Ruthenium brachytherapy for intraocular growth of a conjunctival squamous cell carcinoma: a case report

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Abstract

The aim of this study is to report the use of ruthenium brachytherapy as an adjunctive treatment in the management of an intraocular extension of the conjunctival squamous cell carcinoma (SCC).

In 2013, a 73-year-old man presented with a tumor blocking the angle and infiltrating corneal endothelium. The patient was treated with iridectomy, and after one month, ruthenium brachytherapy was applied. 4.5 years post-irradiation, the treated eye is painless, and no recurrence was noted.

We advocate the use of ruthenium brachytherapy as an eye salvage treatment with an intraocular extension of conjunctival SCC.

Key words: conjunctiva, eye, ruthenium, squamous cell carcinoma, tumor.

Purpose

Conjunctival squamous cell carcinoma (SCC) has an overall population prevalence of 0.13-0.9% per 100,000 [1]. It tends to be more frequent among men and in the elderly population, and 75% of these lesions appear close to the limbus [2]. Intraocular extension of conjunctival SCC is extremely rare, occurring in about 2-11% of cases [2]. It may appear in artificial entry site following too deep keratectomy or a surgical wound. We present a patient with the intraocular extension of conjunctival SCC, whose eye was salvaged with iridectomy and adjunctive ruthenium plaque insertion.

Case description

In 2013, a 73-year-old man presented to our clinic with ocular irritation, pain, and visible tumor mass in the anterior chamber of his left eye. He gave a past ophthalmic history of same eye pterygium surgery a year earlier that was performed elsewhere and an unsuccessful postoperative steroid treatment due to presumed anterior uveitis. On examination, the vision was 20/35 in the affected eye, and 20/20 in the fellow eye, which was healthy. The intraocular pressure was normal in both eyes. A white solid mass was seen in the left anterior chamber covering the nasal part of the iris, and infiltrating the corneal endothelium (Figures 1A-B). On gonioscopy, the tumor was blocking 2 clock hours of the angle. Both fundi were unremarkable, and the submandibular and periauricular lymph nodes were normal. Iridectomy was performed as the first line treatment to remove a part of the tumor adjacent to the iris and for histopathological diagnosis. However, the residual tumor tissue was still present in the anterior chamber and deeper layers of the cornea. The histopathological report revealed T3N0M0 invasive squamous cell carcinoma originating from the conjunctiva with the signs of HPV infection (koilocytosis) (Figures 1C-D). The margins of resected tissue were infiltrated with tumor cells. A month later, conjunctival mapping biopsy was undertaken, which demonstrated no conjunctival involvement, and adjunctive ruthenium plaque brachytherapy was performed to eradicate the residual tumor tissue (Figures 2A-B). The conjunctiva was cut approximately 7 mm from the limbus, and the medial rectus was disinserted to create the opening for the 20 mm CCB plaque as well as to irradiate a wider part of the conjunctiva adjacent to the limbus. The plaque was placed in the nasal part of the conjunctiva covering approximately 6 clock hours of the corneoscleral junction to ensure coverage of all remaining tumor. A dose of 86 Gy at a depth of 1.2 mm was delivered over 24 hours.

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At 4.5 years post-treatment, the affected eye is painless with the vision of 1.0. The intraocular part of the tumor had completely regressed; no orbital or conjunctival recurrence was noted. There was, however, a sectorial cortical cataract (Figures 2C-D) that was removed during uneventful phacoemulsification surgery 6 months ago. No distant metastases were observed at the last follow-up visit.

Discussion

This is a first report on the use of ruthenium brachytherapy in the management of corneal endothelium involvement caused by conjunctival SCC. The globe was salvaged, and no recurrence was noted at 4.5 years follow-up. There are approximately 20 cases of intraocular extension of squamous cell carcinoma described in the literature, the majority of whom were treated with enucleation [1,2,3,4,5,6,7]. More recently, Arepalli et al. demonstrated a good tumor control of a recurrent SCC infiltrating the sclera with iodine plaque brachytherapy [8]. Out of the reported 15 cases with a scleral invasion, three patients had an intraocular extension. Enucleation was performed in one of 3 patients with recurrence, 5 months post-radiotherapy, and in a second case due to ocular irritation. None of the reported patients developed metastasis [8]. The successful treatment in such cases is uncommon. Reported patients are listed in Table 1.

A majority of cases described were preceded by pterygium surgery. Too deep keratectomy might have created an entrance for a tumor invasion, and this was clearly visible on the preoperative photograph of our patient. According to the literature, the intraocular invasion is often confused with granulomatous anterior uveitis, as this was also observed in the case reported. However, the diagnosis is facilitated by histopathological examination. Conjunctival SCC and pterygium may have a similar clinical presentation, but present different treatment requirements, therefore, differentiation is crucial. Some authors recently investigated the scope of the pathology screening of every excised pterygium [9] as well as the prevalence of invasive carcinomas in pterygium specimens [10], but found no justification for detailed pathology report in every case.

In Europe, ruthenium brachytherapy is widely used to treat small choroidal tumors up to 6 mm in thickness. It has been previously employed for anterior segment irradiation in recurrent conjunctival SCC with no intraocular involvement [11], and as an adjunctive to surgical resection for irradiating tumor bed in invasive conjunctival tumors [12]. Long-term follow-up suggests that the risk of corneal melting is minimal. The doses reported suggest 100 Gy to the tumor apex at 2 mm [11] or 1 mm [12] in depth.
Table 1. The reports of eye saving treatment in cases of intraocular extension of conjunctival squamous cell carcinoma

| Authors          | Treatment    | Plaque type | Prescription dose | Number of patients | DFS                   | Treatment outcome                      |
|------------------|--------------|-------------|-------------------|--------------------|-----------------------|----------------------------------------|
| Char et al. [5]  | Iridocyclectomy | –           | –                 | 1                  | DFS                   | No major complications at 3.5 years post-surgery |
| Arepalli et al. [8] | Irradiation | $^{125}$I | 50-80 Gy          | 3 out of 15 reported | 1-8 months (mean 5), n = 4 | Secondary enucleation, n = 2 |
| Häberle et al. [11] | Irradiation | $^{106}$Ru | 100 Gy            | 2                  | 24 months             | No major complication seen              |

DFS – disease-free survival

Conclusions

Intraocular extension of conjunctival SCC is rare, and if the corneal endothelium and anterior chamber are infiltrated, it may be managed with ruthenium plaque brachytherapy.

Disclosure

The authors report no conflict of interest.

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