

# Squamous cell carcinoma in a chronic diabetic foot ulcer

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## Key words

- Diabetic foot ulcer  
- Squamous cell carcinoma  
- Marjolin's ulcer

## Article points

1. Squamous cell carcinoma (SCC) accounts for 20% of all skin cancers and although they are low risk cancers, they have been known to metastasize.
2. SCC can develop from chronic foot ulceration if malignant changes occur and this can often be difficult to differentiate due to complex distracting co-morbidities, clinical inexperience, and non-representative histological sampling (Enoch et al, 2004; Pavlovic et al, 2011; Carlson et al, 2014).
3. SCC often displays features of everted edge, exophytic growth, and bleeding; however, ulcers that develop from chronic wounds do not always exhibit these features.

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**A patient attended the multidisciplinary diabetes foot team following a non-healing ulcer on the right fifth digit. This had been a long-standing problem, which resolved with treatment by the community podiatry team. Following this, the wound deteriorated and was treated for osteomyelitis based on swab and X-ray reports. The appearance of the wound became irregular and larger with keratotic outgrowths and, therefore, malignancy was suspected. Due to ongoing deterioration, the digit was amputated and histological biopsy confirmed a squamous cell carcinoma. The case is described in detail in this article.**

**S**quamous cell carcinoma (SCC) is a malignant tumour that arises from the keratinising cells of the epidermis or its appendages. It is the second most common form of skin cancer on the foot (Solus et al, 2016) and accounts for 20% of all skin cancers, with the incidence rising (Cancer Research UK). It may appear as small scaly bumps or plaques appearing inflamed and progress to hard, projecting callous like lesions (Cavaliere et al, 2017), which rarely metastasize (Van Lee et al, 2018). The development of SCC on the lower extremity is often associated with exposure to ultra-violet radiation (Solus et al, 2016); however, the malignant degeneration can result from chronic wound ulceration or inflammation. The gold standard for identifying the tumour margins of a SCC is with histological of biopsy or excised lesion, with the majority of SCC recommended to be removed by surgical excision.

## Case History

Mr B, a 91-year-old male, attended an NHS multidisciplinary team (MDT) diabetes foot team in December 2018, following a referral from his community podiatrist. He had history of type 2 diabetes, ischaemic heart disease and bilateral total hip and knee replacements. Prior to his referral to the MDT, he was referred by his GP to the infectious diseases (ID) department for chronic ulceration of the right fifth toe and he was seen in November 2018. He was commenced on 6 week of doxycycline 100mg twice a day and metronidazole 400mg three times a day for 4 weeks, based on a recent X-ray and swab results suggesting chronic

osteomyelitis of the intermediate and distal phalanx of the right fifth toe.

On attendance at the MDT, he gave a 4–5-year history of intermittent swelling and pain affecting this toe. He reported the most recent episode, where frank purulent material was expressed by the podiatrist. On questioning, it would appear that the toe is generally always painful to direct touch, although intermittently, with many months in between episodes, the toe becomes more swollen, bright red and sore. It would appear this tends to resolve after 4–5 weeks. Additionally, he was consistently systemically well with no evidence of any invasive systemic features or associated cellulitis of the foot (*Figure 1*).

He continued to be reviewed weekly between the MDT and the community podiatry team, until a consultant review in April 2019, when an unusual excess of keratin was noted over the ulcerated subungual area. A decision was made to urgently refer to dermatology due to the suspicion of a malignant transformation and a picture was taken at this time.

He was reviewed by dermatology in June 2019 — it had been noted that the toe was painful and now producing malodour, which it had not before. A biopsy was arranged and his care was continued under review of the podiatry team.

It was noted at his follow-up podiatry appointment that the ulcer had deteriorated and further ulceration had occurred in the interdigital space, which was probing to bone. There was ongoing clinical features of osteomyelitis despite continued doxycycline use, therefore, the antibiotics



Figure 1. Area of excessive keratin formation noted around the ulcer site. A dermatology referral was made at this point.



Figure 2. Ongoing deterioration with evidence of further metastases.



Figure 3. Distal and intermediate aspects of the digits not involved. Photo taken prior to amputation.



Figure 4. Amputation site 6 weeks post op.

were changed to flucloxacillin 500mg four times a day based on his most recent swab results. There was an increase in the hyperkeratotic plaques with the formation of nodules further suggesting malignancy (Figure 2).

The result from his skin biopsy was negative for cancerous growth and the wound was, therefore, treated as chronic osteomyelitis. However, despite ongoing treatment, the digit continued to deteriorate and became hypergranular with necrotic and sloughy tissue (Figure 3). The toe was "mushrooming", coupled with high exudate and malodour. Clinically, it was still felt that this was cancer despite the previous biopsy. It was suggested that he should undergo an amputation of the digit, although at this time Mr B refused.

Treatment continued with a continually deteriorating wound until October 2019 when Mr B agreed to a referral to the orthopaedic team for amputation of the digit. He was assessed in January 2020 and the digit was amputated in March 2020. At the time of writing, the amputation site has gone

on to fully heal (Figure 4). Following the surgery the digit was sent for pathological investigation, which confirmed the presence of a SCC. It was noted that the tumour had been fully excised with no bone or soft tissue invasion.

## Discussion

Although the incidence is rare, clinicians should still be aware of the possibility of malignant changes, especially when managing chronic wound ulceration. Common differential diagnoses of SCC may include: actinic keratosis, Bowen's disease and nodular basal cell carcinoma. In the authors' experience, worrying features include unusual appearance and painful ulceration in the absence of vascular disease. Guidance from Cancer Research UK recommends following the ABCDE assessment (asymmetrical, border, colour, diameter, evolving) and to refer as per local guidelines if there are any concerns.

The primary management of SCC is guided by the risk for occurrence or metastases. The location of the tumour will influence its prognosis with

**Table.1 Factors affecting the Metastatic Potential of Cutaneous SCC (Dinehart et al, 2005).**

1	SCC arising at sun-exposed sites excluding lip and ear
2	SCC of the lip
3	SCC of the ear
4	Tumours arising in non-sun exposed sites (e.g. perineum, sacrum, sole of foot)
5	SCC arising in areas of radiation or thermal injury, chronic draining sinuses, chronic ulcers, chronic inflammation or Bowen's disease

SCC originating from chronic ulcers or chronic inflammation, commonly seen with diabetic foot ulceration, at the highest risk of metastasising (Table 1). Although the gold standard for identifying SCC is histological assessment, this may not always be accurate — especially in tumours with margins that are ill defined, such as in the case with our patient. Patients who have high-risk SCC often undergo Mohs micrographic surgery, whereby the procedure is performed in stages, thereby allowing laboratory work to be done between tissue removal to ensure any cancerous tissue is removed, while sparing healthy tissue. The patient ended up having an amputation of the fifth digit under the orthopaedic team and due to the ongoing pain and difficulty managing excessive exudates level; this was the best outcome for this patient considering the extent of the malignancy in the digit.

Despite the clinical appearance of the wound suggesting a malignancy, the standard investigative biopsy outcome was negative and it was therefore managed as chronic osteomyelitis. The fact that there was no resolution with treatment for chronic osteomyelitis and it was a deteriorating wound in the absence of any spreading infection, further raised the suspicion of cancer and the need for amputation.

Mr B has now fully healed and has been transferred back to the community podiatry team for ongoing preventative care. The confirmation of SCC was not given until post-amputation, some 9 months after the initial biopsy.

Follow-up care should focus on preventing future ulceration, but also to monitor the amputation site

for cancer recurrence. A history of SCC is high risk for development of basal cell carcinoma, melanoma and SCC recurrence. Between 30%–50% of patients with a history of SCC will develop non-melanoma skin cancer within 5 years. ■

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