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Indian Journal of Pharmacy and Pharmacology

Journal homepage: https://www.ijpp.org.in/

Case Report

Verrucous Carcinoma of the foot: A non-healing ulcer

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Abstract

Verrucous carcinoma is an uncommon, well-differentiated type of squamous cell carcinoma (SCC) with slow progression, minimal potential for invasion, and metastasis. While commonly found in the oral and genital mucosa, its manifestation on the foot is uncommon, typically occurring in weight-bearing areas, such as the ball of the great toe. Chronic inflammation, trauma, and HPV infection are all considered risk factors. We report the case of a 58-year-old male with a non-healing ulcer on his right foot that was first caused by trauma. Despite multiple interventions, including antibiotics and topical treatments, the lesion gradually progressed into a large, exophytic mass. Biopsy and histopathology confirmed a diagnosis of verrucous carcinoma with pseudoepitheliomatous hyperplasia. Radiographic imaging aided in assessing the extent of the lesion, and due to its severity and chronicity, a lower limb amputation was performed. Post-operative recovery was uneventful. This case highlights the diagnostic challenges posed by verrucous carcinoma, particularly when it mimics chronic ulcers or benign lesions. Histopathological analysis remains crucial for accurate diagnosis, as it distinguishes VC from conditions such as pyoderma vegetans or verruca vulgaris. Advanced imaging techniques, such as CT scans, are useful in assessing bone involvement when MRI results are inconclusive. Early recognition and surgical intervention are crucial to avoid extensive morbidity. This case report emphasizes the need to include verrucous carcinoma in the differential diagnosis of chronic foot ulcers, particularly those with a history of trauma or persistent inflammation, to avoid delayed diagnosis and limit the need for radical procedures.

Keywords: Hyperplasia, Squamous cell carcinoma, Pseudoepitheliomatosis, Acanthosis, Verrucous carcinoma

Received: 11-06-2025; **Accepted:** 26-07-2025; **Available Online:** 25-09-2025

1. Introduction

Verrucous carcinoma (VC) is a rare, well-differentiated squamous cell carcinoma (SCC) first discovered by Ackerman in 1948. It presents as a slowly enlarging, exophytic lesion with minimal potential for distant spread but marked local invasiveness if not managed promptly.[1] Though histologically low-grade, VC is capable of extensive invasion into adjacent soft tissue, bone, or neurovascular structures.[2] Clinically, it often resembles a wart or cauliflower-like mass and may develop in various anatomical locations, including the oral cavity (oral florid papillomatosis), genital or perianal areas (Buschke–Löwenstein tumor), plantar foot (carcinoma cuniculatum), and larynx.[3] The condition tends to affect older males, particularly in the Caucasian population between the ages of 50 and 70. Documented risk factors include prolonged inflammation, trauma, inadequate hygiene, tobacco (especially chewing), alcohol intake, and possible infection with human papillomavirus (HPV), mainly types 6 and 11.[4,5]

Although some researchers propose HPV involvement in VC pathogenesis, others report no detectable viral DNA, leading to ongoing debate.[6] Microscopically, VC is marked by pronounced keratinization, broad and bulbous rete ridges, parakeratosis, and a characteristic pushing growth pattern with minimal nuclear atypia.[7] These features can be overlooked on superficial biopsy, causing diagnostic errors and confusion with benign lesions or pseudoepitheliomatous hyperplasia.[8] Hence, deep incisional or excisional biopsy is typically necessary for a conclusive diagnosis.

A systematic review of epithelioma cuniculatum treatment options and recent case reports continues to emphasize diagnostic delays due to the lesion's benign appearance and indolent course.[9,10] Radiotherapy is generally discouraged due to the risk of anaplastic transformation, making surgery the mainstay of treatment. Mohs micrographic surgery has emerged as a viable option in recurrent or anatomically sensitive cases.[11,12]

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https://doi.org/10.18231/j.ijpp.44359.1758805502

2. Case Presentation

This case report presents an atypical instance of VC on the foot, initially mistaken for a chronic ulcer, underscoring the diagnostic difficulty and importance of maintaining a high index of suspicion in non-healing traumatic lesions.

A 58-year-old man was admitted with a chronic, non-healing lesion on the plantar area of his right foot. The patient reported a history of traumatic injury sustained several years prior, which involved a fracture and a persistent wound that never fully resolved. Over the years, the ulcer had been managed at various healthcare facilities with repeated courses of antibiotics, analgesics, and local treatments. Despite these interventions, the lesion progressively enlarged and failed to heal. The patient was eventually referred to our hospital for further evaluation. He was a non-smoker, did not consume alcohol, and had no relevant medical or family history of malignancy or chronic skin disease.

Figure 1: The radiographic image taken of the right foot with verrucous carcinoma

Figure 2: Front view of the right foot verrucous carcinoma before amputation

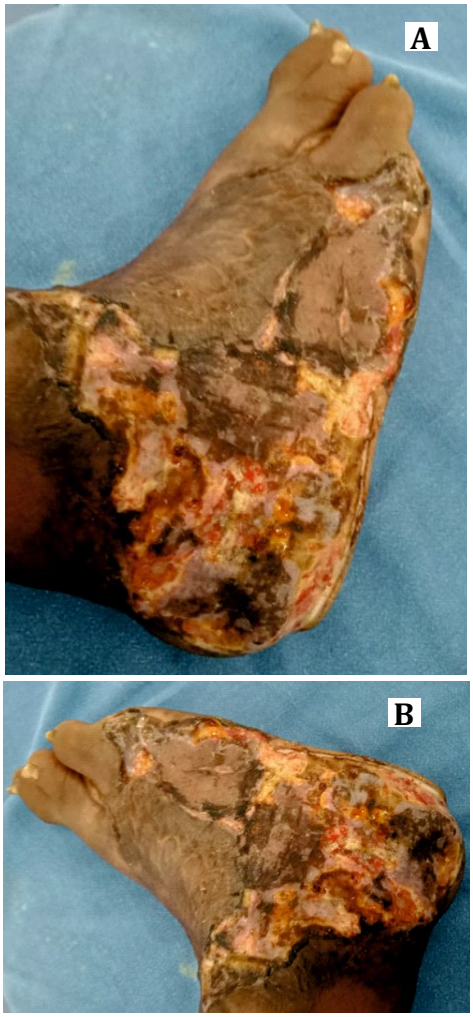

Figure 3a and b: Verrucous carcinoma, a squamous papillomatosis lesion with granulation tissue formation, hyperkeratotic plaque on the right foot

Upon presentation, a clinical examination and radiograph of the affected foot were performed **(Figure 1)**. A biopsy was also obtained for histopathological evaluation. Histological analysis confirmed the diagnosis of verrucous carcinoma with areas of adjacent ulceration and pseudoepitheliomatous hyperplasia. Gross examination described a verrucous mass measuring 6 × 5 × 0.8 cm, with varying distances from the lesion to the surgical margins. The lesion displayed focal grayish-brown discoloration and necrosis **(Figure 2) (Figure 3a and b)**. Microscopically, sections revealed ulcerated epidermis exhibiting features consistent with VC, including marked hyperkeratosis, acanthosis, parakeratosis, spongiosis, papillomatosis, and pseudoepitheliomatous hyperplasia. Due to the extensive involvement of underlying structures and failure to respond to conservative therapy, a below-knee amputation was performed. The patient recovered well postoperatively and experienced no surgical complications.

3. Discussion

Verrucous carcinoma (VC) represents a low-grade subtype of squamous cell carcinoma characterized by indolent progression and lack of distant metastasis, but notable local

tissue invasion. VC most commonly affects mucosal surfaces such as the oral cavity, larynx, and anogenital regions, but its occurrence on the plantar foot remains uncommon.[3,4] The lesion's location in a weight-bearing area, coupled with a history of trauma and chronic inflammation, aligns with previously reported risk factors.[4] Di Palma et al. documented a similar case where bilateral foot VC was misdiagnosed as diabetic ulcers, underscoring the importance of maintaining a high index of suspicion in non-healing lesions.[4] Notably, our patient lacked conventional risk factors such as tobacco use, alcohol consumption, or immunosuppression, suggesting that chronic mechanical irritation alone may suffice as a carcinogenic stimulus in cutaneous VC.

Persistent post-traumatic ulcers, especially in pressure-prone areas like the sole, may indicate carcinoma cuniculatum, a plantar subtype of VC. Chronic irritation appears to be a significant risk factor in such cases, even in the absence of tobacco use or HPV infection.[5] Odar et al. found no evidence of HPV involvement in cutaneous VC using molecular techniques, challenging its etiological significance in non-mucosal presentations.[6] This divergence reinforces the need to consider alternative mechanisms such as trauma-induced epithelial dysregulation and chronic inflammation. Histopathologically, VC is distinguished by pronounced hyperkeratosis, parakeratosis, papillomatosis, and broad, bulbous rete ridges with a pushing growth pattern.[2,7] These features were evident in our case, along with pseudoepitheliomatous hyperplasia and absence of basement membrane invasion—hallmarks that differentiate VC from conventional SCC and benign hyperplastic lesions.[8,13,14] However, superficial biopsies often fail to capture these diagnostic features, leading to misclassification. Koch et al. and Cunha et al. emphasize the necessity of deep incisional or excisional biopsies to avoid underdiagnosis and to rule out hybrid lesions with invasive SCC components.[8,13] Therapeutically, surgical excision remains the cornerstone of VC management. In our case, the extent of local invasion necessitated a below-knee amputation—a radical but definitive approach. While Mohs micrographic surgery has gained traction for VC in anatomically sensitive or recurrent sites, as demonstrated by other studies,[12,15,16] its applicability is limited in cases with deep tissue involvement or extensive spread. Radiotherapy is generally contraindicated due to reports of anaplastic transformation and poor outcomes.[2,14] Importantly, no lymph node involvement or distant metastasis was observed in our patient, consistent with VC's localized behavior.[3,13] A systematic review of epithelioma cuniculatum treatment options reinforces the importance of early biopsy and aggressive surgical management to prevent morbidity.[9] The absence of hybrid transformation in our case is reassuring, yet it underscores the need for meticulous histological evaluation of resected specimens to exclude occult invasive components.

This case contributes to the literature advocating for VC to be included in the differential diagnosis of chronic, non-healing ulcers, particularly in trauma-prone regions of the foot. It also highlights the limitations of conventional wound care when malignancy is not considered early. Increased awareness among clinicians, especially in primary care and dermatology settings, is essential to reduce diagnostic delays and improve patient outcomes.

4. Conclusion

Although verrucous carcinoma is considered a slow-growing and less aggressive variant of squamous cell carcinoma, it can cause significant local destruction if not promptly recognized and treated. This case highlights the importance of including VC in the differential diagnosis of persistent or non-healing ulcers, especially in patients with a long-standing history of trauma or chronic irritation. In this patient, a substantial diagnostic delay resulted in extensive tumor growth requiring amputation. Early clinical suspicion, appropriate biopsy techniques, and timely surgical intervention are essential to prevent such outcomes. Increased awareness among primary care physicians, dermatologists, and surgeons may help reduce misdiagnosis and improve prognosis by facilitating early and effective treatment.

5. Author Contribution

1. **Krishna Kumar Dhakchinamoorthi:** Conceptualized the case report, supervised clinical data collection, and performed critical manuscript preparation.
2. **Lekha Sakthivel:** Compiled clinical details and assisted in drafting the initial manuscript.
3. **Jisha Joe RJ:** conducted literature review and assisted in drafting the initial manuscript.
4. **Raju Nagappan:** Provided expert clinical insights, reviewed diagnostic findings, and contributed to final manuscript approval.

6. Source of Funding

None

7. Conflict of Interest

None

8. Acknowledgment

We extend our gratitude to all the nurses and technicians of the Government Medical College Hospital, Tiruppur, for their unwavering support in this case report.

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Cite this article: Kumar DK, Lekha S, Joe RJJ, Raju N. Verrucous Carcinoma of the foot: A non-healing ulcer. *Indian J Pharma Pharmacol.* 2025;12(3)*:*182–185