followed by the appearance of a progressively enlarging mass at the impact site. This raises important questions about whether the trauma triggered the development of a secondary osteochondroma or simply brought attention to a pre-existing asymptomatic lesion.[2,3] Secondary osteochondromas have been documented to develop following various forms of skeletal trauma, including fractures, surgical procedures, and radiation therapy. Post-traumatic osteochondromas are thought to arise from displacement of growth plate cartilage fragments through the cortex, which subsequently undergo endochondral ossification under the periosteum. However, the exact pathophysiological mechanism remains incompletely understood, and the three-month interval between trauma and clinical presentation in this case makes it difficult to definitively establish causation. An alternative explanation is that the osteochondroma was pre-existing but asymptomatic, and the trauma simply drew the patient's attention to the area, or that the trauma caused inflammation and swelling around a previously unnoticed lesion. The progressive enlargement reported by the patient from 2cm to 4cm over three months is noteworthy, as osteochondromas typically grow slowly and should cease growing after skeletal maturity. In skeletally mature patients, continued growth raises concern for malignant transformation to chondrosarcoma, though the clinical presentation and subsequent benign histopathological diagnosis in this case argue against malignancy.

Osteochondromas of the foot are distinctly uncommon, accounting for only 3-10% of all osteochondromas. Within the foot, osteochondromas have been reported in various locations

including the calcaneus, metatarsals, and phalanges. The lateral aspect of the foot, as seen in this case, represents an unusual site that makes the lesion more readily palpable and symptomatic due to pressure from footwear and weight-bearing activities. The pedunculated morphology in this case is significant, as pedunculated osteochondromas characteristically project away from the nearest joint through a narrow stalk and are generally associated with a lower risk of malignant transformation compared to sessile lesions. The typical appearance of a pedunculated osteochondroma includes a mushroom-shaped or cauliflower-like lesion with cortical and medullary continuity with the parent bone and a cartilaginous cap, which are the pathognomonic features that establish the diagnosis. The superficial location of pedal osteochondromas renders them more readily apparent and symptomatic compared to lesions in other anatomical regions, leading to earlier clinical presentation and diagnosis.

The clinical presentation in this case was characteristic, with the patient reporting progressive pain exacerbated by weight-bearing, a palpable firm mass, and restricted ankle range of motion. These features are consistent with symptomatic osteochondromas, which most commonly present with mechanical symptoms related to mass effect on surrounding structures. The absence of neurovascular compromise, which can occur with osteochondromas compressing adjacent nerves or vessels, is fortunate in this case. The differential diagnosis for a post-traumatic foot mass includes several entities that must be systematically excluded, including soft tissue masses such as hematomas, ganglion cysts, and lipomas; other benign bone tumors such as giant cell tumors, aneurysmal bone cysts, and enchondromas; reactive bone lesions such as subperiosteal hematoma, turret exostosis, and bizarre parosteal osteochondromatous proliferation (BPOP or Nora lesion) The clinical characteristics in this case firm, immobile, bony-hard consistency on palpation with progressive growth, were highly suggestive of an osseous lesion rather than a soft tissue mass and malignant tumors such as osteosarcoma and chondrosarcoma. A notable case report by Heck et al. described a pedunculated osteochondroma of the fourth toe distal phalanx that was initially misdiagnosed and treated as verruca vulgaris for over five years before the correct diagnosis was established, highlighting the importance of maintaining a high index of suspicion for underlying bone tumors when evaluating skin lesions or masses in the foot.

Plain radiography serves as the primary diagnostic modality for osteochondromas and is often sufficient for diagnosis. The pathognomonic radiographic features include a bony excrescence arising from the surface of the bone with clear continuity of the cortex and medullary canal with the parent bone, which distinguishes osteochondromas from other surface lesions that lack medullary continuity such as parosteal osteosarcoma, juxtacortical chondroma, and subperiosteal hematoma. In this case, post-operative radiographs were obtained, but ideally, pre-operative imaging should have been performed to confirm the diagnosis and assist with surgical planning. The absence of pre-operative radiographic documentation represents a limitation in the diagnostic workup, though the intraoperative findings of a bony excrescence and the subsequent clinical course support the diagnosis. Cross-sectional imaging with CT or MRI is particularly valuable in several scenarios: when the lesion is located in anatomically complex regions such as the pelvis, scapula, or spine where medullary continuity may be difficult to demonstrate on plain radiographs; when there is concern for malignant transformation; and for assessment of the cartilage cap thickness, as caps greater than 2cm in adults are concerning for chondrosarcoma. MRI demonstrates the cartilage cap as low signal

on T1-weighted images and high signal on T2-weighted images due to high water content, with a characteristic thin rim of low signal representing the perichondrium. In the case series by Jilani et al., a 30-year-old male with an unusual giant osteochondroma of the distal tibia demonstrated concerning features on imaging, including a large pedunculated chondroid lesion with significant cartilage cap thickness and mild diffusion restriction, raising suspicion for malignant degeneration. However, histopathological examination confirmed benign osteochondroma, emphasizing that imaging findings must be correlated with clinical presentation and histology.

The laboratory investigations in this case revealed mild anemia with hemoglobin of 11.4 g/dL and hematocrit of 35%, which may represent chronic disease or nutritional deficiency, though this is likely incidental and not directly related to the osteochondroma. The relative neutrophilia (74.7%) and lymphopenia (19.2%) with normal total white blood cell count may reflect a stress response or early inflammatory process, though infection was unlikely given the absence of fever, elevated white blood cell count, or local signs of infection. Coagulation parameters were within normal limits, ensuring safe surgical intervention. Random blood glucose was normal, ruling out diabetes mellitus as a comorbid condition. These laboratory findings provided appropriate pre-operative clearance for surgical excision.

Surgical management remains the definitive treatment for symptomatic osteochondromas, with complete excision including the cartilaginous cap and perichondrium being the treatment of choice. The surgical approach in this case utilized a lateral incision to access the lesion, which is appropriate for laterally located foot masses. The use of osteoclasis technique for complete excision is well-established, ensuring removal of the entire lesion including the stalk at its base with the parent bone. Complete resection is critical to minimize the risk of local recurrence, which occurs in less than 2% of cases when adequate margins are achieved. Incomplete excision leaving remnants of the cartilage cap or perichondrium may result in tumor recurrence, as demonstrated in the case report by Zamzami et al., who described a 28-year-old female with recurrent plantar calcaneal osteochondroma that had initially been excised at age 12 but recurred shortly thereafter and continued to grow over 16 years.

The timing of surgical intervention in osteochondroma management is an important consideration. In pediatric patients with osteochondromas, some authors recommend delaying surgery until skeletal maturity is reached, as the recurrence rate may be higher in skeletally immature patients and the cartilage cap is typically thicker in growing children. However, symptomatic lesions causing pain, functional impairment, or cosmetic concerns may warrant earlier intervention regardless of skeletal maturity. In adults, as in this case, surgical excision can be performed once the diagnosis is established and the patient desires treatment, as there is no benefit to conservative management for symptomatic lesions. The indications for surgery in this case pain with weight-bearing, progressive enlargement, and functional limitation of ankle motion are well-established indications for surgical excision.

Post-operative management in this case included appropriate analgesia with ketorolac, antibiotic prophylaxis with ceftriaxone and gentamicin, and gastroprotection with ranitidine. The use of dual antibiotic coverage is somewhat aggressive for a clean orthopedic procedure, though it may reflect institutional protocols or concern for infection given the foot's proximity to the ground and exposure to environmental contaminants. Standard antibiotic prophylaxis for clean orthopedic surgery typically involves a single agent such as cefazolin or ceftriaxone

administered 30 minutes to one hour before incision, with post-operative continuation generally limited to 24 hours unless specific risk factors for infection are present. The patient tolerated the procedure well with an uneventful immediate post-operative course, consistent with the generally excellent prognosis following complete excision of benign osteochondromas.

The risk of malignant transformation to chondrosarcoma, while low in solitary osteochondromas (approximately 1%), must always be considered when evaluating these lesions. Features concerning for malignant transformation include continued growth after skeletal maturity, cartilage cap thickness greater than 2cm in adults, new onset of pain in a previously asymptomatic lesion, irregular or indistinct margins, internal lytic areas, and destruction or erosion of adjacent bone. In this case, the progressive enlargement over three months in a skeletally mature adult was potentially concerning; however, the temporal relationship with trauma, the clinical presentation, and the benign histopathological diagnosis confirmed that this represented a benign lesion rather than malignant transformation. The final histopathological examination is essential for definitive diagnosis and should always be performed on excised specimens to confirm the benign nature of the lesion and exclude malignancy.

The prognosis following complete surgical excision of benign osteochondroma is excellent, with local recurrence rates of less than 2% and no risk of metastatic disease. Long-term follow-up is generally not necessary for solitary osteochondromas that have been completely excised and confirmed as benign on histopathology. However, patients should be counseled regarding the signs and symptoms of local recurrence, including return of pain or swelling at the surgical site, and instructed to seek medical attention if such symptoms develop. In contrast, patients with hereditary multiple exostoses require lifelong surveillance due to the higher risk of malignant transformation (3-10%) and the development of new lesions. The absence of family history or multiple lesions in this case supports the diagnosis of solitary osteochondroma rather than HME.

This case highlights several important clinical lessons. First, osteochondromas should be included in the differential diagnosis of post-traumatic foot masses, particularly when the lesion is firm, bony-hard, and progressively enlarging. Second, the relationship between trauma and osteochondroma is complex, and clinicians must consider both the possibility of trauma-induced secondary osteochondroma and trauma bringing attention to a pre-existing lesion. Third, complete pre-operative imaging evaluation with plain radiographs is essential for diagnosis and surgical planning, with cross-sectional imaging reserved for cases with atypical features or concern for malignancy. Fourth, surgical excision with complete removal of the cartilaginous cap and perichondrium remains the definitive treatment for symptomatic lesions, with excellent outcomes and low recurrence rates. Finally, histopathological examination is mandatory to confirm the diagnosis and exclude malignant transformation.

CONCLUSION

This case report highlights a rare instance of *pedunculated osteochondroma* in the foot of a 37-year-old female following trauma, raising questions about whether trauma initiates or reveals the lesion. Such foot osteochondromas, though uncommon (3-10% of cases), often cause symptoms due to their superficial location, requiring earlier intervention. Diagnosis relies mainly on plain radiography showing characteristic bone continuity, with advanced imaging

reserved for suspicious or complex cases. Surgical excision with complete removal of the cartilaginous cap and perichondrium remains the standard treatment, yielding excellent outcomes and low recurrence rates under 2%. Histopathological evaluation is necessary to confirm benign pathology, especially when lesions grow in skeletally mature patients. This case reinforces the need to include osteochondroma in differential diagnoses of post-traumatic foot masses presenting with hard swelling and motion restriction. Future research could focus on clarifying the role of trauma in osteochondroma pathogenesis and exploring non-surgical management options or pharmacological therapies such as retinoic acid receptor gamma (RARγ) agonists to inhibit osteochondroma growth, potentially offering alternative treatments for atypical or recurrent cases.

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