

# Osteoradionecrosis a disfiguring complication following radiotherapy in scalp squamous cell carcinoma: a case study

## KEY WORDS

- ▶ Cutaneous squamous cell carcinoma
- ▶ Osteoradionecrosis
- ▶ Radiotherapy
- ▶ Scalp
- ▶ Wound healing

**Abstract:** Here we present the case of a 69-year-old man, with a 13-year history of progressive scalp ulceration and bony destruction secondary to osteoradionecrosis. We emphasise the debilitating and severe consequence of this complication, the importance of meticulous wound care and close observation in these patients. We also describe the impact of definitive surgical management for the successful resolution of disease in this patient's care.

Osteoradionecrosis (ORN) is a well-known sequela of radiotherapy in the management of mucosal head and neck cancers, which can have devastating consequences, causing disfigurement and loss of function, as documented by Raggio and Winters (2018). This case highlights its manifestation on the scalp, the difficulties in its management with conservative treatment and the impact of definitive surgical treatment in a life-threatening anatomical location.

A 69-year-old Caucasian man, presented in December 2005, with a history of extensive scalp ulceration, skin biopsies revealing a 95mm moderately differentiated infiltrating basaloid cutaneous squamous cell carcinoma (SCC) of the scalp. He underwent wide local excision (WLE) of the SCC and reconstruction with INTEGRA dermal substitute (Integra LifeSciences) and split-thickness skin graft (STSG), and 12 weeks later completed a course of radiotherapy, receiving 54 Gy in 20 fractions to the treated scalp area in March 2006.

He attended the dermatology department in March 2019 for Mohs surgery to a basal cell carcinoma (BCC) on the left nasal ala. On investigation of the scalp, a foul odour was noted together with extensive slough and exudative ulceration over a 15x15cm area, with an infestation of fly larvae under the wound dressing (*Figure 1a*). He admitted that this dressing had not been changed for a couple of weeks, and neither he

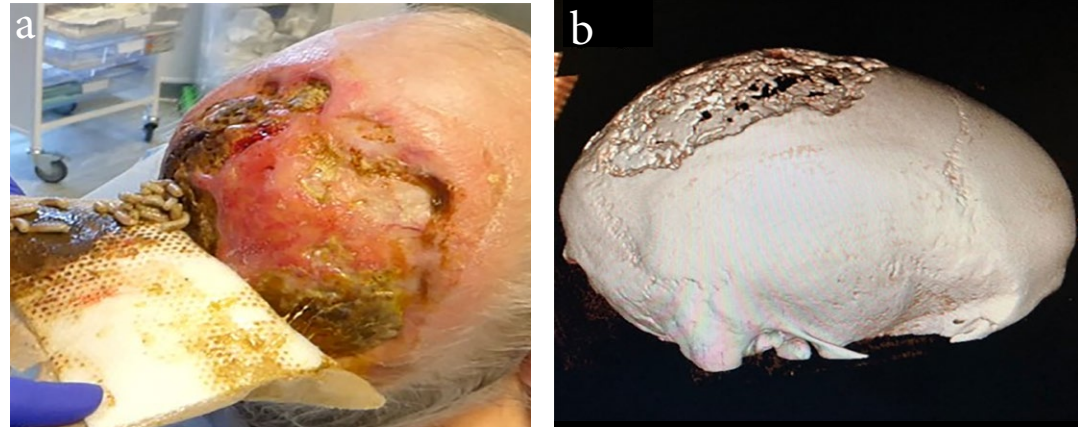
nor his partner had been aware of the infestation or its potential origin. Over the last 13 years he had been receiving conservative wound care via his community district nursing team, primarily through regular application of Medihoney Apinate non-adherent antibacterial dressings (Derma Sciences). He had repeatedly refused further surgical intervention on his scalp despite progression of the ulceration at his follow-up appointments under plastic surgery, preferring not to undergo further operations under general anaesthetic. However, upon presentation to dermatology the severity of his presentation was clear, revealing visible pulsatile, friable tissue together with extensive bony loss (*Figure 1b*) leading to an urgent CT head scan. This revealed irregular bone loss bilaterally in the parietal regions amounting to one third loss of the skull vault with some areas of full-thickness calvarial erosion and exposure of the dura. Fortunately, brain parenchyma remained intact, with no intracranial sequelae.

A definitive pathogenesis for ORN remains elusive at the time of writing; however, two theories have been established that paved the way for towards better treatment. The theory put forward by Marx (1983) describes radiation-induced hypoxia, hypovascularity and hypocellularity leading to tissue necrosis. Delanian and Lefaix (2004) propose that radiation causes dysregulation of fibroblast activity, giving rise to fibrotic tissue susceptible to breakdown, and eventually, necrosis.

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**Figure 1.** (a) Infestation of fly larvae in an area of extensive exudative ulceration on the parieto-occipital scalp; (b) 3D imaging revealing extensive destructive parietal bony loss amounting to one-third of skull vault

It is likely that features of both mechanisms contribute to its pathogenesis.

There have been numerous studies highlighting ORN as a known complication following radiotherapy for the treatment of nasopharyngeal carcinoma (NPC). Skull base ORN has been documented extensively by Han et al (2018) in a cohort of 1348 patients with NPC, with an incidence of 1.04% following one course of radiotherapy. Furthermore, ORN is also a well-recognised complication following radiotherapy in oropharyngeal and oral cavity cancer causing disability and severe loss of quality of

life. However, the incidence of ORN following cutaneous SCC treatment is less well established.

This case highlights the need for diligent wound care and close observation for patients who have elected to not undergo major surgery for non-healing wounds following radiotherapy. Despite annual review, this patient had progressive erosive scalp and skull bone loss which was not treated at an early stage. In May 2019, subsequent to his presentation in dermatology, he agreed to undergo radical treatment including surgical resection of the necrotic skin, full-thickness skull resection and reconstruction involving cranioplasty (titanium plate), and free flap resurfacing — latissimus dorsi muscle flap with a STSG. At follow-up five months later, there was evidence of wound healing with no evidence of further malignancy (Figure 2), underlining the benefit of definitive surgical treatment in a progressively challenging case. [WUK](#)



**Figure 2.** Presentation at follow-up 5 months after wide local excision and reconstruction with titanium plate, latissimus dorsi flap and split-thickness skin graft showing excellent wound healing

#### DECLARATION OF INTEREST

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