An unusual complication of a foot burn in a patient with diabetes

KEY WORDS
- Diabetes
- Mellitus
- Thermal injury
- Unusual foot complication
- Sarcoidosis

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The authors of this article outline and illustrate a case of an unusual foot complication in a patient with type 2 diabetes and sarcoidosis, who went on to develop a large plantar foot verruca and nodular prurigo after getting accidently burned. Here they describe the patient's dramatic wound healing journey in words and pictures.

In December 2016, a 46-year-old man with type 2 diabetes mellitus and a history of peripheral neuropathy, end-stage kidney failure (requiring dialysis) and sarcoidosis presented at the A&E department due to 2% partial thickness burns to both feet, after an accidental immersion for 1.5 minutes in hot water while being bathed *(Figure 1, 2a and b)*. After the accident, his feet had been dried with a towel, causing the blisters to burst and first aid had been given. Via A&E, he was admitted to hospital, where he stayed for 14 days, being treated with flamacerium, in line with clinical indications and the Trust's practice guidelines (Garner and Heppell, 2005a). The patient was discharged in January 2017.

Initially, the wound began healing well and by March 2017 the patient was able to walk and drive. There was no infection, eschar formation followed and in June 2017 the left foot had healed without incident. However, around the same time, a large area of abnormal fungating tissue became apparent in the medial-longitudinal arch of the right foot. This lesion progressed to become well vascularised, malodorous and macerated, approximately 7 cm in diameter and 15 mm deep, with no overt soft tissue infection present *(Figure 3a and b)*.

A punch biopsy in July 2017 showed typical features of verruca plantaris with pseudo-epitheliomatous hyperplasia, with no signs of inflammation or malignancy noted in the histopathology report. Another biopsy in August 2017 showed hyperkeratosis, papillomatosis, hypergranulosis and squamous cell proliferation *(Figure 4)*. The morphological appearance was again thought to be compatible with a benign viral wart — albeit a very large one. The histopathology report confirmed the same, ruling out a diagnosis of squamous cell carcinoma, which had been an initial concern.

In addition, it was noted that the patient had perforating dermatoses on the upper and lower limbs and diffuse nodular prurigo, resulting in firm, itchy bumps (nodules) on the skin's surface (British Association of Dermatology, 2016). These lesions are intensely uncomfortable, discoloured and with a rough, thickened surface and overlying eschar or scratch marks. Characteristically, the lumps are less than 1 cm in diameter with the arms and legs most commonly affected (British Association of Dermatology, 2016).

WHAT CAUSES NODULAR PRURIGO?

Nodular prurigo is a chronic inflammatory dermatosis of unknown aetiology; although many patients have a significant medical history of unrelated conditions, including kidney dysfunction, secondary skin conditions or other autoimmune disorders (in which the patient's pre-existing sarcoidosis may be included).

In August 2017, the patient was referred for treatment with intra-lesional bleomycin therapy in order to resolve the viral wart on the sole of his right foot (Rajpar, 2017). Bleomycin is a cancer treatment, however, it is effective in small doses injected into the lesion or topically in order to resolve warts that have been present for a long

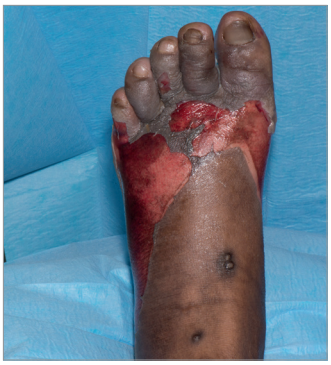
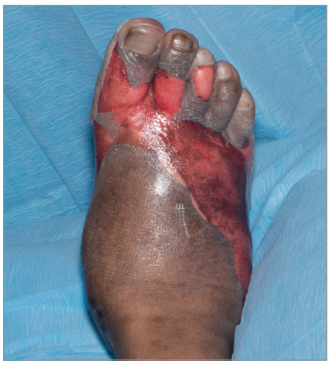


Figure 1. Burned left foot on presentation



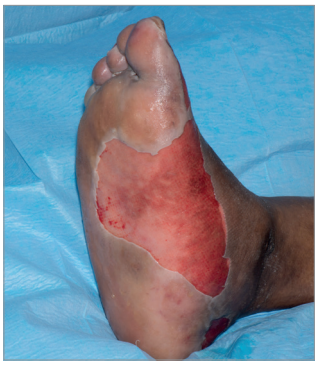
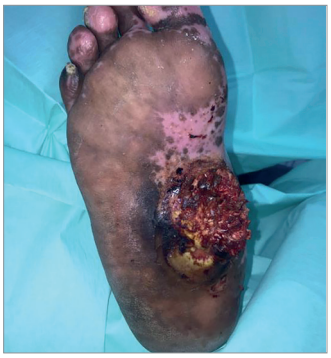


Figure 2a and b. Burned right foot on presentation



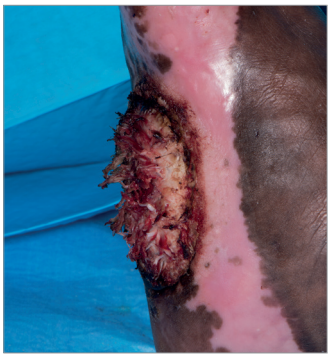


Figure 3a and b. Three months later, the patient presented with a lesion on the plantar aspect of the right foot with abnormal, vascularised, malodorous and macerated tissue

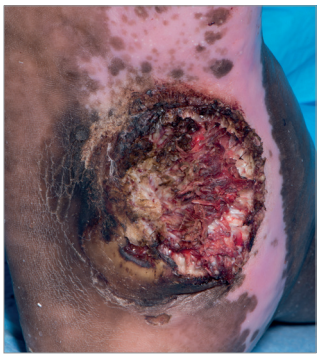
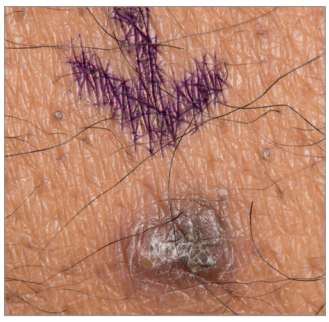


Figure 4. Hyperkeratosis, papillomatosis, hypergranulosis and squamous cell proliferation



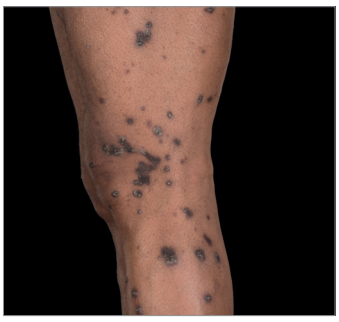


Figure 5 a and b. Sarcoidosis is a disease that involves abnormal collections of inflammatory cells forming into granulomas, here seen on skin of the patient's legs

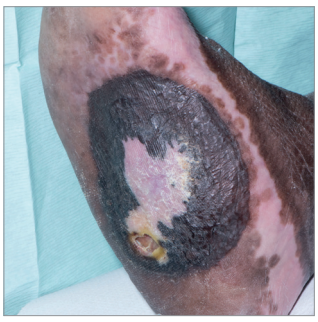


Figure 6. A significant reduction in wound size but a subsequent ulceration after graft healing

period or have been resistant to other treatments. He was also treated with oral antibiotics to treat any low-grade soft tissue infection present and potassium permanganate foot baths daily as per local dermatology recommendation.

In October 2017, the patient was investigated for verrucous carcinoma and an MRI performed (with intra-lesional bleomycin rejected as a treatment option by the dermatology team due to the size of the lesion and penetration of the intervention). The patient was referred for a complete excision and histology of the lesion in order to exclude malignancy, followed by a reconstruction with a split skin graft from the right thigh anterior.

This was completed in November 2017 and a subsequent histology report demonstrated that the lesion focally reached the sweat ducts coils but did not extend beyond these — with no evidence of deep extension on MRI. The lesion was completely excised with, subsequently, the

histological appearance of a warty, squamous, proliferative lesion. In December 2017, it was noted that although a diagnosis of verrucous carcinoma had been considered, the lesion did not show the characteristic bulbous rete ridges and, as it had been present for a short period of time, a diagnosis of viral wart was preferred.

The wound broke down again in January 2018, with a central area of graft breakdown. The patient required a 3-day hospital stay for an infection of unknown aetiology and was given intravenous antibiotics. In July 2018, the graft was almost healed. A subsequent MRI of the right foot showed no deep infection or osteomyelitis.

In August 2018, there was a loss of the central area of the graft resulting in a further ulceration and additional skin grafts were ruled out at this point due to the poor healing prognosis.

DISCUSSION

Sarcoidosis *(Figure 5a and b)* is a disease that involves abnormal collections of inflammatory cells forming into granulomas (MedicineNet, 2018). It commonly occurs in the lungs, skin, or lymph tissue with skin symptoms, presenting as tender, red lumps, rashes or patches and affects approximately 25% of patients (as in this case report). It is thought that sarcoidosis is due to the immune system becoming "overactive", causing the body to attack its own tissues or organs, which in turn results in the formation of the characteristic granuloma. Sarcoidosis can affect people of any age, but is more common in adults aged 20–40 years. It affects people from all ethnic backgrounds, but is especially prevalent in people of African descent, and more common in women than men (National Heart, Lung and Blood Institute, du).

Smith and Black (2000) adopted the term verrucous sarcoidosis and defined it as a rare variation of skin sarcoidosis, most common in the lower extremities. Noparstak et al (2015) further suggested that it represents a localized hypertrophic response in an area with previous sarcoidal granulomas or it could be a secondary response by a viral wart overlying a sarcoidal plaque. Verruca plantaris are skin warts that occur frequently on the soles of the feet caused by the Human Papilloma Virus (HPV). They are spread through direct contact (American College of Foot and Ankle Surgeon, 2019) and are associated with moist, damp environments. It is possible to contract verrucae if there are any small cuts or abrasions on the skin which make it easier to penetrate the epidermal barrier. Noparstak et al (2015) further hypothesised that the development of verrucae in patients with sarcoidosis may be preceded by local inoculation of HPV, especially after trauma, which would be supported after the local thermal burns in this case report. The HPV then spreads to involve previous sarcoid plaques with resultant lesion formation as detailed.

OUTCOME

Healing at the graft site resulted in a significant reduction in size and consistent evidence of closure at the wound edges *(Figure 6)*, however, the patient went on to develop a second ulceration within the graft after he was admitted to hospital in August 2018 after feeling unwell during haemodialysis. A cannula-related infection from his dialysis line was suspected and this was subsequently removed. He was once again treated with intravenous antibiotics and had a temporary dialysis line inserted.

This subsequent wound was saucerised by podiatry in October 2018 to reduce wound undermining and to promote wound healing. The initial healing response was good although the patient had further hospital admissions for suspected infections and, unfortunately, died in November 2018 of an unrelated cause. WUK

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