

Case Report/Case Series

Local Recurrence and Ocular Adnexal Complications Following Electronic Surface Brachytherapy for Basal Cell Carcinoma of the Lower Eyelid

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IMPORTANCE Various treatment options exist for nonmelanoma skin cancer (NMSC), including topical agents, surgery, or definitive or adjuvant radiation therapy. Recently, electronic surface brachytherapy (ESB) has been described as a noninvasive option for NMSC. We report a case of local recurrence of basal cell carcinoma (BCC) and ocular complications following ESB to the lower eyelid.

OBSERVATIONS A man in his 60s presented with a recurrent BCC within the radiation field 10 months after undergoing ESB for a biopsy-proven BCC. In addition to the recurrence, he had contracture of the conjunctiva in the socket of his previously enucleated eye, as well as lower eyelid ectropion, resulting in displacement and loss of retention of his ocular prosthesis.

CONCLUSIONS AND RELEVANCE Electronic surface brachytherapy should be used with caution, particularly in the periocular region because the late effects of hypofractionated radiation may cause ocular and orbital complications. To our knowledge, this is the first reported case of ocular complications with this modality. This case highlights a local recurrence following use of this new treatment modality, suggesting further investigation is warranted to determine the safety and efficacy of ESB.

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Nonmelanoma skin cancer (NMSC) affects over 2 million individuals per year in the United States.¹ A variety of modalities exist to treat basal cell carcinoma (BCC) and squamous cell carcinoma lesions, including electrodesiccation and curettage, excision, Mohs micrographic surgery, and topical agents. Radiation therapy is an alternative treatment option in select cases and can be delivered via different modalities, including external-beam radiation with megavoltage photons, superficial radiographs, electrons, or surface mold brachytherapy.²

Recently, others have reported using high dose rate electronic surface brachytherapy (ESB) as an alternative treatment option for NMSC.^{2,3} Purported advantages of this technique over standard external beam radiation therapy include less shielding and fewer treatment visits owing to the hypofractionated regimen, which delivers a larger dose per treatment with fewer overall treatments. Although good short-term efficacy and cosmesis have been reported with ESB by others, the long-term safety and efficacy of this treatment modality remains unknown.^{2,4} Herein, we report a case of BCC treated with ESB that recurred within 1 year of treatment within the radiation field, and in which the patient experienced lower eyelid ectropion and socket contracture leading to displacement of his ocular prosthesis.

Report of a Case

A man in his 60s presented to oculoplastic surgery with a lesion on the left lower eyelid. His ocular history was notable for a traumatic icicle injury as a child that resulted in loss of the left eye. Subsequently, he had surgery to place an implant into the eye socket and, approximately 14 years prior to his recent presentation to our office, underwent a lower eyelid reconstruction to help retain the implant. After that surgery, he had excellent prosthesis position without need for refitting or replacement for more than 10 years. However, he recently noted that his ocular prosthesis would spontaneously extrude from his anophthalmic socket. On examination, he had a small, pearly lesion in the tear trough region of the left lower eyelid that had been growing over the past few months.

On further questioning, the patient revealed that he had been diagnosed as having a BCC of the same region 10 months prior to presentation and had been treated with an in-office radiation device by his dermatologist. We reviewed his medical records from the treating physician. A shave biopsy revealed nodular BCC of the left cheek, and he was treated with ESB to a dose of 42 Gy in 12 fractions using the Xofig device (Xofig Inc) with a 20-mm cone. He was noted to have clinical signs

Figure 1. Local Recurrence of Basal Cell Carcinoma Within Electronic Surface Brachytherapy Field



An elevated, pearly lesion on the left lower eyelid (black arrowhead) is present in the field of prior radiation (white arrowheads). The scleral show on the prosthetic eye of the left lateral lower eyelid is appreciated by comparing it with the right eye. This scleral show is indicative of the conjunctival fornical shortening with extrusion of the prosthesis as well as cicatricial shortening of the lower eyelid skin.

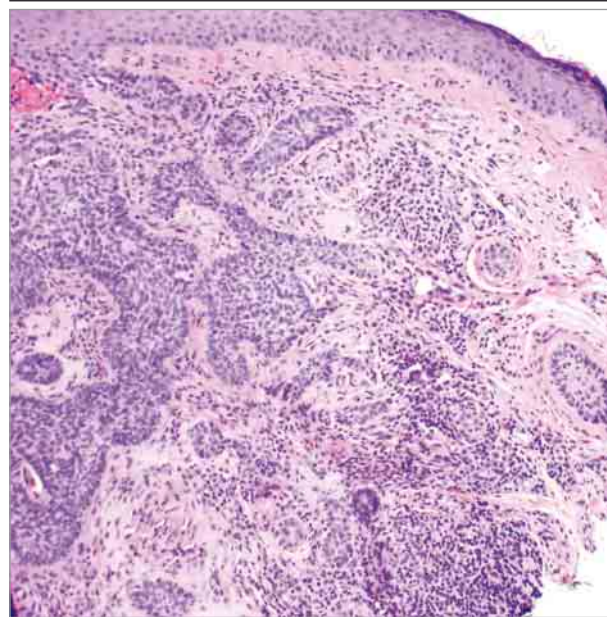
of tumor regression while receiving treatment. However, on follow-up in our clinic, we noted a suspicious lesion within the area in which he had received radiation therapy (Figure 1). In addition, he had contraction of the conjunctival mucosal tissue across the fornix of the left lower eyelid and increased scleral show of his ocular prosthesis with shortening of his lower eyelid skin. His prosthesis was extruded from his socket owing to the cicatricial effects causing conjunctival shrinkage and eyelid skin contracture.

A biopsy specimen of the new lesion on the left lower eyelid showed recurrent infiltrative BCC. There were no signs of fibrosis or an inflammatory infiltrate that is sometimes associated with radiation therapy (Figure 2). He was referred for Mohs micrographic surgery, and the BCC was resected in 1 stage. Pathologic analysis of the lesion demonstrated no sign of residual BCC, and the patient was referred back to oculoplastic surgery for reconstruction. The following day, he underwent reconstruction of the defect in his left lower eyelid via local advancement flaps. At the same time, we tightened his lateral canthus with an internal tarsal strip procedure and performed a conjunctivoplasty to deepen the conjunctival fornix to ensure improved prosthesis retention. The subsequent change in depth and contour of his anophthalmic socket necessitated an updated prosthetic eye, and at 2 months following surgery he had no evidence of recurrence, with improved prosthetic fit and cosmesis.

Discussion

Nonmelanoma skin cancer is the most common malignant neoplasm in the United States and has many well-established treatment modalities. Radiation therapy has been used in selected cases, typically as definitive therapy for inoperable lesions or as adjuvant therapy for high-risk resected or incom-

Figure 2. Pathologic Image of Basal Cell Carcinoma Recurrence



Mohs specimen of recurrent basal cell carcinoma (hematoxylin-eosin, original magnification $\times 100$).

pletely resected lesions. Recent publications^{2,3} have advocated for the use of ESB as an alternative treatment modality for NMSC for patients who desire noninvasive therapy.

This case highlights several concerns regarding the use of electronic surface brachytherapy. First, our patient experienced a recurrence of his BCC within the field of radiation within a year of treatment. The largest series to date of 171 cases reported 100% local control rates; however, a major limitation was duration of follow-up. The median follow-up time was 10 months, with fewer than one-third of lesions in the cohort

having 1-year follow-up.³ Most NMSC recurrences occur years after initial therapy; therefore, the long-term and clinically relevant efficacy of ESB is unknown.⁴⁻⁶

Second, the use of hypofractionated radiation—with high doses in less treatment fractions—as a first-line treatment in the management of NMSC of the lower eyelid and cheek area presents unique challenges for subsequent dermatologic surgery and oculoplastic reconstruction should a recurrence develop. Our patient, who had had an excellent fit of his ocular prosthesis for 14 years prior to presentation, quickly developed cicatricial changes to the eyelid skin and conjunctiva following radiation therapy that resulted in displacement of his prosthesis from the conjunctival fornix and extrusion of the prosthesis on multiple occasions. Fortunately, after Mohs excision of his BCC and subsequent reconstruction of the cheek defect and conjunctival fornix reconstruction, the patient experienced improved prosthesis retention and cosmesis. Nonetheless, over time the patient may be prone to the development of continuing fibrosis at the treatment site with consequential contraction as a complication of radiation therapy. Use of this technique in the periocular area of seeing eyes has even more potential for complications than our case.

Several recent commentaries have noted concerns regarding the increasing use of the ESB modality⁴ as well as the ethical issues surrounding the relationships existing between der-

matologists and radiation oncologists who practice within a narrow exception of the Stark self-referral laws.⁷ Indeed, in the field of prostate cancer therapy, the use of radiation has increased in certain regions coincident with the integration of urology and radiation oncology practices, suggesting that patient choices may be restricted when financial incentives for physicians become skewed.⁸ This raises important ethical concerns regarding the appropriate use of ESB as a treatment modality for NMSC because it is currently marketed to dermatology practices as a higher reimbursement procedure than surgery or topical therapy.

Conclusions

This case of the rapid recurrence of a BCC in the treatment field of ESB causing lower eyelid ectropion and socket contraction highlights several concerns regarding the use of this type of radiation for the treatment of NMSC. To our knowledge, recurrence within the field of ESB has heretofore not been described, nor have ocular complications of this treatment modality been reported in the literature. As increasing use of this type of radiation therapy modality occurs, clinicians should be aware of the possibility for early and late recurrences as well as cicatricial changes to surrounding structures with particular concern around the eyelids.

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