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Presentations of Tumor Recurrence of Non-Melanoma Skin Cancer After Treatment with Low-Energy Superficial Radiation Therapy

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Tumor recurrence of non-melanoma skin cancer after treatment with low-energy 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 (NMSC).[1]
- Patients and physicians may prefer superficial radiation therapy (SRT) for a variety of reasons. These include consideration for comorbid conditions, anatomic location, tumor type, size, frailty, medical costs, least disruption to daily routine, and cosmetic outcomes.[2,3,4]
- Older studies show a 5-year cure rate between 84.2-95.8% in BCC and 90.4-94.5% in SCC when treated with SRT.[5] More recent literature shows a combined 97.4% cure rate.[6]
- Image-guided SRT is a relatively new method, with most published studies based on an older non-comparable form called Grenz Ray therapy.[7]
- Factors that increase risk of recurrence include tumor size, tumor location (nasolabial fold, ears, and scalp), poorly differentiated tumors, histological subtype, gender, age, and immunosuppression.[1]

Objective

Although the incidence of cancer recurrence after superficial radiation therapy is low, relatively little is known regarding predictive patterns. The frequency and timing of recurrence are not well defined with image-guided approaches utilizing high-frequency ultrasound capabilities with SRT delivery technology.[5]

Methods

Retrospective chart review on patients treated with image-guided SRT at the HSC Dermatology Clinic

Retrospective chart review

Study period: December 12/2018 to 12/2021

Follow up through: 12/31/2022

Treatment failure and cancer recurrence were monitored based on the American Academy of Dermatology guidelines.[13]

The primary endpoint was any histologically confirmed NMSC identified within the treatment field at any follow-up visit

Results

Figure 1. Malignancy Totals

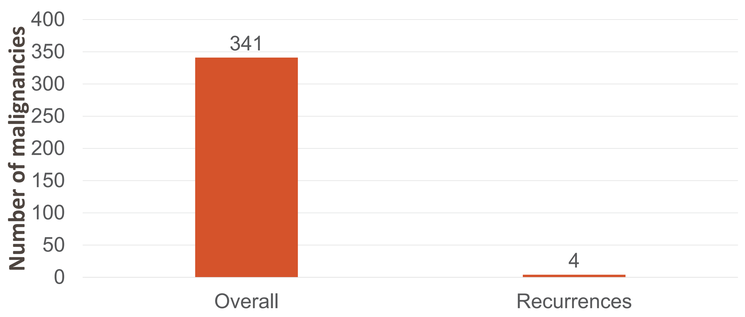

Table 1. Recurrences

Characteristics	Subject 1	Subject 2	Subject 3	Subject 4
Age (years)	70	70	61	60
Gender	Male	Male	Male	Male
Location	Neck	Mucosal Lip	Ear Helix	Temple
Time to confirm recurrence	3 months	5 months	2 months	36 months
Relapse histologic subtype	**SCC**, well differentiated	**SCC** in-situ	**SCC** with superficial invasion	**SCC** Invasive, well-differentiated
Months of Observation	8 months	14 months	5 months	45 months

Table 2. Average Rate of Recurrences of cSCC With Other Treatment Modalities

Treatment	Recurrence Rate
Mohs Surgery	0-6%[8]
Standard Excision	0-15%[8]
ED&C	2%[12]
Cryotherapy	7.5%[12]
Imiquimod	16.1%[12]
Photodynamic Therapy	29%[12]

Discussion

- In the four patients that had recurrences of SCC following SRT with the tumor cleared via ultrasound imaging, three were in high-risk locations (lip, ear, and temple) while one occurred on the neck.
  - Factors that were previously identified to increase risk of recurrence include tumor size, tumor location (nasolabial fold, ears, and scalp), poorly differentiated tumors, histological subtype, gender, age, and immunosuppression.[5]
- The tumor on the lip was SCC in-situ, compared to the ear, temple, and neck which were invasive SCC.
- Cutaneous SCC of the ear poses a higher risk of treatment difficulties due to minimal subcutaneous tissue.
  - This anatomy allows for tumors to have a close connection with the dermis and underlying lymphatic system.[10]
  - SRT in this area should be limited to those who are not surgical candidates.[9]
- Tumor diameter of >2 cm doubles the risk of SCC recurrence compared to those <2 cm.[11]
- All treatment recurrences were previously diagnosed as SCC. There were no BCC recurrences.
- It is notable that all relapses occurred in men aged >60.
- Three of the four recurrences were on curved surfaces.
  - There is currently no literature on a modified protocol that accounts for curvature when using SRT.

Conclusion

- The outcome of high-frequency ultrasound-guided SRT shows relatively high success rates comparable to other treatment modalities. Longer duration of follow-up, multi-center studies, and randomized controlled studies investigating the risk of recurrences after SRT would be beneficial to better understand the risk of recurrence compared to other treatment modalities. Optimization of treatment protocols, based on factors such as histology, tumor location, and size, may be beneficial to minimize the risk of treatment failures and tumor recurrence and enhance treatment outcomes.

References

- 1. McGregor S, Minni J, Herold D. Superficial Radiation Therapy for the Treatment of Nonmelanoma Skin Cancers. *J Clin Aesthet Dermatol*. Dec 2015;8(12):12-4.
- Dundar Y, Cannon RB, Hunt JP, Monroe M, Suneja G, Hitchcock YJ. Radiotherapy regimens in patients with nonmelanoma head and neck skin cancers. Int J Dermatol. Apr 2018;57(4):441-448. doi:10.1111/ijd.13879
- 3. Han H, Gade A, Ceci FM, Lawson A, Auerbach S, Nestor MS. Superficial radiation therapy for nonmelanoma skin cancer: A review. Dermatological Reviews. 2023;3(6):409-417. doi:10.1002/der2.174
- 4. Nestor MS, Berman B, Goldberg D, et al. Consensus Guidelines on the Use of Supercial Radiation Therapy for Treating Nonmelanoma SkinCancers and Keloids. Journal of Clinical and Aesthetic Dermatology. 2019;12(2):12-18.
- 5. Yu L, Oh C, Shea CR. The Treatment of Non-Melanoma Skin Cancer with Image-Guided Superficial Radiation Therapy: An Analysis of 2917 Invasive and In Situ Keratinocytic Carcinoma Lesions. Oncol Ther. Jun 2021;9(1):153-166. doi:10.1007/s40487-021-00138-4
- 6. Roth WI, Shelling M, Fishman K. Superficial Radiation Therapy: A Viable Nonsurgical Option for Treating Basal and Squamous Cell Carcinoma of the Lower Extremities. J Drugs Dermatol. 2019 Feb 1;18(2):130-134. Erratum in: J Drugs Dermatol. 2019 Apr 01;18(4):398. PMID: 30794362.
- 7. Lindelöf B. Grenzstrahlentherapie [Grenz ray therapy]. Hautarzt. 1989 Jan;40(1):4-7. German. PMID: 2646248.
- 8. van Lee CB, Roorda BM, Wakkee M, Voorham Q, Mooyaart AL, de Vijlder HC, Nijsten T, van den Bos RR. Recurrence rates of cutaneous squamous cell carcinoma of the head and neck after Mohs micrographic surgery vs. standard excision: a retrospective cohort study. Br J Dermatol. 2019 Aug;181(2):338-343. doi: 10.1111/bjd.17188. Epub 2018 Oct 28. PMID: 30199574.
- 9. Gonzalez A, Etchichury D, Rivero JM, Adamo L. Squamous cell carcinoma of the external ear: 170 cases treated with Mohs surgery. J Plast Reconstr Aesthet Surg. Nov 2021;74(11):2999-3007. doi:10.1016/j.bjps.2021.03.060
- 10. Nestor MS, Berman B, Goldberg D, et al. Consensus Guidelines on the Use of Superficial Radiation Therapy for Treating Nonmelanoma Skin Cancers and Keloids. J Clin Aesthet Dermatol):12-18.
- 11. Yu L, Oh C, Shea CR. The Treatment of Non-. Feb 2019;12(2Melanoma Skin Cancer with Image-Guided Superficial Radiation Therapy: An Analysis of 2917 Invasive and In Situ Keratinocytic Carcinoma Lesions. Oncol Ther. Feb 5 2021;doi:10.1007/s40487-021-00138-4
- 12. Stewart JR, Lang ME, Brewer JD. Efficacy of nonexcisional treatment modalities for superficially invasive and in situ squamous cell carcinoma: A systematic review and meta-analysis. J Am Acad Dermatol. 2022 Jul;87(1):131-137. doi: 10.1016/j.jaad.2021.07.067. Epub 2021 Aug 8. PMID: 34375669.
- 13. Work G, Invited R, Kim JYS, et al. Guidelines of care for the management of cutaneous squamous cell carcinoma. J Am Acad Dermatol. Mar 2018;78(3):560-578. doi:10.1016/j.jaad.2017.10.007

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