

# Trauma-Related Melanoma of the Foot: A Case Study

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## Purpose

Acral lentiginous melanoma (ALM) is one of four subtypes of cutaneous melanoma. ALM is a serious condition that has high mortality when compared to other melanomas due to the advanced stage at the time of diagnosis and the aggressive nature of the tumor. ALM, unlike other melanomas, is not associated with UV light exposure. Trauma, pressure, and genetic mutations are hypothesized to play a role in the formation of ALM, although the exact pathogenesis is not entirely understood. This case study reviews a case of subungual ALM which presented following a traumatic incident<sup>1</sup>.

## Literature Review

Reed, in 1976, first described acral lentiginous melanoma as pigmented lesions on the extremities that displayed a lentiginous growth. Subungual melanoma, most commonly ALM, is a subtype of melanoma accounting for 0.7 % to 3.5 % of all cutaneous melanomas in the Caucasian population. The rate is higher in patients of African or Asian descent, 75% and 25%, respectively<sup>2</sup>. These tumors most often occur in the fifth to seventh decades of life<sup>3</sup>.

The pathogenesis of ALM is unknown. While some believe that trauma merely draws attention to an already present lesion, there is evidence that trauma plays a role in the development of ALM. It is reported that 90% of subungual melanomas occur on the hallux or thumb, frequently injured digits<sup>4</sup>. Squamous cell carcinoma is well known to occur at sites of chronic trauma including burns and chronic wounds. O'Toole et al presented a collection of case reports from hands and feet that report developing subungual melanoma following direct trauma<sup>3</sup>. Li et al studied 56 cases reporting that trauma may be associated with ALM, noting vasculogenesis and its role in trauma, inflammation and tumor growth. Mutations of melanocytes during trauma-induced cell proliferation may also be another mechanism<sup>5</sup>. Green et al found that patients that noted a serious penetrative injury to their hand or foot had a fivefold increased risk of developing acral melanoma<sup>6</sup>.

ALM is known to have the worst prognosis among the cutaneous melanomas. Teramoto et al found that age, presence of ulceration, tumor thickness, and tumor spread are prognostic factors in disease specific survival. While these prognostic factors are the same for other melanomas, ALM typically is diagnosed late with higher rates of ulceration, tumor thickness, and tumor spread. In the same study, 20% of all ALM presented with some kind of metastasis at diagnosis<sup>1</sup>. Once ALM has metastasized to visceral organs, the median survival is 6 months or less<sup>7</sup>.

Current management of ALM, especially for a depth of > 2 mm thickness, include 2 cm of lateral margins. For subungual melanoma, amputation of the digit or partial digit is the standard of care. The current trend is to perform more distal amputations as the prognosis depends more the clinical stage of the tumor rather than the level of amputation. Further treatment includes lymph node dissection and oncology referral for possible chemotherapy/immunotherapy<sup>7,8</sup>.

## Case Study

A 65 year old male patient with a past medical history of anxiety, depression, GERD, HTN, and HLD. The patient initially presented to his PCP a few days after sustaining an injury from dropping a refrigerator on his right 2nd toe. At this time, it was noted that the nail was avulsed and no other deformity noted. The patient denied any lesion prior to the injury. A few months later he presented again with slow healing wound that was painful and bled frequently. Over the next few months the patient underwent debridement and silver nitrate application for hypergranular tissue. Ultimately, he was referred to podiatry for evaluation and possible surgical intervention. An excisional biopsy was performed and sent to pathology for further analysis. The results indicated invasive malignant melanoma. Amputation of the 2nd digit and sentinel node biopsy were then performed. The final pathology results indicated Clark level of at least IV, Breslow thickness of at least 2.1 mm, high mitotic rate, no definitive ulceration, and positive nodal involvement. Following the procedures, he was seen by oncology. He received monthly Nivolumab infusions for one year. He has also undergone regular monitoring with full body PET CT scans with no current concerns for further metastasis.



Figure 1. 3 month presentation following initial injury.

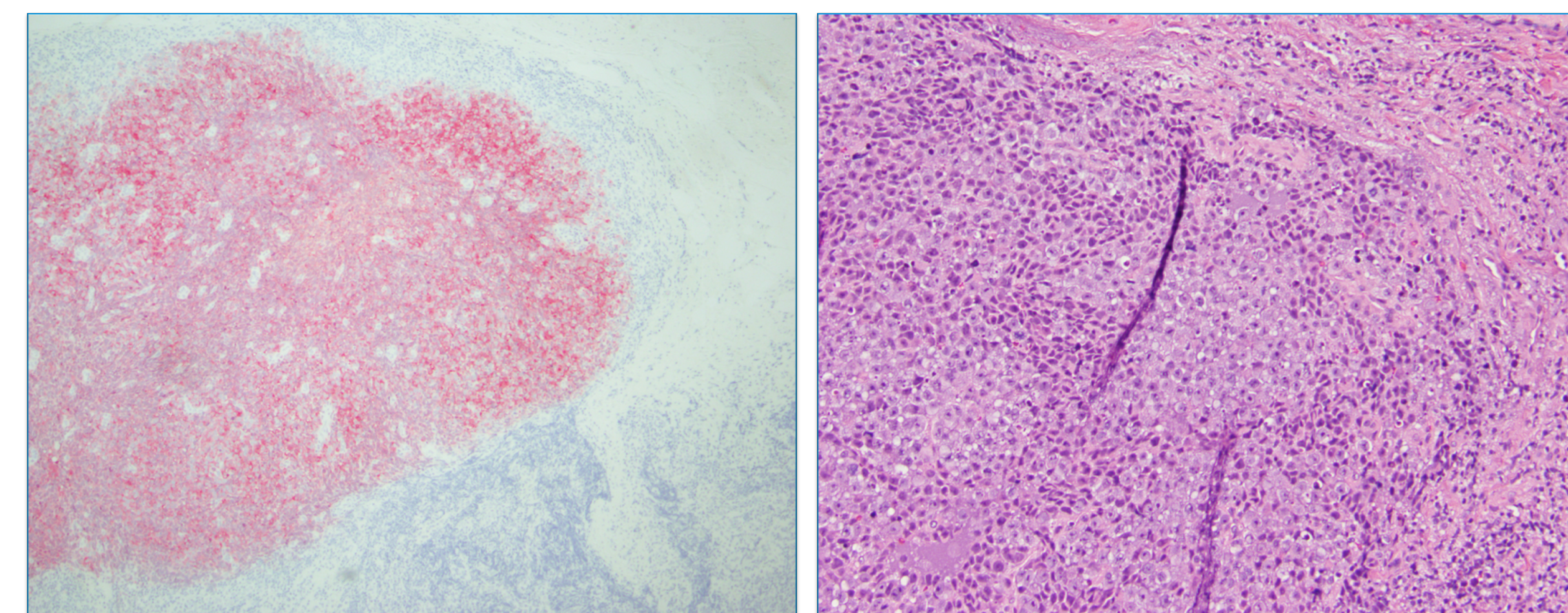


Figure 2. Melanoma cocktail, highlighting malignant melanoma. Figure 3. Invasive malignant melanoma.

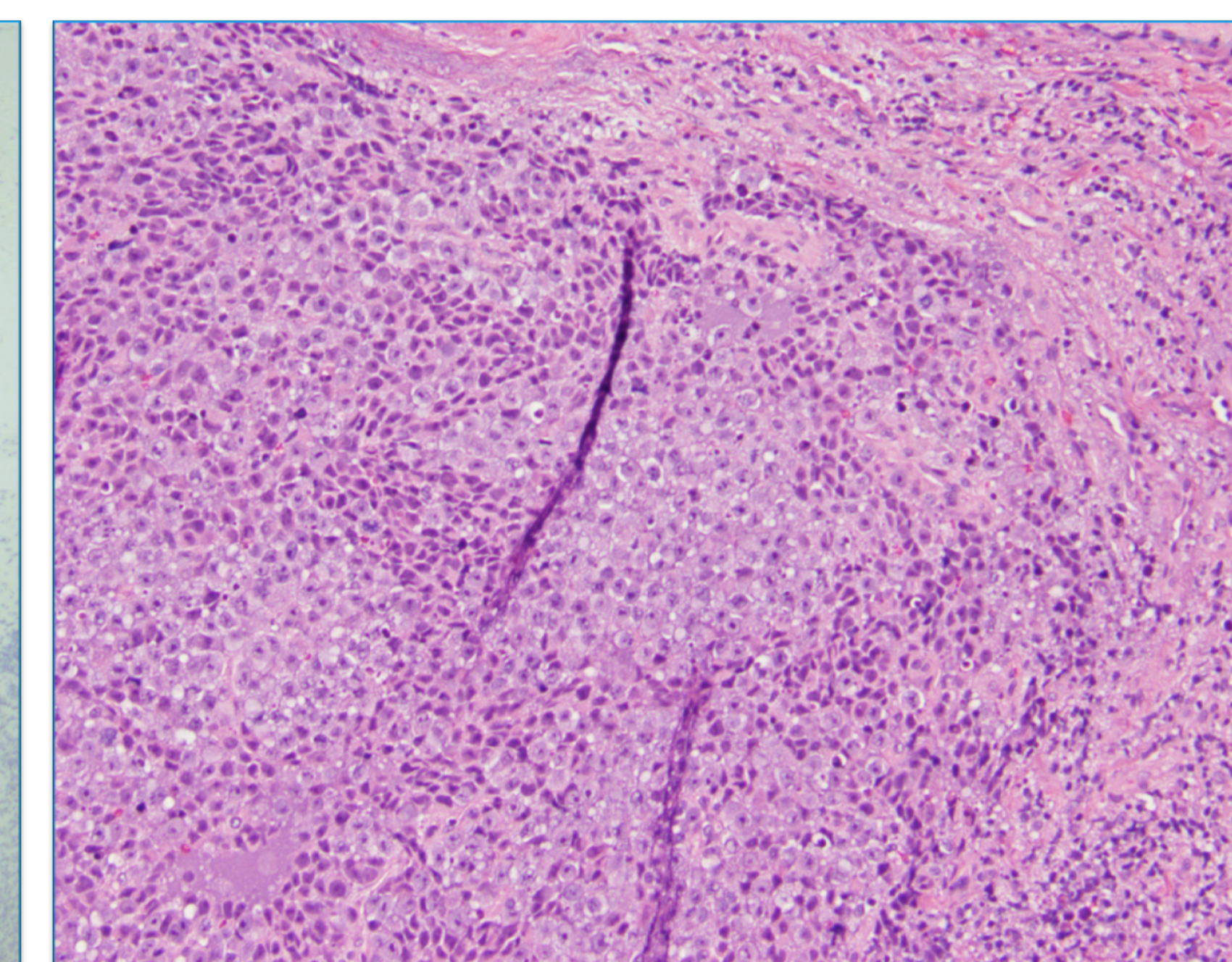


Figure 4. AP radiograph showing partial 2<sup>nd</sup> toe amputation. .

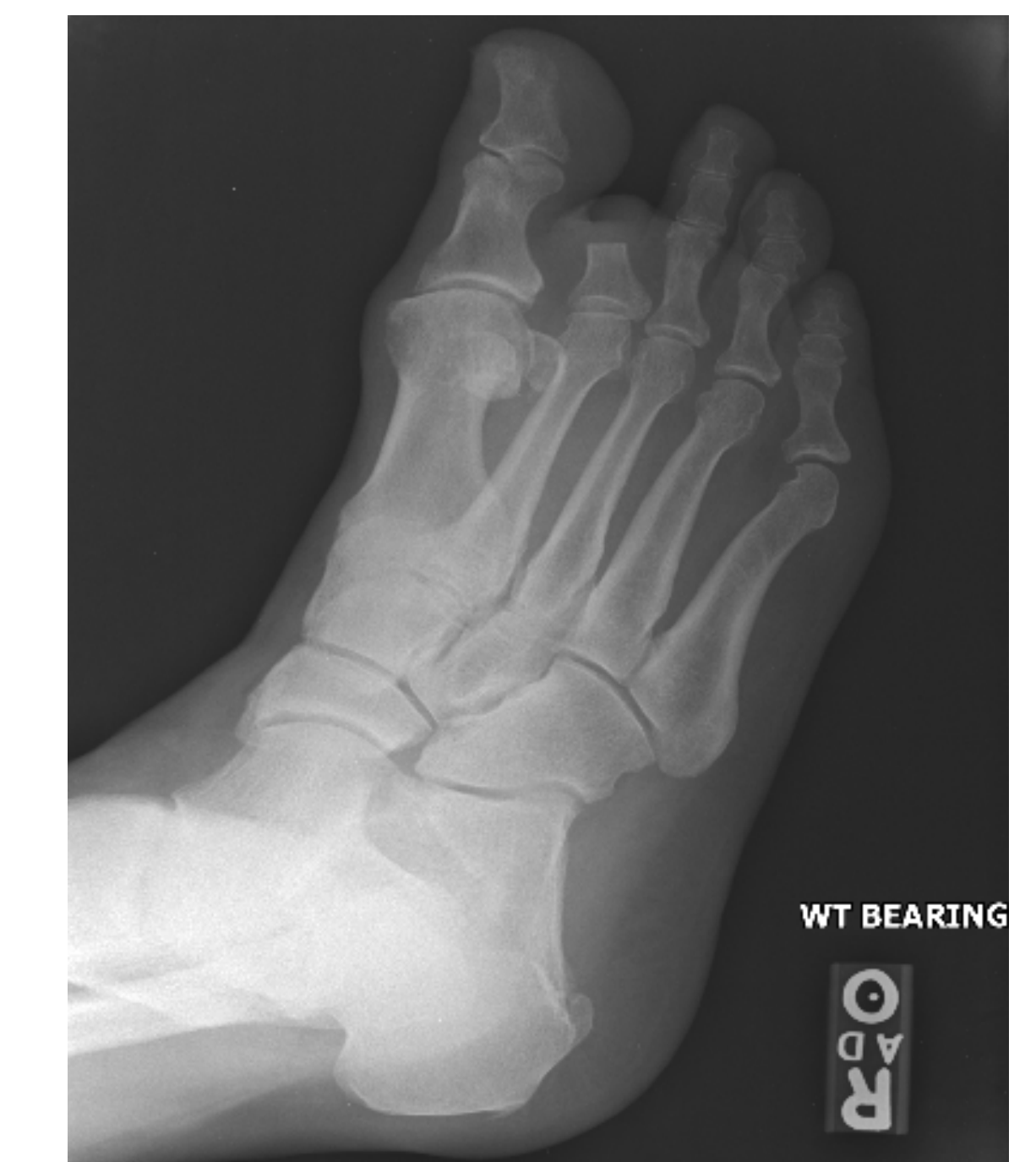


Figure 5. Oblique radiograph following amputation.

## Analysis & Discussion

Acral lentiginous melanoma is one of four subtypes of cutaneous melanoma and it has the worst prognosis of all subtypes. Diagnosis of these lesions are often delayed. One study suggested that 85% of lesions are misdiagnosed at their initial presentation<sup>4</sup>. Late diagnosis of these lesions is due to the often concealed acral or subungual locations of the lesions. These lesions also look similar to other common lesions of the foot including, verruca, paronychia, non-healing ulcer, subungual hematoma, pyogenic granuloma, SCC, and hemangioma. The clinician must have a high index of suspicion for these lesions as early diagnosis and treatment is crucial to long term prognosis. Subungual melanoma has a 10% to 30% 5 year survival rate<sup>4</sup>.

Once the diagnosis of ALM is made, surgical excision, typically a toe amputation for subungual tumors, should be performed. In this case, the patient was referred to general surgery who simultaneously performed an inguinal sentinel node biopsy during the amputation procedure. Due to the metastatic nature of this tumor, oncology also initiated immunotherapy infusions and performed regular PET CT scans to monitor for further metastasis. Close follow up with dermatology was also recommended. The patient recently retired and moved out of state. He will continue oncologic and preventative therapy at a new institution.

While the pathogenesis of ALM is still unknown, it is reasonable to include trauma as a potential factor in developing ALM. Hypothesizing that trauma induces cellular damage/inflammation, this results in mutations during vascular or cellular proliferation.

This is an interesting case of subungual ALM following a traumatic incident. This case review is to emphasize performing a biopsy of suspicious lesions to appropriately diagnose and treat as indicated. Clinicians should utilize a multidisciplinary approach due to the complexity of ALM and the many treatment options available.

## Contact

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