

Squamous cell carcinoma in a recently healed burn

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Marjolin's ulcers are a rare and aggressive malignant transformation occurring in previously injured skin, making up 2.5% of all squamous cell carcinomas (SCC). Acute Marjolin's ulcers, defined as ulcers arising within one year of injury, make up an even smaller percentage of Marjolin's ulcers. Early and aggressive wound debridement is the best way to prevent the development of Marjolin's ulcers. We report the case of a Marjolin's ulcer that arose within two months of a burn and review the literature of such unusually early malignancies.

Keywords: Marjolin's ulcer, squamous cell carcinoma, early excision, skin graft, burn scar carcinoma

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Introduction

Marjolin's ulcers are a rare yet aggressive skin cancer arising in previously injured skin.¹ Celsius is credited as the first to observe the malignant transformation in 100 AD.^{2,3} It was later formally described by Jean-Nicolas Marjolin in 1828 a French surgeon and pathologist. In his 19-page article published in *Dictionnaire de Médecine*, Marjolin detailed the lesion as a "wartlike ulcer".² However, he did not describe the correlation between a burn scar and malignant transformation. The association was made in 1833 by an English surgeon, Caesar Hawkins, who described ulcers appearing many years after injury from flogging or a scald.³

The incidence of burn-related cancer is 0.1–2.5% of all squamous cell carcinomas (SCCs).^{4,5} The highest incidence reported is 6.8% among the Kashmir Indians who have a practice of wearing a "kangiri", a clay container filled with coal during wintertime, kept under their garments. This can result in repeated burn injuries, also known as "kangri ulcers".⁶ The incidence in sub-Saharan Africa is reported to be higher than expected due to the increased chronicity of wounds and poor wound management.^{6,7}

Malignant transformation in burn scars can be acute or chronic. Treves et al.⁸ defined an acute burn scar carcinoma as one which arises within one year of injury, and chronic as those developing anytime thereafter. The mean latency period is described as being 30 years from time of injury.¹ In sub-Saharan Africa, the latency period was demonstrated to be much shorter at 19 years, as reported by Nthumba who studied 75 124 ulcer samples from six sub-Saharan countries from March 1992 to April 2008.⁷ This is a result of poorer burn ulcer management and wounds that were allowed to heal by secondary intention.

In our review, we focused primarily on SCC in acute burn scars. We found that one of the shortest recorded intervals in the literature is six weeks, when a 14-year-old boy developed SCC after a thermal injury.⁹

However, due to the latent period, most acute Marjolin's ulcers present in older individuals (> 50 years old).⁴ It is speculated that the process of ageing skin results in changes in the dermal connective tissue, which undergoes further derangement during injury.¹⁰ Acute cases are rare compared with chronic cases, with most literature existing in the form of case reports. Chang et al.¹¹ summarised 17 acute cases, finding that 16 progressed to SCC and only one developed basal cell carcinoma.

Love et al.⁹ presented a Marjolin's ulcer occurring six weeks post-burn injury. They discussed the suspicion that grafted skin may have been placed over pre-existing SCC that was not obliterated by the thermal injury. The possibility of compromised immune cells that promote inflammatory genes, resulting in cellular proliferation and angiogenesis, has also been discussed.^{11,12} Love et al.⁹ recommend early excision of lesions, with histopathological confirmation for clearance. Another case provided by Mohammadi et al.¹³ describes a 54-year-old male who developed a Marjolin's ulcer, also presenting six weeks after scald burns on the dorsal aspect of the right hand. The nodule was completely excised, and a full-thickness graft was done; as confirmed by the pathologist, there was no evidence of recurrence at the two-year follow-up.¹³

Case report

We report the case of a 68-year-old woman who sustained scald burns to her right lower leg (Figure 1). Her comorbid conditions include hepatitis C, previous Hodgkin lymphoma addressed with surgery and chemotherapy, a previous myocardial infarction requiring stents, and a previous splenectomy for idiopathic thrombocytopenic purpura. The initial course of her treatment for the burn was uneventful, and the wounds healed with conservative management.

The patient then presented after two months with two dome-shaped lesions (15 and 8 mm in diameter, respectively) in the healed wounds (Figure 2). The lesions had only a slight amount of central ulceration with



Figure 1: Right leg at nine days post-scauld burn wounds



Figure 2: Right leg at eight weeks post-burn, showing two dome-shaped lesions

a central scab/plug, clinically suspicious of keratoacanthoma (KA). There was no lymphadenopathy. The lesions were both excised with narrow margins (approximately 2 mm) to facilitate a primary closure (Figure 3). However, frozen sections were obtained in the theatre to ensure that the margins were clear. Due to the fairly tight closure, her wound was treated with an incisional negative pressure wound therapy device. At her one-week follow-up, the wound had healed without complications (Figure 3c).

Formal histology reported the presence of an infiltrating, well-differentiated squamous carcinoma, with the dermis showing infiltration of large, irregular islands of squamous cells with keratinisation, peripheral atypia, and mitotic activity. There was an extension beyond the sweat glands of invasive squamous cells with cellular anaplasia and mitoses. There was no lateral lipping or sharp outline between the stroma and the squamous proliferation. Both lesions were confirmed again as adequately excised. The patient was seen for her six-month follow-up by her dermatologist, who reported a normal examination.

Discussion

Clinical diagnosis of malignancy in previous burn wounds requires a high index of suspicion, with signs such as an enlarging mass, foul odour, haemorrhage, and lymphadenopathy in a non-healing burn wound.^{4,14} They tend to be more aggressive than other forms of skin cancer.¹⁵ While a Marjolin's ulcer is typically ulcerated, as the name suggests, any malignancy in a burn is known as a Marjolin's ulcer, regardless of ulceration. The initial suspicion in the reported case was a KA, partly because it did not have the typical ulcerated appearance.

Differentiating between KA and SCC can be challenging due to their similarities, both clinically and histologically.¹⁶ Clinically, both may present with a "button"-type appearance, and both have similar predisposing factors, such as trauma and sun exposure. Though unlike SCC, a KA grows rapidly, usually within 2–3 months, and occurs



Figure 3: Right leg 10 weeks post-burn
a – Markings for excision with narrow margins (approximately 2 mm)
b – Wound post-excision of raised lesions
c – Healed wound at one-week follow-up

occasionally after exposure to a predisposing factor. In comparison, SCC usually develops more than one year after an insult.¹⁷ Cribier et al.¹⁶ assessed 296 tumours classified as either a KA or SCC. They identified five useful histological criteria:

- KA exhibits a significant degree of symmetry and epithelial lipping; SCC does not.
- KA does not tend to spread beyond the level of the sweat glands, whereas SCC may spread further due to its invasive nature.
- SCC often exhibits more cytologic atypia than KA.
- Ulceration and mitoses favour SCC over KA.
- Atypia in KA is typically located in the periphery, whereas SCC has a more haphazard distribution due to pleomorphic cells.

Acute malignant transformation is not fully understood. It is postulated that an initiating factor that stimulates the transformation of dormant precursor cells is followed by a promoting factor, such as a burn injury.^{10,11} Complete excision with pathological confirmation of 1 cm clear margins is the recommended management of choice.¹⁹

The incidence of Marjolin's ulcers post-burn is expected to be on a downward trend due to a better standard of care, with prompt, early excision followed by grafting. It is suggested that surveillance should be offered to patients whose wounds have been allowed to heal by secondary intention, as their chance of malignant degeneration is relatively increased as the normal components of skin are altered.¹⁸

Conclusion

Marjolin's ulcers are a rare entity, and finding one in the acute form is even rarer, with sparse literature on the topic. A high index of suspicion is required from clinicians to recognise the development of the malignant change. An even higher index of suspicion should be offered to burn injuries allowed to heal by secondary intention. Early excision and grafting of burn wounds reduce the risk of potential malignant transformation.

Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

Informed consent was obtained from the patient.

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