Retrospective review of adverse events after treatment of non-melanoma skin cancer with image-guided superficial radiation therapy

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Background

- Basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) are the most common types of non-melanoma skin cancer.[1-3]
- Treatment options include wide local excision, electrodesiccation and curettage, topical therapies, oral anti-neoplastic medications, and Mohs.[1,3,4]
- Superficial radiation therapy (SRT) is another treatment option as both a definitive and adjunct therapy.[1,3-6]
- Although superficial radiation therapy has shown favorable outcomes with a low risk of complications, it still poses a risk for adverse events.
- The frequency and severity of these complications are not well defined with newer SRT devices that have image-guided high-frequency ultrasound.

Objective

This study aimed to evaluate the complications of treating non-melanoma skin cancer with Image-guided superficial radiation therapy at an academic outpatient dermatology clinic.

Methods

Retrospective chart review on patients treated with image-guided superficial radiation therapy (IG-SRT) at the Health Science Center Dermatology Clinic

Retrospective chart review

Study period: December 12/2018 to 12/2022

Follow up through: 12/31/2023

Adverse events collected during the treatment and follow-up

Primary endpoint

Any cutaneous adverse event that required treatment or diagnostic studies beyond the 2-week follow-up visit

Results

Table 1. Adverse events

Characteristics	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
Age (years)	82	84	64	64	59	83
Gender	Female	Female	Male	Male	Female	**Male**
Location	Right lower leg	Left lower leg	Vertex scalp	Center forehead	Right naris	Right lower leg
Adverse event	Chronic non-healing wound	Chronic non-healing wound	Discoid lupus	Geometric Favre-Racouchot syndrome	Geometric Favre-Racouchot syndrome	Radiation recall
Histological subtype	**SCC**, Invasive	**SCC** in-situ	**SCC** in-situ	**BCC**, nodular	**BCC**, nodular	**SCC**, invasive
Follow-up	Dermatology & wound care ~ 2 years	Dermatology & wound care ~ 4 years	Topical Tacrolimus 0.1% ointment & photo-protection	Topical adapalene 0.1% gel → lost to follow-up	Topical adapalene 0.1% gel → shave removal & curettage	Topical triamcinolone 0.1% ointment

Table 2. Rate of Adverse Events with different treatment modalities

Treatment modality	Adverse event rate	Adverse events
IG-SRT	1.1% (6/566)	Chronic non-healing wound, discoid lupus, geometric Favre-Racouchot syndrome, radiation recall
Mohs surgery[7]	0.5% - 2%	Infection, hematoma, dehiscence, necrosis
Vismodegib[8]	12% - 74%	Muscle spasm, dysgeusia, alopecia, weight loss, fatigue, diarrhea, nausea, headache
Wide local excision[9,10]	3.8% - 20%	Bleeding, infection, flap necrosis
Electrodessication & Curettage[11]	----------	Keloid, hypertrophic scar
PD-1 Inhibitors[12]	Up to 100%	Diarrhea, fatigue, nausea, constipation, rash, anemia, hypothyroidism, pneumonitis, death

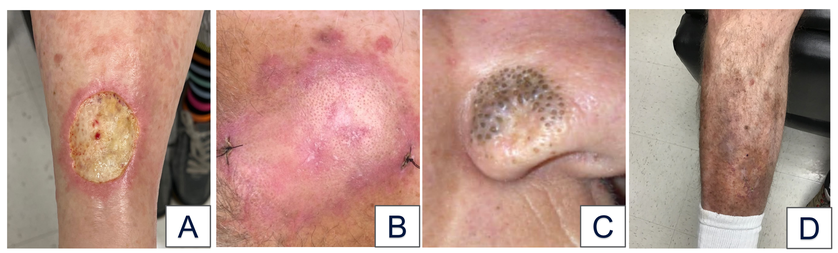

Figure 1. A) Well-demarcated ulcerated plaque with central granulation tissue and an erythematous border in the field of prior radiation therapy- chronic non-healing wound B) Pruritic, annular, scaly plaque with accentuated borders in area of prior radiation therapy- discoid lupus C) Well-demarcated plaque at site of prior radiation treatment with comedones around a central scar at site of malignancy- geometric Favre-Racouchot syndrome D) Edematous hyperpigmented plaque with focal linear hemorrhagic crust – radiation recall

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Discussion

- Both patients with chronic non-healing wounds had venous stasis with chronic edema. A chronic inflammatory state with pre-existing cutaneous changes in addition to the radiation may have an increased risk of non-healing wounds[13]
- Patients are questioned about risk factors for radiation complications including a history of cutaneous lupus prior to superficial radiation treatment
- Both patients with Favre-Racouchot Syndrome were active tobacco users throughout treatment and both occurred on the face
- Other treatment sites of patient 4 that were not on the face did not cause Favre-Racouchot Syndrome
- The radiation recall occurred at a site of a previous superficial radiation therapy treatment field. He had approximately 10 prior radiation sites, but only one developed radiation recall
- The multiple courses of radiation treatments were likely a risk factor for having an incident of radiation recall
- IG-SRT shows favorable treatment outcomes with low adverse event rates compared to other common treatment modalities (Table 2)
- Limitations of the study include a single clinic population, a shorter follow-up period of 1-5 years, and a small patient sample size

Conclusion

- IG-SRT is a safe and effective treatment modality for the treatment of basal cell carcinoma and squamous cell carcinoma
- Patients with pre-existing co-morbid conditions may have an increased risk of developing certain adverse events
- Prospective studies investigating the frequency, risk factors for adverse events, and prevention strategies would enhance patients' ability to choose between the different treatments for non-melanoma skin cancer.

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