



Article

Treatment of Advanced Neglected Periorbital Basal Cell Carcinoma Using Radiotherapy "case report"

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1. Introduction

The incidence of skin malignancies is gradually increasing worldwide. The most common skin cancer is basal cell carcinoma (BCC). BCC occurs most frequently in the head and neck region, with about 20% appearing in the periocular region (Saleh, 2017; Sun, 2015) Orbital invasion is rare, being reported in 2% of cases (Madge, 2020). The age of onset of BCC is usually over the age of 60. Although metastasis is seldom seen, eyelid BCCs have a high recurrence rate (Furdova, 2017). The more aggressive BCC subtypes, the more frequent recurrence occurs

Abstract

Basal cell carcinoma (BCC) is the most prevalent malignant periocular tumor throughout the world, with a higher incidence in the age group above 60. Excessive exposure to Ultraviolet radiation is one of the well-known risk factors. Periocular BCCs more frequently occur on the lower lid and medial canthus. If periorbital invasion occurs, orbital exenteration is essential. In this report, we present a case of a 72-year-old man with recurrent neglected BCC of the medial canthus of the right eye with infiltration of the medial rectus muscle of the right orbit and right ethmoid air sinus, treated with Intensity-Modulated Radiation Therapy (IMRT) modality. The course of radiotherapy resulted in rapid tumor regression, with major partial response after one year follow up with acceptable toxicities. We believe that radiotherapy is an alternative treatment option to preserve anatomy and in frail elderly patients unfit for surgery. As far as we know, our report is the first to report using IMRT in treating large advanced periocular tumor.

and the worse overall prognosis will be encountered than the primary tumor usually does. BCC is not a fatal disease, but when neglected for a long time, the eyelid appearance and function will both be destroyed (Sun, 2015; Allali, 2005; Pfeiffer, 2015). Early diagnosis and proper surgical excision, consequently, guarantee better functional and cosmetic treatment outcomes. Advanced cases account for 5.5% of periocular BCC and in such cases, the radical surgical approach of choice is orbital exenteration (Iuliano, 2012; Howard, 1992; Nemet, 2006). An alternative organ-sparing approach is radiation therapy. Applying radiation, and sparing organs at risk (lens, conjunctiva, cornea, retina, and lacrimal glands) is of paramount importance.

BCC of the eyelids has a high risk of recurrence, especially in infiltrative types. Late diagnosis of BCC can lead to functional and cosmetic defects. Any periocular skin malignancy can invade the orbit region and lead to the probability of radical exenteration. The orbital invasion of BCC occurs in 2-4% and the risk factors include the large size of the primary tumor, also multiple recurrences, infiltrative histological subtype, perineural spread, the medial canthus and inner angle localization, and patient's age over seventy (Sun, 2015; Leibovitch, 2005).

Superficial lesions are traditionally treated with orthovoltage photon beam or electron beam radiotherapy; however, in the case of large-sized periocular lesions with challenging anatomy, none of them provides optimal tumor coverage or eye sparing. High-energy X-rays can be used in deeply infiltrating tumors (Kim, 2008; Newlands, 2016; Lovett, 1990). Nasal squamous cell carcinoma cases have been reported to be treated with external beam radiation techniques (EBRT), with an 85% 5-year local control rate and no grade 4 toxicities (Tsao, 2002).

Modern devices using EBRT, such as those using intensity-modulated radiation therapy (IMRT) can deliver high doses to irregularly shaped targets. IMRT represents an efficient method for treating head and neck cancers. It ensures optimal target coverage with minimal doses to the surrounding normal tissues (Marta, 2014; Spiotto, 2014; Combs, 2006). Here, we report a patient with neglected locally advanced BCC of the medial canthus treated with IMRT in our radiotherapy department.

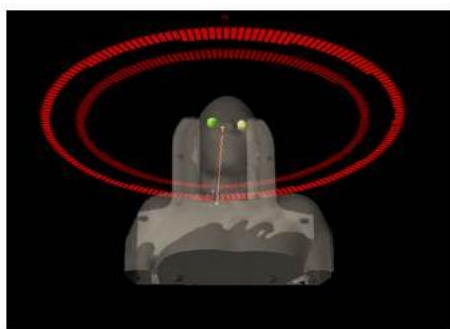
2. Case report

A 72-year-old male patient had a BCC of the inner canthus of the right eye since 2002 which was surgically excised. Multiple recurrences occurred for which multiple surgical re-excisions were done. The last surgical excision was done in 2018. In November 2021, the patient presented to our department with recurrent locally advanced basal cell carcinoma of the right eye. Clinical examination revealed an ulcerative lesion in the right inner canthus extending to the naso-orbital junction and displacing the right globe laterally. A computed tomographic (CT) scan revealed an irregularly shaped heterogeneous mass involving the right naso-orbital region measuring 4.5*4.6 cm; that involved the medial wall of the right orbit and right ethmoidal air cells. The mass was inseparable from the right medial rectus muscle and deviated from the right eye globe laterally (figure 1). The patient has an Eastern Cooperative Oncology Group (ECOG) performance scale of 1. A baseline ophthalmological evaluation was done, the patient had the ability to count fingers and right-sided optic atrophy was documented. Upon discussion with the patient, he refused orbital exenteration, and for this reason, in December 2021 he was admitted to our Department for EBRT.



Figure 1. Recurrent basal cell carcinoma occupying the naso-orbital fold, destructing the ethmoid air cells and displacing the right globe laterally.

CT simulation was performed with the patient supine and immobilized with a thermo-plastic mask (Klarity®, White S-Type, 3.2 mm). A multislice CT scan (Philips Medical Systems, Cleveland, OH, USA) was performed for a Three mm slice thickness. Contouring of the tumor and organs at risk (OARs) on the CT images was done using the ARIA™ Oncology Information System (Eclipse™ Treatment Planning System version. 13.6). Gross tumor volume (GTV) was defined as the heterogeneous mass shown in the CT scans and magnetic resonance imaging (MRI) studies. Clinical target volume (CTV) was made by adding 5 mms to the GTV. Planning target volume (PTV) was created by adding 5mms to the CTV. GTV was 54.8 cm³. PTV was 125.8 cm³. The treatment plan was created using a single isocenter and two non-coplanar arcs. A 0.5 mm bolus was applied to increase the skin dose. The prescribed dose was 70 Gy delivered in 35 sessions, with 95% of the dose prescribed to 95% of the PTV. The maximal dose (Dmax) was 7596 cGy. The number of total monitor units was 296 MUs. The Dmax and mean dose (Dmean) of the OARs are shown in table.1. Figure 2 shows the beam arrangement used in the case and figure. 3 display the isodose distribution.



Field ID	Technique	Energy	Gantry Rtn (deg)	Coll Rtn (deg)
Field 1	Arc-1	6X	181.0 CW 179.0	30.0
Field 2	Arc-1	6X	179.0 CCW 181.0	330.0

Figure 2. Beam arrangement used in the case; single isocenter two non-coplanar volumetric-modulated arc therapy.

The treatment was delivered using Unique™ Linac (Millennium 120™ MLC, 6 MV single modality linear accelerators, Dose Rate 400 – 600 MU/min: Varian Medical System).

Table 1. The mean dose (Dmean) and maximum dose (Dmax) of the organs at risk.

Organ at risk	Dmean	Dmax
left eye	17Gy	43.2Gy
left lens	5.7 Gy	7 Gy
left retina	23.0 Gy	48.7 Gy
left optic nerve	33.2 Gy	44.6 Gy
left lacrimal gland	16.8 Gy	42 Gy

The patient ended his radiotherapy course safely. He was kept on follow-up since February 2022. During follow-up visits, the patient suffered from a red and teary eye. He was kept on follow-up with an ophthalmologist as well. Figure 4 shows major partial remission achieved after a one-year follow-up.

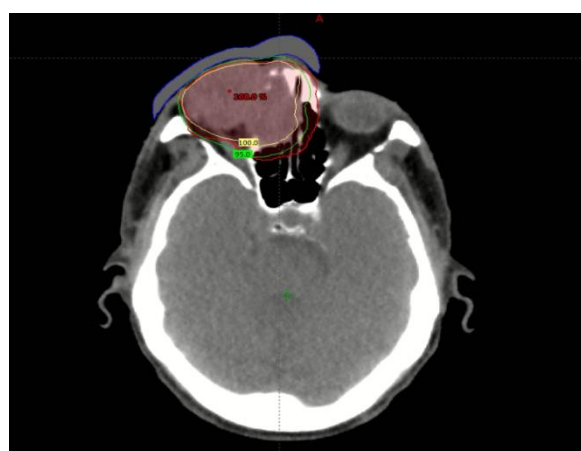


Figure 3. Dose distribution all over the target. The PTV (red) is covered with an isodose line of 95% (green).

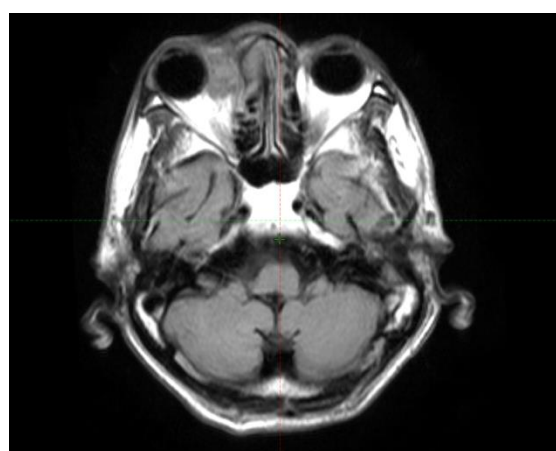


Figure 4. Major partial remission one year after the IMRT treatment.

3- Discussion

In this report, we present a case with unique characteristics: an aged patient, with recurrent neglected large-sized BCC infiltrating the orbital extrinsic muscle and ethmoid air sinus. These features are associated with poorer prognosis if conservative approaches are attempted. Using IMRT, the prescribed dose was 70 Gy with major partial remission observed after 3 months and sustained for one year till now. As a late toxicity, a teary eye was disclosed.

The main treatment of periocular BCC is surgery. Patient age, comorbidities, general condition, patient choice, tumor size, and infiltration should be thoroughly considered when choosing the optimal treatment option (Tsao, 2002). In cases with deep structure infiltration, the only surgical modality is orbital exenteration. Radiotherapy is an alternative treatment option to preserve anatomy in frail elderly patients unfit for surgery (Veness, 2003). Old patients usually have comorbidities and general anesthesia carries a major risk for them (Momm, 2004).

EBRT was previously reported to be used in the treatment of head and neck skin cancers (Kim, 2019). Kim et al, have recorded 9 BCC cases treated with definitive radiotherapy, and among these two of them were at periorbital sites. In their report, they used three-conformal radiation therapy and they prescribed 50 to 66 Gy with 2.0–2.75 Gy per daily fraction. In our report, we used IMRT prescribing 70Gy in 35 fractions with 2 Gy per fraction. Another locally

advanced BCC case involving the right eye was reported by Kramkimal et al. (Kramkimel, 2013). Helical tomotherapy was used in this report. They prescribed a total dose of 66 Gy. Complete clinical remission was observed after eight months, and a teary eye was reported as late toxicity.

Various Radiotherapy fractionation schedules have been used in skin tumors ranging from 64 Gy in 32 fractions to 20 Gy in single fractionation (Bichakjian, 2016; Bonerandi, 2011; Mendenhall, 2009). Radiation oncologists dealing with hypofractionation schedules care about the cosmetic results. In skin lesions involving bone or cartilage, they care about radionecrosis as well. Osteonecrosis was reported in 3 patients with skin cancer receiving radiotherapy (Lovett, 1990). In our current case, we deal with a good performance status patient. We need to minimize the toxicity as much as we could so we chose the conventional fractionation schedule.

To the best of our knowledge, none of the previous reports described locally advanced, large-sized BCC which invades deeper structures treated with IMRT.

3. Conclusion

We believe that EBRT is feasible and could be offered for old patients who refuse or are unfit for surgery. We point out this is the first case report discussing the use of definitive radiotherapy in such a large periorbital BCC case.

References

- Allali J., D'Hermies F., & Renard G. (2005). Basal cell carcinomas of the eyelids. *Ophthalmologica*; 219(2):57–71.
- Bichakjian C. K., Olencki T., Aasi S. Z., Murad A., Andersen J. S., Berg D., Bowen G. M., Cheney R. T., Daniels G. A., Glass L. F., Grekin R. C., Grossman K., Higgins S. A., Ho A. L., Lewis K. D., Lydiatt D. D., Nehal K. S., Nghiem P., Olsen E. A., Schmults C. D., Sekulic A., Shaha A. R., Thorstad W. L., Tuli M., Urist M. M., Wang T. S., Wong S. L., Zic J. A., Hoffmann K. G., & Engh A. (2016). Basal cell skin cancer, Version 1.2016, NCCN clinical practice guidelines in oncology. *J Natl Compr Canc Netw*; 14:574–97.
- Bonerandi J. J., Beauvillain C., Caquant L., Chassagne J. F., Chaussade V., Clavère P., Desouches C., Garnier F., Grolleau J. L., Grossin M., Jourdian A., Lemonnier J. Y., Maillard H., Ortonne N., Rio E., Simon E., Sei J. F., Grob J. J., & Martin L. (2011). Guidelines for the diagnosis and treatment of cutaneous squamous cell carcinoma and precursor lesions. *J Eur Acad Dermatol Venereol*; 25(Suppl 5):1–51.
- Combs S. E., Konkel S., Schulz-Ertner D., Mütter M. W., Debus J., Huber P. E., & Thilmann C. (2006). Intensity-modulated radiotherapy (IMRT) in patients with carcinomas of the paranasal sinuses: clinical benefit for complex shaped target volumes. *Radiat Oncol*; 1:23.
- Furdova A. & Lukacko P. (2017). Periocular Basal Cell Carcinoma Predictors for Recurrence and Infiltration of the Orbit. *Journal of Craniofacial Surgery*; 28:e84–7.
- Howard G. R., Nerad J. A., Carter KD, & Whitaker D. C. (1992). Clinical characteristics associated with orbital invasion of cutaneous basal cell and squamous cell tumors of the eyelid. *American Journal of Ophthalmology*; 113: 123-133.
- Iuliano A., Uccello G., Diplomatico A., Tebaldi S., & Bonavolontà G. (2012). Risk factors for orbital exenteration in periocular basal cell carcinoma. *American Journal of Ophthalmology*; 153(2): 238-241.

- Kim J. H., Yun B. M., Shin MS, Kang J. K., Kim J. J., & Kim Y. S. (2019). Effectiveness of radiotherapy for head and neck skin cancers: a single-institution study. *Radiat Oncol J*; 37(4):293-301.
- Kim J. H. (2008). Radiation therapy in elderly skin cancer. *Radiation Oncology Journal*; 26:113-7.
- Kramkimel N., Dendale R., Bolle S., Zefkili S., Fourquet A., & Kirova Y. M. (2013). Management of advanced non-melanoma skin cancers using helical tomotherapy. *J Eur Acad Dermatol Venereol*; 28(5):641-50.
- Leibovitch I., McNab A., Sullivan T., Davis G., & Selva D.(2005). Orbital invasion by periocular basal cell carcinoma. *Ophthalmology*; 112: 717-23.
- Lovett R.D, Perez C. A., Shapiro S. J., & Garcia D. M. (1990). External irradiation of epithelial skin cancer. *International Journal of Radiation Oncology, Biology and Physics*; 19:235-42.
- Madge S. N., Khine A. A., Thaller V. T., Davis G., Malhotra R., McNab A., O'Donnell B., & Selva D. (2010). Globe-sparing surgery for medial canthal Basal cell carcinoma with anterior orbital invasion. *Ophthalmology*; 117:2222-8
- Marta G.N., Silva V., Carvalho H. A., Arruda F. F., Hanna S. A., Gadia R., Silva J. L. F., Correa S. F. M., Abreu C. E. C. V., & Riera R.(2014). Intensity-modulated radiation therapy for head and neck cancer: systematic review and meta-analysis. *Radiother Oncol*; 110(1):9–15.
- Mendenhall W.M., Amdur R.J., Hinerman R.W., Cогnetta A. B., & Mendenhall N. P. (2009). Radiotherapy for cutaneous squamous and basal cell carcinomas of the head and neck. *Laryngoscope*; 119:1994–9.
- Momm F., Becker G., Bartelt S., & Guttenberger R. (2004). The elderly, fragile tumor patient: radiotherapy as an effective and most feasible treatment modality. *J Pain Symptom Manag*; 27:3-4.
- Nemet A.Y., Deckel Y., Martin P.A., Kourt G., Chilov M., Sharma V., & Benger R. (2006). Management of periocular basal and squamous cell carcinoma: A series of 485 cases. *American Journal of Ophthalmology*; 142(2): 293-297.
- Newlands C., Currie R., Memon A., Whitaker S., & Woolford T. (2016). Non-melanoma skin cancer: United Kingdom National Multidisciplinary Guidelines. *The journal of Laryngology and Otology*; 130(S2):S125-S132.
- Pfeiffer M.J., Pfeiffer N., & Valor C. (2015). Estudio descriptivo sobre el carcinoma basocelular en el párpado [Descriptive study on basal cell eyelid carcinoma] *Arch Soc Esp Oftalmol*; 90(9):426–431. Spanish [with English abstract]
- Saleh G.M., Desai P., Collin J.R.O., Ives A., Jones T., & Hussain B. (2017). Incidence of eyelid basal cell carcinoma in England: 2000-2010. *British Journal of Ophthalmology*; 101:209-12.
- Spiotto M.T., & Weichselbaum R.R. (2014). Comparison of 3D conformal radiotherapy and intensity modulated radiotherapy with or without simultaneous integrated boost during concurrent chemoradiation for locally advanced head and neck cancers. *PLoS One*; 9(4), e94456.
- Sun M.T., Wu A., Figueira E., Huilgol S.C., & Selva D. (2015). Management of periorbital basal cell carcinoma with orbital invasion. *Future Oncology (London, England)*; 11:3003-10.
- Sun M.T., Wu A., Huilgol S.C., & Selva D. (2015). Accuracy of biopsy in subtyping periocular basal cell carcinoma. *Ophthalmic Plastic and Reconstructive Surgery*; 31(6):449–451.

Tsao M.N., Tsang R.W., Liu F.F., Panzarella T., & Rotstein L. (2002). Radiotherapy management for squamous cell carcinoma of the nasal skin: the Princess Margaret Hospital experience. *International Journal of Radiation Oncology, Biology and Physics*; 52:973-9.

Veness M. & Richards S. (2003). Role of modern radiotherapy in treating skin cancer. *Australas J Dermatol*; 44:159-66.

الملخص العربي

علاج سرطان الخلايا القاعدية المهملة حول العين المتقدم باستخدام العلاج الإشعاعي "دراسة حالة"
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يعد سرطان الخلايا القاعدية هو الورم الخبيث الأكثر انتشارًا في جميع أنحاء العالم، مع ارتفاع معدل الإصابة في الفئة العمرية فوق ٦٠ عامًا. كما يعد التعرض المفرط للأشعة فوق البنفسجية أحد عوامل الخطر المعروفة للإصابة بهذا النوع من السرطان. عند حدوث سرطان الخلايا القاعدية في منطقة حول العين، فإن الاستئصال الكامل للعين أو ما يسمى بالاستخراج المداري يعتبر ضرورياً. نقدم في هذا المقال تقريراً عن حالة سرطان الخلايا القاعدية وقد تم علاج الحالة باستخدام تقنية العلاج الإشعاعي معدل الشدة. يبلغ المريض ٧٢ عاماً وتم تشخيص المريض بورم سرطاني مرتجع في منطقة حول العين. وقد تم متابعة المريض لمدة عام بعد العلاج الإشعاعي وقد حقق المريض استجابة كبيرة. يعد العلاج الإشعاعي حل بديل لاستئصال العين في حالات المرضى كبار السن أو في حالة عدم الكفاءة الجراحية.

الكلمات الأساسية: سرطان الخلايا القاعدية، سرطان حول العين، العلاج الإشعاعي، العلاج الإشعاعي معدل الشدة.