

# A Rare Pedal Phenomenon: The First Reported Case of a Bridging Forefoot Osteochondroma with Superimposed Brodie's Abscess in an Immunocompromised Patient

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## Statement of Purpose

This is a case report describing the diagnosis and treatment of a 44-year old, HIV male patient with neuropathy and a known left foot bridged pedal osteochondroma that became infected. The patient began care at a local wound care center with initial radiograph evaluation revealed underlying bridged osteochondroma of the affected foot and was referred to our clinic. He underwent further advanced imaging and ultimately required surgical intervention.

Despite several documented solitary metatarsal osteochondroma cases, the bridging osteochondroma in the forefoot has been rarely described. To the best of our knowledge, there are no studies discussing wound development and formation of a Brodie's abscess due to a pedal osteochondroma. This case is presented to educate and appreciate the importance of treating underlying etiologies to pedal plantar pressures in neuropathic, immunocompromised patients to prevent infection.

## Literature Review

Osteochondromas represent 10-20% of all primary bone lesions and are the most common benign bone tumor in the body (1,2). This lesion is rarely found in the distal extremities, but it is the most common bone tumor in the foot. Anatomically, the most common site is the metaphysis of the phalanges (75%) followed by the metatarsals (3-6). These lesions normally occur in a solitary, pedunculated or stalked type. Despite several documented metatarsal solitary cases, the bridging osteochondroma in the forefoot has been rarely described in the literature (7-10). The presence of these lesions are not enough for indication of surgical intervention and would require sequelae such as pain, neuritis, malignancy, shear size increase, or infection (11). An infection of an osteochondroma in the body has rarely been described, and there are no documented cases of superimposed infection of a pedal osteochondroma (12,13).

## Case Study

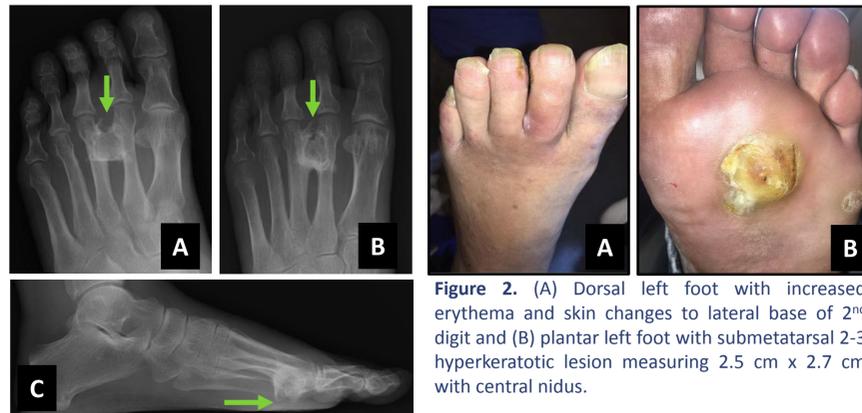
The 44-year-old HIV, Hepatitis C, and 30+ year smoking history patient initially presented to a local wound care center for treatment of a right plantar pre-ulcerative lesion with a known osteochondroma of the right foot. The knowledge of the osteochondroma has been for 20+ years, however the pre-ulcerative lesion was recent. Radiographs were taken at the wound care center (Figure 1) with concern for infection and referral to our clinic. There was clinical suspicion for underlying pedal pressure due to the known osteochondroma. Patient initially refused advanced imaging and surgical intervention. At follow-up visit, patient's foot had concern for clinical signs of infection (Figure 2).

Advanced imaging was ordered after patient was amenable (Figure 3). MRI revealed a large bridging osteochondroma extending between the lateral and medial aspect of the 2nd and 3rd metatarsal, respectively. T1 and STIR revealed acute and chronic osteomyelitis with a 1.0 x 1.1 x 0.9 cm Brodie's abscess within the osteochondroma. There was possible osteomyelitis involved in the 2nd proximal phalanx and shafts of metatarsals 2 and 3.

Due to the osteochondroma with Brodie's abscess and underlying pressure etiology, an excision of superimposed Brodie's abscess on osteochondroma with partial second and third ray resection and complex plantar wound excision and closure was recommended (Figure 4). Proximal margins for osteomyelitis were taken of both 2nd and 3rd metatarsal. The gross specimen was sent for pathology to further evaluate the superimposed infection on the osteochondroma (Figure 5).

Four weeks after the initial procedure, the patient had a post-operative infection and required a washout procedure with new proximal margins with wound vacuum-assisted closure (VAC) application due to the surgical site intraoperative void (Figure 7). The patient's new margins were positive for osteomyelitis and completed 6 weeks of intravenous antibiotics. Patient remained non-weight bearing in a Controlled Ankle Motion (CAM) and crutches until completion of VAC therapy at four weeks after the second procedure (Figure 8). Patient was clinically healed 12 weeks after the second procedure and for a total of 16 weeks from initial procedure. Patient was transitioned to supportive shoe gear (Figure 9).

## Case Study - Preoperative

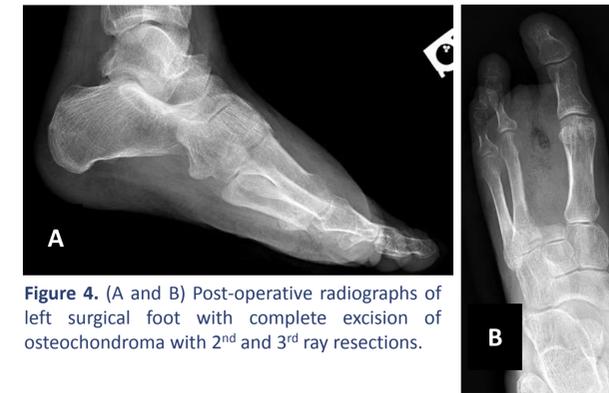


**Figure 1.** (A) Medial oblique, (B) anterior posterior, and (C) lateral left foot radiograph. Fluffy periosteal mass bridging medial 3<sup>rd</sup> metatarsal to lateral 2<sup>nd</sup> metatarsal. Cortical break (arrow) in the anterior inferior aspect of the mass.

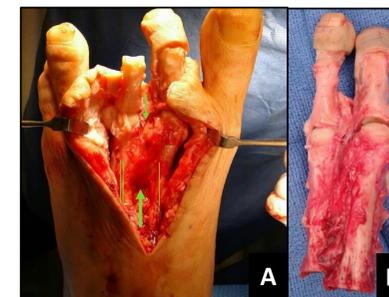


**Figure 3.** (A-D) Magnetic resonance imaging identified a bridging osteochondroma from distal metaphyseal region of the lateral 2<sup>nd</sup> metatarsal to medial 3<sup>rd</sup> metatarsal. Osteochondroma measured 2.3 cm x 2.2 cm x 2.7 cm with acute and chronic osteomyelitis. A Brodie's abscess (arrow) measured 1 cm x 1.1 cm x 0.9 cm within the central aspect of the osteochondroma that extends to the 2<sup>nd</sup> proximal phalanx base.

## Case Study - Intraoperative



**Figure 4.** (A and B) Post-operative radiographs of left surgical foot with complete excision of osteochondroma with 2<sup>nd</sup> and 3<sup>rd</sup> ray resections.



**Figure 5.** (A) Intra-operative visualization of osteochondroma dorsally with exposure of distal (small arrow) and proximal (large arrow) extent bridging 2<sup>nd</sup> (line) and 3<sup>rd</sup> (double line) metatarsals. (B) Resected gross specimen sent for histopathology with proximal margins acquired from both metatarsals.

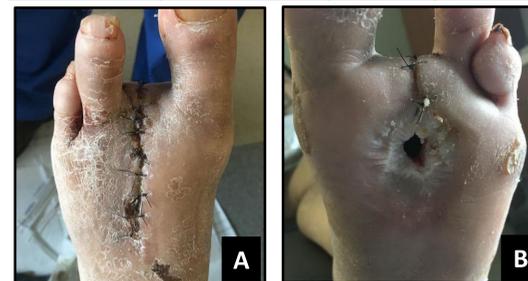
**Clinical History**  
Bone tumor left 2nd and 3rd metatarsals, septal joint 2nd MPJ left foot (pedicle)  
1) PLANTAR SOFT TISSUE MASS LEFT FOOT, RESECTION  
-- REGION WITH HAZARD HYPERPLASIA, SARCOMATOUS, REACTIVE SQUAMOUS PSEUDOEPITHELIOMA AND CERAM FIBROSIS  
2) SECOND PROXIMAL METATARSAL RESECTION SITE PROXIMAL:  
-- BONE NEGATIVE FOR OSTEOMYELITIS  
3) LEFT THIRD PROXIMAL METATARSAL RESECTION SITE:  
-- BONE NEGATIVE FOR OSTEOMYELITIS  
4) BONE WITH OSTEOMYELITIS INVOLVING LEFT SECOND AND THIRD METATARSAL AREA, SECTION OF BONE TUMOR LEFT SECOND AND THIRD METATARSALS, SECTION AND DRILLING LEFT SECOND METATARSAL/PHALANX JOINT  
-- OSTEOCHONDROMA ASSOCIATED WITH THE DISTAL LATERAL METATARSAL/PHALANX REGION OF THE LEFT SECOND METATARSAL AND MEDIAL ASPECT OF THE DISTAL METATARSAL/PHALANX REGION OF THE THIRD METATARSAL WITH BECOMING OF THESE BONES AND EXTENSION INTO THE PLANTAR SOFT TISSUE WITH CORTICAL DEFECT OF THE OSTEOCHONDROMA. SINUS TRACT  
-- CHRONIC OSTEOMYELITIS INVOLVING THE OSTEOCHONDROMA  
-- EXTENSIVE FIBROBLASTIC ASSOCIATED WITH THE OSTEOMYELITIS AND OSTEOCHONDROMA WITH FOCAL BACILLI RELATED NODULES  
-- THERE IS NO EVIDENCE OF MALIGNANCY

**Figure 6.** Histopathological report confirming the osteochondroma bridging the 2<sup>nd</sup> and 3<sup>rd</sup> metatarsal superimposed with acute and chronic osteomyelitis.

## Case Study – Clinically Postoperative



**Figure 7.** (A and B) Two weeks postoperative with increase erythema and plantar maceration.



**Figure 8.** (A and B) Four weeks postoperative with clinically healed dorsally and discontinued NPWT application plantarly.



**Figure 9.** (A and B) Clinical picture one year postoperatively of left foot with completely healed plantar dimple without transfer lesions.

## Outcomes

Twelve months status post excision of superimposed Brodie's abscess on osteochondroma with partial right second and third ray resection and complex plantar wound excision and closure, and status post right foot washout and NPWT application, the patient had improved ACFAS scores. Pre-operative ACFAS score was 64 and post-operative score was 86.

The patient required customized offloading insoles based on his new foot structure and biomechanics. He was fitted with custom orthotics and is wearing appropriate shoe gear. He was followed every other month until his one-year mark since initial surgery to continually assess his feet and orthotics. There was no gait abnormality and patient did not sustain a transfer lesion. He remains an active yearly-patient due to his co-morbidities and pedal history.

## Analysis & Discussion

Despite osteochondromas representing the most common benign bone tumor in the body, it is rarely found in the distal extremities. However, it is the most common bone tumor in the foot seen commonly in the metaphysis of phalanges and metatarsals as a solitary tumor. The bridging osteochondroma in the forefoot has been rarely described in the literature. There have been seldom studies describing infection associated with an osteochondroma, none described in the foot. To the best of our knowledge, there are no reported cases of a Brodie's abscess superimposed on an osteochondroma.

Normally, an osteochondroma alone is not enough for surgical intervention. In regard to the case presented, the pathological increase in pedal pressure lead to wound development and formation of osteomyelitis. The authors believe this was due to the progression of his immunocompromised state, development of neuropathy secondary to HIV, and 30+ years of smoking history without cessation. The MRI confirmed a bridging osteochondroma that was superimposed with acute and chronic osteomyelitis with a central Brodie's abscess that measured 1.0 x 1.1 x 0.9 cm. Imaging also confirmed 2<sup>nd</sup> MPJ septic arthritis, 2<sup>nd</sup> proximal phalanx osteomyelitis, and potential osteomyelitis of the 2<sup>nd</sup> and 3<sup>rd</sup> metatarsal shaft. Due to the extensive concern for infection an aggressive partial 2<sup>nd</sup> and 3<sup>rd</sup> ray resection with excision of the plantar wound was deemed necessary.

The anatomical location and aggressive treatment that was required lead to a large void within the surgical foot. Primary closure was unsuccessful in this case and required secondary closure utilizing NPWT. During the peri-operative period the patient's comorbidities were addressed with scheduled medical management appointments, smoking cessation education, vascular work-up. Post operatively, the patient required custom-molded orthotics due to the patient's unique post operative foot structure and biomechanics. We believe this helped the patient decrease his chances of developing a transfer lesion.

It is important to address osteochondromas if they lead to a limb threatening sequelae like a pressure wound. Our patient was immunocompromised with neuropathy which attributed to the bone tumor becoming infected by direct extension. Due to the progressive osteomyelitis, partial ray resections were chosen for surgical cure which was successful.

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