



# An invasive squamous cell carcinoma of the ankle: a case report

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**Introduction and importance:** One to ten percent of all squamous carcinomas are invasive squamous cell carcinomas (ISCC), a rare variation of the disease. According to a recent literature review, less than 25 cases have been reported in the foot and ankle, making it especially uncommon in those areas.

**Case presentation:** The authors present the case of a male patient, 60 years old, who presented with a progressive mass on his left ankle for 2 years with a history of healed burns in that area. The ISCC was diagnosed using histopathology after which he underwent a marginal excision biopsy and split-thickness skin grafting. Wide-marginal excision and split-thickness skin grafting were done. It was noted that the graft had taken well and that there were clear tumour margins postoperatively. The skin graft was almost completely incorporated. No tumour cells were reported on the margins during the postoperative histopathology.

**Clinical discussion:** This case highlights a successful outcome of the patient improved at the 12-month follow-up, and he expressed a high degree of satisfaction with the treatment.

**Conclusion:** ISCC of the lower extremities is a rare disease that almost never affects the ankle and is frequently treated inappropriately since it mimics chronic wounds. It is important to have an index of suspicion in patients with a history of chronic irritation to the area of interest. Surgery is the primary option if ICCS is detected. Clear tumour margins are important, and, if done well, excision should be curative.

**Keywords:** carcinoma, micrographic surgery, mohs, squamous cell, verrucous

## Introduction

ISCC is a relatively uncommon malignancy<sup>1,2</sup>. It usually affects the oral and genital areas, but only very rarely the foot and ankle, where it has a predilection for the base of the hallux, when arising from areas other than the oral or genital mucosa, these masses are termed as “verrucous”<sup>2,3</sup>. It is thought to arise from areas of chronic, local trauma, where epithelial cells have undergone malignant degenerative anaplasia. Recent studies have implicated human papilloma virus type 16 as having a role in its pathogenesis, but specimens have been inconclusive in most studies<sup>2,4,5</sup>. The disease is typically not metastatic. Due to its chronic and insidious course, ISCC is often locally very invasive, destructive, and disfiguring<sup>6</sup>. Often slow in onset, patients and healthcare providers usually treat it as a chronic ulcer or an infected wound. This also means that these cases could

## HIGHLIGHTS

- One to ten percent of all squamous carcinomas are invasive squamous cell carcinomas (ISCC), a rare variation of the disease.
- Current surgical intervention for invasive verrucous squamous cell carcinoma established that surgical intervention appears to be efficient and effective in halting disease progression.
- This surgical technique could be considered an option for surgery.

be underreported, mismanaged, or referred for surgery only when the disease process has become extensive<sup>4,6</sup>.

Human papilloma virus type 16 is an uncommon variant of squamous cell carcinoma, constituting only up to a tenth of all tumours. It most commonly arises in the sixth to seventh decade of life with a predisposition to affect elderly male, white, smokers<sup>5,6</sup>. Histologically, it shows abundant keratin formation, featuring wide ridges that appear to invaginate in the epithelium with keratin plugs inserting themselves between these ridges<sup>6</sup>. The authors present a case of successful treatment of ISCC of the ankle, an uncommon location for this tumour, with excellent functional outcomes and no recurrence noted. The study aims to establish that if done properly good functional and cosmetic outcomes are achievable. The work has been reported following SCARE Guidelines<sup>7</sup>.

## Case presentation

The patient, a 60-year-old man who worked as a pedal-operated tricycle driver, came to the outpatient clinic with the chief

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complaint of a mass on his left ankle. He reported the lesion had started 2 years previously, when he noticed a wound on the dorsal side of his ankle where the skin had been scratched by a tree branch. The patient also had healed second degree burns over his lower extremities, the result of a kerosene accident ten years ago which had led to scar formation over most of the anterior surface of both lower extremities. The patient had initially ignored the wound, but it increased in size with pruritic characteristics. One year prior to consultation with medical authorities, the patient noted that the wound had started to fungate to the size of a marble and which he described as friable. He continued to ignore the wound until the mass had reached the size of a lemon. The patient claimed to be a non-smoker and non-alcoholic beverage drinker with an unremarkable family history. Physical examination revealed that he was ambulatory, with no limitation of range-of-motion of the ankle with the exception of dorsiflexion to about 10 degrees from neutral which compressed the mass, causing him pain. No sensory deficits were noted. The mass was 7.0 × 7.0 × 5.0 cm., fungating, tender to touch, and odorous (Fig. 1A).

Preoperative evaluation by the baseline American Orthopedic Foot and Ankle Score (AOFAS) found the ankle hindfoot score was 77. Initial laboratory examinations included a complete blood count, erythrocyte sedimentation rate, and C-reactive protein. The complete blood count was normal, erythrocyte sedimentation rate was elevated at 43 mm/hr., and C-reactive protein was elevated at 13.33 mg/dl. A radiographic study of the ankle in anterior-posterior and lateral views showed multiple radiopaque lesions extruding from the integument to the subcutaneous layer (Fig. 2A, B). T2-weighted magnetic resonance imaging shows a 2.1 × 3.9 × 6.2 cm heterogeneously enhancing lesion reaching up to the subcutaneous layer with no noted tendinous or bony involvement. This allowed us to plan for a total excision of the mass without worrying about postoperative ankle stability and to estimate the size of skin graft needed (Fig. 2C-E).

The surgical technique by M.C.S. and J.A.C. used was a vertical ellipsoid incision, leaving 4 mm of gross margin on the

exterior tumour surface. The mass was excised en toto, freeing it from the grossly normal parts (Fig. 3). Intraoperatively, the mass was observed to extend only up to the subcutaneous tissue, with no excessive bleeding or intraoperative complications noted. The wound bed was copiously washed with normal saline after which a split-thickness skin graft (0.3–0.45 mm thickness) was harvested from the contralateral proximal thigh using a Cobbett Knife. The graft was then put in place and manually meshed by means of 0.5 cm stab incisions made 0.5 cm apart using a No. 11 surgical blade (Fig. 1B). The graft was then secured with a tie-over cotton bolster dressing and the ankle was immobilized with a short leg splint.

The histopathologic evaluation of the tumour revealed a malignant neoplasm composed of a well-defined border of irregular solid sheets and islands of squamous epithelium exhibiting infiltrative stromal invasion. The neoplastic cells had enlarged hyperchromatic nuclei, prominent nucleoli, and a moderate amount of eosinophilic cytoplasm. A considerable number of whorl-shaped accumulations of keratin were also noted. The final histopathologic diagnosis was ISCC, well-differentiated, Clark's Level 5, Breslow thickness 0.8 cm., and negative for lymphatic and vascular space invasion as well as for perineural invasion. All resection margins were negative for tumour (Figure 4).

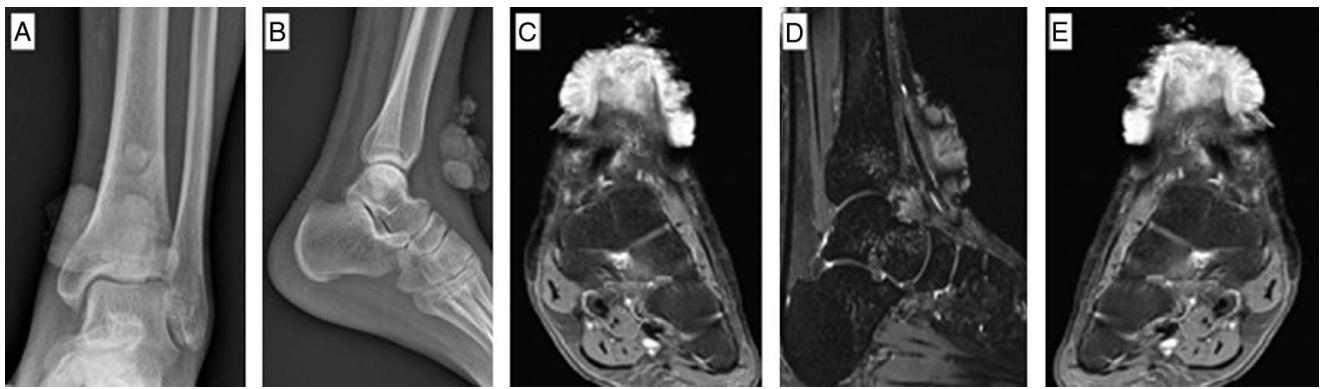
Postoperatively, the patient had no complications and was enrolled in a rehabilitation programme. The skin graft was observed to have fully integrated at 2 weeks (Fig. 1D). Six months after surgery, the skin graft was found to have been completely integrated (Fig. 1E). The patient's clinical status at the 12-month follow-up was improved, and he expressed a high degree of satisfaction with the treatment.

## Discussion

Invasive verrucous squamous cell carcinoma was first described in 1948 by Lauren V. Ackerman, earning it the eponym "Ackerman's tumor"<sup>[6,8]</sup>. Ackerman described it as a lesion



**Figure 1.** Anterior view of left ankle showing: (A) preoperative abnormal mass imaging, (B) intraoperative wide-marginal excision, (C) the skin grafting technique, (D) posterior operative at 2 weeks and (E) at the 6-month follow-up.

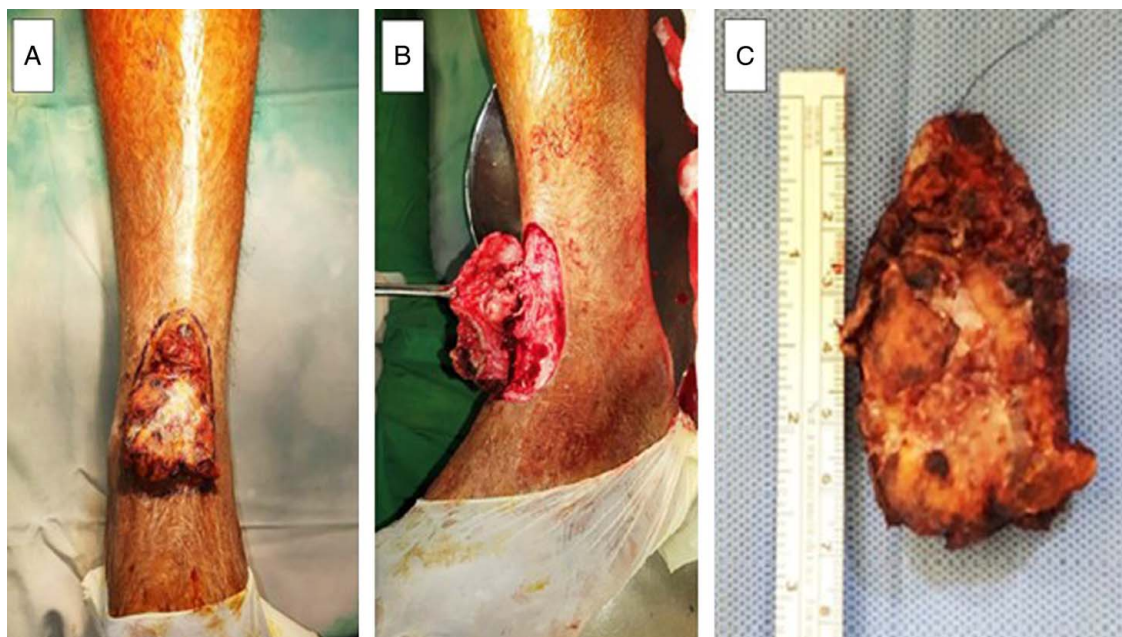


**Figure 2.** Radiographs studies of left ankle: (A) X-ray anteroposterior and (B) lateral view, (C) coronal and (D) sagittal T2-weighted MRI images, (E) axial T1 weighted MRI images showing exclusively subcutaneous involvement of the tumour with no musculature invasion.

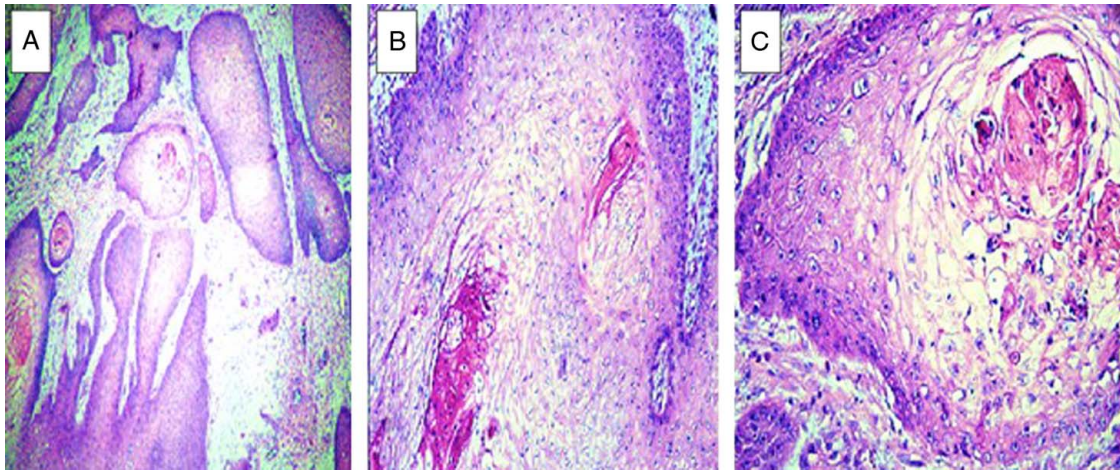
occurring primarily in older men and as having a predisposition for the lower gingiva and buccal mucosa. He also stated that it was associated with the use of tobacco and tobacco-derived products<sup>[6]</sup>. It is described as a locally invasive lesion but with no distal metastasis and sporadic local metastasis. If adequately treated, including properly done excision, the cure rate is high. In inadequately managed cases; however, the local recurrence rate is also high<sup>[9]</sup>.

In a 2013 report, Penera reported a verrucous carcinoma of the dorsal forefoot treated with wide excision with intraoperative frozen section. The applied a full-thickness skin graft and the patient followed up with a fully healed operative site and no signs of local recurrence. They suggested that excision is curative in these types of cases provided that a proper history and workup are done<sup>[2]</sup>.

In 2014, Gordon *et al.*<sup>[4]</sup> described a case of plantar verrucous carcinoma which had been misdiagnosed and, as a consequence, mismanaged for 10 years. What had started off as a very small lesion resulted in the patient repeatedly receiving only topical creams until the mass had reached a disfiguring size which prompted a medical consultation. As a result, the patient underwent a multiple ray amputation and skin grafting, which over time negatively affected his functional outcome due to the laterally displaced third toe postoperatively. Boettler *et al.*<sup>[10]</sup> concluded in 2022 that verrucous carcinoma has a low metastatic potential but a high local recurrence rate if inadequately excised. They advocated for the use of Mohs micrographic surgery to obtain adequate margins and good outcomes for patients. If done properly recurrence rates should be extremely low and surgery will be curative in most cases<sup>[9,10]</sup>.



**Figure 3.** Intraoperative images: (A) vertical ellipsoid line for resection, (B) resection of the tumour with a Cobbett Knife and (C) the tumour en toto with a silk strand denoting the most superior aspect of the tumour.



**Figure 4.** Photomicrographs of biopsied tumour features: abundant keratin pearls and well-differentiated neoplastic cells, hematoxylin and eosin (H&E) stain: (A)  $\times 100$ , (B)  $\times 400$ , (C)  $\times 1,000$ .

Nevertheless, because metastasis and recurrence are still possibilities, patients should undergo risk assessments and performance evaluations. In summary, our review of current publications on surgical intervention for invasive verrucous squamous cell carcinoma established that surgical intervention appears to be efficient and effective in halting disease progression.

## Conclusion

ISCC of the lower extremity is a rare condition, manifesting on the foot but almost never on the ankle, which is frequently misdiagnosed and mismanaged due to its relatively benign onset and its mimicry of chronic, infected, non-healing wounds. Thus, it is important to have a high index of suspicion, especially in patients with a history of scar tissue formation and recent trauma to the area of interest, with surgery being the primary curative option. Clear tumour margins are also of utmost importance in the treatment of this disease, as its local recurrence rate is high if not done properly.

## Ethical approval

This study has been waived ethical approved for this clinical case study by the ethical committees in accordance with the declaration of Helsinki.

## Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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None.

## Author contribution

M.C.S.: writing—original draft, visualization and data curation. J.A.C. IV: resources, data curation, writing—review and editing. W.L.: writing—original draft, conceptualization, methodology, visualization, writing—review and editing and revision the final version for publication.

## Conflicts of interest disclosure

None.

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None.

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