CASE REPORT
RADIOLOGY

Diseases & Research

Radiotherapy in the Shadow of Shingles: Managing Non-Melanoma Skin Cancer in Postherpetic Fields

Kevin F. Zhang[1], Kelcee Byrnes[2], Yunfei Hu[2], Gerald B. Fogarty[2,3,4,5,#]

[1] Joint Medical Program, University of Newcastle, University Drive, Callaghan, NSW 2308, Australia
[2] ICON Cancer Centre, 41 William Street, Gosford, NSW 2250, Australia
[3] Faculty of Health, University of Technology Sydney, 235 Jones St, Ultimo, NSW 2007, Australia
[4] Monash University, Faculty of Medicine, Nursing and Health Sciences, 27 Rainforest Walk, Clayton, VIC 3168, Australia
[5] School of Medicine, The University of Notre Dame Australia, 160 Oxford Street, Darlinghurst, NSW 2010, Australia

Abstract: Cutaneous squamous cell carcinoma (cSCC) is a common form of non-melanoma skin cancer (NMSC), with incidence increasing in elderly and immunocompromised populations. Postherpetic neuralgia (PHN) is a chronic neuropathic pain condition that occurs following reactivation of the varicella–zoster virus and typically affects a single dermatome. In the skin, PHN occurs following re-infection with the varicella-zoster virus (VZV), also known as human herpesvirus-3 (HHV-3). It usually takes a dermatomal distribution. We report on the successful treatment of a 15 mm biopsy-proven painful and tender in-situ cutaneous squamous cell carcinoma (cSCC) arising within a symptomatic field of longstanding PHN in an 82-year-old male, immunosuppressed with chronic lymphocytic leukemia (CLL)and cognitive decline. Definitive superficial radiotherapy (SXRT) of 45 Gy in 15 fractions was delivered over 3 weeks, using a 5 mm standoff to avoid direct contact with hypersensitive skin. The patient tolerated treatment well and achieved a complete clinical response still present at six months post RT when death from other causes intervened with no significant acute toxicity. This case highlights the feasible use of SXRT for cSCC arising within a PHN-affected dermatomal field through applying stand off to reduce contact irritation during treatment.

Keywords: Post-herpetic neuralgia; Non melanoma skin cancer; Stand-off; Radiotherapy; Case study; Australia.

Introduction

Non-melanoma skin cancers (NMSC), including cutaneous squamous cell carcinoma (cSCC), are the most common malignancies in humans. Australia has the highest incidence in the world[1]. NMSCs occur most commonly in head and neck locations[2]. The incidence continues to increase, especially in the elderly[3]. Older patients can have comorbidities and cognitive impairment, which can complicate surgical management and hinder compliance with postoperative wound care. Cure is further compounded in immunosuppressed populations, including those with chronic lymphocytic leukaemia (CLL), in which the incidence of NMSC is markedly increased[4]. Surgery with histological analysis remains the standard of care. Alternative treatment options include cryotherapy, topical 5-fluorouracil or imiquimod, photodynamic and radiotherapy (RT)[5].

Postherpetic neuralgia (PHN) is a chronic pain condition localized to a dermatome that occurs after reactivation of the varicella-zoster virus, also known as human herpesvirus-3 (HHV-3)[6]. It can occur months or even years after resolution of the acute shingles rash and is common in the cranial dermatomes[7]. Surgery within areas of PHN may exacerbate neuropathic pain, further reducing tolerability and quality of life[8].

We present the case of an 82-year-old male cognitively challenged patient with multiple comorbidities, including CLL, with symptomatic biopsy proven in-situ cSCC within an area of symptomatic PHN of the left cervical spinal nerve 2 (C2) dermatome, which was successfully treated without added pain by definitive superficial radiotherapy (SXRT) using standoff.

Case presentation

An 82-year-old male presented with a tender lesion on the left posterior scalp. This was wholly within a symptomatic area of PHN affecting the left C2 dermatome. Previous pharmacologic measures, including gabapentin and tricyclic antidepressants, had provided little relief from the PHN. His medical history also included CLL, diagnosed twenty years prior to this presentation. He also suffered from mitral regurgitation and so was deemed not suitable for general anaesthesia, also because of a fear of worsening cognition. He had limited tolerance for invasive procedures under local anesthesia.

On inspection, there was a 15 × 10 cm field of tender, hyperesthetic skin over the left occipital scalp, consistent with established PHN. Within this area, a 15 mm nodule was identified (see Fig.1.). The nodule was painful, and tender on examination. This was within an area of asymptomatic field change. A 3 mm punch biopsy from this nodule revealed full-thickness epidermal dys-

Correspondence: Gerald B. Fogarty. E-mail: gerald.fogarty@icon.team. Address: Icon Cancer Centre, 41 Williams Street, Gosford, NSW 2250, Australia.
Received 5 January 2026; Revised 11 March 2026; Accepted 23 April 2026; Available Online 8 May 2026
DOI: 10.54457/DR.202602005

plasia, consistent with intraepidermal squamous cell carcinoma (in-situ SCC), with no evidence of dermal invasion or perineural involvement. There was no regional lymphadenopathy.

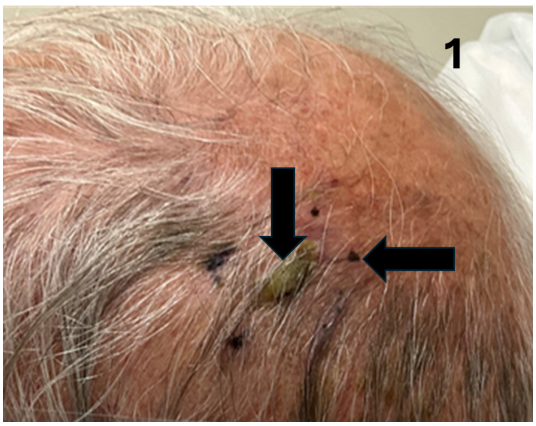

Fig. 1. The left posterior scalp at presentation.
The black vertical arrow identifies the 1.5cm nodule of in-situ cSCC. The black horizontal arrow shows surrounding asymptomatic field change. The lesion only was subsequently selected for definitive superficial radiotherapy (SXRT) using a 5 mm standoff from the cone to avoid direct contact with hypersensitive skin.

It was decided to treat the symptomatic biopsy proven nodule only and not the field change. Management options, including topical agents (5-fluorouracil, imiquimod, and Tolak) and surgical excision, were discussed. The patient and family declined these due to anticipated compliance issues with prolonged topical therapy and concern that surgery might exacerbate neuropathic pain. The patient also expressed a strong preference to avoid invasive procedures. Given his comorbidities, immunosuppression from CLL, and the lesion's symptomatic burden, definitive SXRT was selected. The principal concern was that RT within a PHN-affected field could potentially worsen neuralgia.

The prescribed dose was 45 Gy in 15 fractions (3 Gy per fraction) delivered five days per week according to NSW guidelines[9]. This fractionation pattern was used as the worst acute effect would then be experienced the week after a therapeutic dose was delivered.

The treatment was delivered on a WOmed T-105 superficial radiotherapy (SXRT) Unit (BEBIG, Berlin, Germany) using Filter 3, which has an equivalent half-value layer (HVL) of 1.9 mm aluminium. The treatment plan was generated within an in-house automated planning system named WOcalc (v2024.11.05.4 J. Rijken pHD). The WOcalc system automates what was traditionally a manual calculation completed by radiation therapy staff. It combines key factors such as prescription dose, filter type, custom cutout and stand off to calculate the treatment time duration. This is because the WOmed machine dose delivery is measured through Time (minutes and seconds) instead of Gray.

The plan was prescribed to a Point Depth Dose (PDD) of 100%, that is, to the skin surface. The field size created at clinical markup was confined to the clinically apparent lesion and was approximately 2.0 cm, with the smallest margin possible for dose build up. A 2 cm cone was used for treatment.

To avoid pain reported by the patient when the applicator was flush against the treatment area, a 5.0 mm standoff was applied, see Fig. 2. As a result, a standoff correction of 0.930 was applied based on the inverse square law. The final treatment time calculation was 58 seconds per 3 Gy fraction.

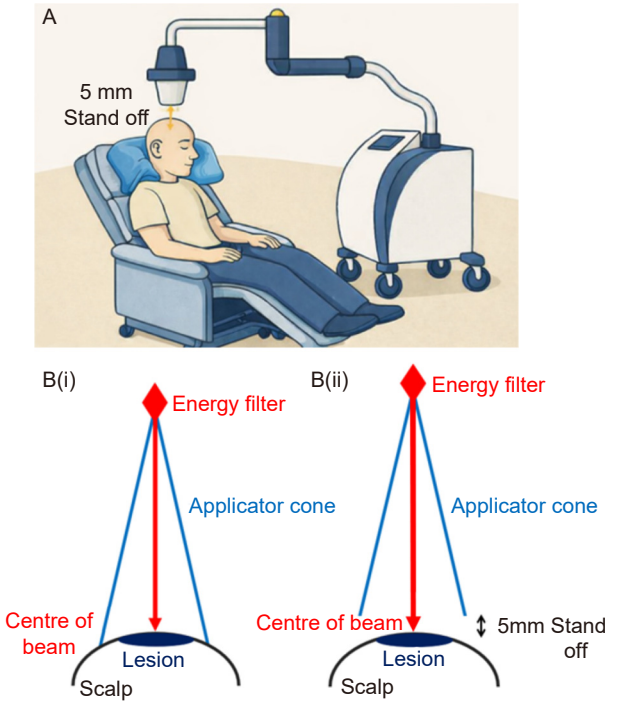

Fig. 2. Demonstration of importance of standoff for the calculation of incident radiation dose.
A. A schematic diagram of the patient seated in a chair, and the treatment applicator is aligned over the posterior scalp. A 0.5 cm stand-off between the applicator and the scalp is clearly indicated, ensuring accurate dose delivery and maintaining the prescribed treatment geometry.
B. (i) The radiation SXRT cone impinging on the skin. The source surface distance (SSD) is the distance from the source of the radiation (orange diamond) to the skin surface where the lesion is (in blue) and the dose there is as per factory standard. (ii) The radiation cone 5 millimetres above the skin surface. This increases the SSD and a recalculation of incident dose needs to be done, according to the inverse square law.

The patient tolerated simulation and treatment well. Surprisingly, his neuropathic pain decreased rather than increased during the treatment and no additional analgesic was required. He had the expected tumour lysis, erythema and dry desquamation within the treatment field. Thus also being unable to apply the usual moisturizers and wet gel dressings.

At 6-weeks post-RT, upon clinical examination the patient showed a complete tumour response, and all reported side effects had resolved. He passed away from unrelated causes 6 months post treatment still with a sustained ongoing complete infield response.

Discussion

We present the case of an 82-year-old male with significant comorbidities with biopsy-proven symptomatic in-situ cSCC with a field of symptomatic PHN successfully treated with SXRT. We minimized symptoms by using 5 mm of stand off and hypofractionation with a sustained ongoing complete infield response at 6 months. To our knowledge this is the first modern case study where SXRT using standoff has been used to successfully treat skin cancer in an area of PHN.

From a technical standpoint, a 5 mm standoff between the radiation cone and the skin was employed to minimise direct mech-

anical stimulation of the hypersensitive area. This nuance likely contributed to successful delivery and compliance. It also reflects an underappreciated principle in radiotherapy planning: that surface anatomy and neuropathic considerations may demand unconventional adaptations, particularly in elderly or frail patients.

Another interesting point relates to the decision-making process for treatment. Although intraepidermal SCC carries a risk of progression to invasive disease, especially in the immunocompromised, the patient's worsening symptoms warranted definitive treatment. RT represents an effective treatment method, offering excellent local control, avoidance of anesthesia, and preservation of function and cosmesis as well as being tissue-conserving[10,11]. Alternatives such as topical chemotherapy and surgical excision were discussed but declined as it was not thought possible to deliver a therapeutic dose, highlighting the role of patient factors and preference in complex dermatologic oncology. On the other hand, other approaches such as, contact X-ray therapy, may achieve similar results however it would be at the cost of discomfort to the patient. If contact-based therapy must be used, local anaesthetic (LA) could be considered. LA application may be painful, and RT timing at the peak of the anaesthetic's effect then needs to be factored into the workflow. All this may further complicate the treatment and prove challenging for a cognitively impaired patient.

Contrary to initial expectations, not only did the tumour resolve, but the patient's baseline neuropathic pain improved post-treatment and thus no change in analgesia was required. This clinical observation suggests that SXRT may exert a modulatory effect on nociceptive signaling within the irradiated dermatomal field.

When delivered with proper dosing, margin selection, and fractionation, modern SXRT offers local control rates approaching those of Mohs surgery, conventional excision and brachytherapy in well-selected non-melanoma skin cancers (NMSC)[12].

Finally, this case contributes to a body of literature examining the interaction between radiation and neuropathic skin[13]. This case supports the literature that carefully delivered superficial radiotherapy, with appropriate precautions, may offer both oncologic control and symptomatic relief.

Abbreviations

CLL, chronic lymphoblastic leukemia; cSCC, cutaneous squamous cell carcinoma; Gy, Gray; HHV-3, human herpes virus 3; HVL, half value layer; LA, local anaesthetic; NMSC, non melanoma skin cancer; PDD, point dose depth; PHN, post herpetic neuralgia; RT, radiotherapy; SCC, squamous cell carcinoma; SXRT, superficial radiotherapy.

Ethical approval and consent to participate

The patient gave the explicit consent for the use of their de-identified information to be used within this case study.

Conflicts of interest

All authors declared that there are no conflicts of interest.

Acknowledgements

The authors would like to acknowledge the participating patient and referring doctor. Jai Talwar and Varoon Sharma - advice regarding format of case study.

Authors' contributions

KFZ: wrote the MS and managed the process. GBF: provided the patient and guidance on writing the case report and gathered other co-authors. KB: wrote the technical analysis of standoff and radiotherapy techniques. YFH: assisted with the technical analysis as well as providing information on radiotherapy techniques.

References

[1] Roky AH, Islam MM, Fuad M, et al. Overview of skin cancer types and prevalence rates across continents. Cancer Pathog Ther, 2025, 3(02): 89-100.

[2] Khalid A, van Essen P, Crittenden TA, et al. The anatomical distribution of non-melanoma skin cancer: A retrospective cohort study of 22 303 Australian cases. ANZ J Surg, 2021, 91(12): 2750-2756.

[3] Olsen CM, Pandeya N, Neale RE, et al. Age group-specific changes in keratinocyte cancer treatment rates in Australia, 2012-2021: A retrospective cohort study based on MBS claims data. Med J Aust, 2024, 220(9): 472-479.

[4] Jobson D, McCormack CJ, Mar V, et al. Impact of chronic lymphocytic leukaemia on melanoma outcomes: a retrospective case-control study. Br J Haematol, 2022, 197(3): 320-325.

[5] Madan V, Lear JT, Szeimies RM, et al. Non-melanoma skin cancer. Lancet, 2010, 375(9715): 673-685.

[6] Gruver C, Guthmiller KB. Postherpetic Neuralgia. Treasure Island (FL): StatPearls Publishing: USA, 2026.

[7] Mallick-Searle T, Snodgrass B, Brant J. Postherpetic neuralgia: epidemiology, pathophysiology, and pain management pharmacology. J Multidiscip Healthc, 2016, 9: 447-454.

[8] Jung K, So Y, Kim S, et al. An experience of increased pain in patient with postherpetic neuralgia who had skin excision: a case report. Anesth Pain Med, 2012, 7: 289-292.

[9] eviQ. Skin cancer squamous cell carcinoma definitive EBRT. Available from: https://www.eviq.org.au/radiation-oncology/skin/1036-skin-cancer-squamous-cell-carcinoma-definitiv. [Last accessed on 2026]

[10] Ashby M, Smith J, Ainslie J, et al. Treatment of nonmelanoma skin cancer at a large Australian center. Cancer, 1990, 63(9): 1863-1871.

[11] Fogarty GB, Christie DRH, Kaminski A, et al. A radiation oncology approach for using definitive radiotherapy with volumetric modulated arc therapy (VMAT) for skin field cancerisation (SFC). Int J Radiol Radiat Ther, 2018, 5(4): 227-234.

[12] Lee CT, Lehrer EJ, Aphale A, et al. Surgical excision, Mohs micrographic surgery, external-beam radiotherapy, or brachytherapy for indolent skin cancer: an international meta-analysis of 58 studies with 21, 000 patients. Cancer, 2019, 125(20): 3582-3594.

[13] Moloney NA, Lenoir D. Assessment of neuropathic pain following cancer treatment. Anat Rec, 2023, 307(2): 309-319.