ECRONICON OPEN ACCESS

EC OPHTHALMOLOGY
Case Series

Intraocular Invasion by Conjunctival Squamous Cell Carcinoma Documented by UBM

Jonathan T Regenold[1], James J Augsburger[1] and Zélia Maria Corrêa[1,2]*

[1]*Department of Ophthalmology, University of Cincinnati Academic Health Center, Cincinnati, Ohio, USA*

[2]*Bascom Palmer Eye Institute and Sylvester Comprehensive Cancer Center, Miller School of Medicine, University of Miami, Miami, Florida, USA*

***Corresponding Author:** Zelia Maria Correa, Bascom Palmer Eye Institute and Sylvester Comprehensive Cancer Center, Miller School of Medicine, University of Miami, Miami, Florida, USA.

Received: November 09, 2024; **Published:** December 20, 2024

Abstract

Purpose: Conjunctival squamous cell carcinoma is a relatively common malignant ocular neoplasm. Occasionally, this type of cancer extends completely through the underlying sclera or corneosclera and gains access to intraocular tissues (intraocular invasion). The purpose of this article is to remind eye care professionals of the typical settings in which this complication occurs, describe the spectrum of ocular physical examination features that should alert them to this potential problem, and emphasize the role ultrasound biomicroscopy (UBM) can play in confirming this diagnosis.

Methods: This study is a retrospective review of two cases of intraocular invasion by conjunctival squamous cell carcinoma. It also provides an overview of UBM features and physical examination findings suggestive of intraocular invasion by squamous cell carcinoma.

Results: The authors report two patients with intraocular invasion by conjunctival squamous cell carcinoma and present UBM images of these cases, demonstrating features suggestive of intraocular invasion, including sonoreflective tissue extending into uveal tissue and sheets of matted cells on anterior angle structures.

Conclusion: Attention to details of the clinical setting, identification of relevant ocular abnormalities during ophthalmic physical examination, and evaluation of UBM images of the affected eye are likely to lead to the correct clinical diagnosis in most cases.

Keywords: *Squamous Cell Carcinoma; Ultrasound Biomicroscopy (UBM); Intraocular Invasion; Conjunctiva*

Introduction

Conjunctival squamous cell carcinoma is a primary malignant neoplasm that arises from the stratified squamous epithelium of the conjunctiva. It usually originates from the limbal or bulbar conjunctiva medially or laterally in the sun exposed areas of the eye. It typically appears as a leukoplakic, papillary, or gelatinous mass or as a combination of these growth patterns. It can be confined to the conjunctival epithelium (conjunctival intraepithelial neoplasia, CIN), but it frequently extends horizontally into the epithelium of the cornea, vertically into the conjunctival substantia propria, or both. Fortunately, it can often be eradicated at this stage by simple excision of the tumor plus a limited margin of normal appearing conjunctiva, especially if the excision is supplemented by cryotherapy to the retained conjunctiva adjacent the line of incision [1]. Diffuse intraepithelial squamous cell carcinoma of the conjunctiva can be treated successfully by topical

chemotherapy (mitomycin C, 5-fluorouracil) or topical interferon alpha 2 beta in many cases [1,2]. Occasionally, conjunctival squamous cell carcinoma invades the underlying sclera or limbal corneosclera [3]. In such a case, lamellar excision of the invaded sclera or corneosclera following excision of the conjunctival tumor supplemented by cryotherapy to the remaining scleral or corneoscleral layers or focal radiation therapy (typically by either Sr-90 applicator therapy or epibulbar plaque radiotherapy) to the invaded eye wall tissues must be performed to eradicate the invasive neoplastic tissue [1]. In rare instances (usually neglected-advanced tumors or recurrent tumors following prior attempted excision), conjunctival squamous cell carcinoma extends completely through the sclera or corneosclera and gains access to the anterior chamber aqueous humor and anterior uveal tissue (iris, ciliary body, or both) [3]. We refer to this situation as intraocular invasion. Unfortunately, conjunctival squamous cell carcinoma that has invaded into the eye usually cannot be eradicated except by enucleation of the affected eye [1].

The purposes of this article are to review the typical clinical settings in which intraocular invasion by conjunctival squamous cell carcinoma should be suspected, describe the clinical features of the conjunctival tumor and anterior segment intraocular structures detectable by ocular physical examination that should suggest intraocular invasion, and emphasize the ultrasound biomicroscopy features of such cases that help to confirm the clinical diagnosis. We report herein two previously unpublished cases of intraocular invasion by conjunctival squamous cell carcinoma in which UBM was performed as an introduction to this topic.

Case Reports

Case 1

A 78-year-old man presented to a comprehensive ophthalmology practice with symptoms of chronic irritation and hyperemia of his right eye (OD) for the preceding two months. His past medical history was significant for mucosa-associated lymphoid tissue (MALT) lymphoma of the duodenum diagnosed four years earlier and treated by chemotherapy and external beam radiation therapy. At the time of his ophthalmic presentation, he was in complete clinical remission of this lymphoma. Ocular examination in the comprehensive ophthalmology practice revealed a conjunctival lesion involving the inferotemporal limbal region OD. The examining ophthalmologist diagnosed the lesion as a probable squamous cell carcinoma but did not measure the tumor, describe the tumor in detail in his clinical notes, or obtain photographs of the tumor. He recommended excision of the tumor, and the patient consented to this procedure. At surgery, he detected strong adhesion of the tumor to the underlying sclera. Because of this, he not only excised the conjunctival tumor but also performed an excision of the superficial scleral lamellae underlying the tumor and treated the sclera at that site with probe cryotherapy. The excised conjunctival specimen measured 9 mm x 7 mm in basal size by about 2 mm in thickness. Histopathologic analysis of the excised specimen confirmed invasive conjunctival squamous cell carcinoma and revealed neoplastic cells extending to the lateral conjunctival and deep scleral margins. Upon receipt of this report, the ophthalmologist referred the patient to our practice for further evaluation and management. For reasons that are not clear, there was a 71-day lapse between the date of patient referral to our practice and the date when the patient was first evaluated in our practice.

Initial evaluation in our practice revealed a best corrected visual acuity of 20/100 in the patient's affected right eye. Intraocular pressure in that eye was 17 mmHg by applanation tonometry. Slit-lamp examination OD (Figure 1A) revealed dilated limbal blood vessels temporally, satisfactory healing of the conjunctiva corresponding to the site of prior lesion excision, diffuse 1+ edema involving the temporal portion of the cornea, a limited amount of deep corneal stromal vascularization and whitening temporally adjacent the limbus, and 1+ pale cells in the anterior chamber aqueous humor but no obvious residual or recurrent conjunctival mass. Ocular 50 MHz ultrasound biomicroscopy (UBM) OD (Figure 1B-1D) revealed moderately sonoreflective thickening of the limbal and anterior bulbar conjunctiva temporally, a patch of more intensively sonoreflective soft tissue underlying the conjunctiva which appeared to extend through the underlying corneosclera and anterior sclera, invade and thicken the underlying peripheral iris and ciliary body, and extend to the iris root, multiple low density particles (cells) in the anterior chamber aqueous humor, layering of matted cells on the anterior surface of the

iris and endothelial surface of the peripheral cornea, blunting of the iridocorneal angle, and localized peripheral iridocorneal appositional angle closure. Our clinical diagnosis was transscleral intraocular invasion by conjunctival squamous cell carcinoma. We recommended enucleation OD, and the patient consented to this procedure.

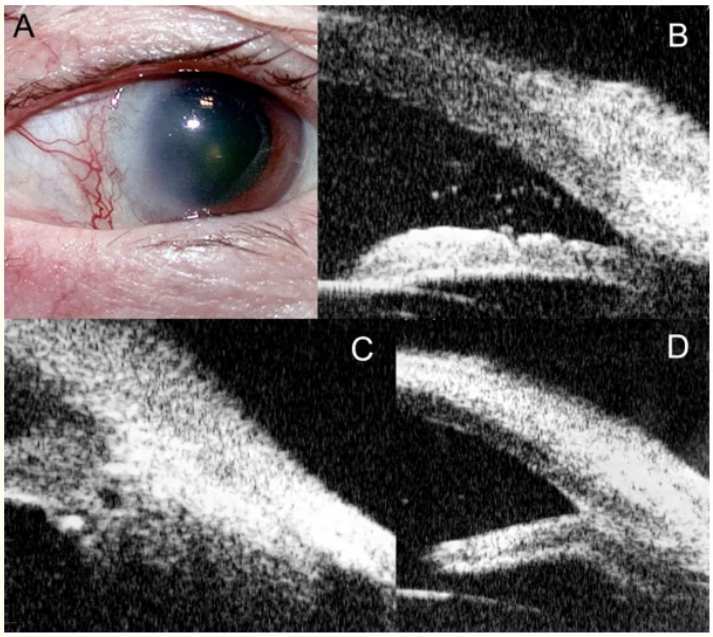

Figure 1: *Images of Case 1. A: Color external photograph of affected right eye at initial ocular oncology practice evaluation, 2+ months after attempted excision of conjunctival tumor elsewhere. Note prominent epibulbar blood vessels at the limbus temporally and deep corneal whitening adjacent the limbus. No residual or recurrent conjunctival tumor is evident at this time. B-D: 50 MHz UBM radial cross-sectional images of anterior ocular segment through inferotemporal meridian.*

Enucleation of the right eye was combined with wide excision of the conjunctiva around the prior excision site. Pathological examination of the enucleated eye confirmed conjunctival squamous cell carcinoma invading the sclera and extending transsclerally into the iris and ciliary body temporally. The patient tolerated the surgery well and showed no tumor recurrence in his right orbit during available post-enucleation follow-up. Unfortunately, he died of an acute cardiac event 6.5 months following the enucleation.

Case 2

An 89-year-old man with a history of ischemic cardiomyopathy and congestive heart failure secondary to a prior myocardial infarction presented to a comprehensive ophthalmology practice with a 2+ year history of a slowly enlarging reddish lump on the surface of his left eye. The ophthalmologist diagnosed probable conjunctival squamous cell carcinoma and recommended excision. The patient ignored this recommendation but returned to the practice 2 years later. At that time, the ophthalmologist noted that the tumor had enlarged substantially; however, he did not measure the tumor, describe the features of the tumor in his clinical notes, or obtain photographs of the tumor. He recommended and performed an incisional biopsy of the tumor. Histopathological analysis of the biopsy specimen confirmed invasive conjunctival squamous cell carcinoma. The ophthalmologist then referred the patient to our practice for further evaluation and management.

Baseline evaluation in our practice showed visual acuity limited to counting fingers and intraocular pressure of 12 mm Hg in the patient's affected left eye. Slit lamp examination of that eye revealed a multinodular limbal-bulbar conjunctival tumor that extended from the 12:30 o'clock meridian clockwise to the 8:00 o'clock meridian (Figure 2A) and measured approximately 13 mm x 8 mm in basal diameters x about 4 mm in thickness. The tumor was predominantly papillary in appearance and was associated with prominently dilated, tortuous epibulbar blood vessels. The biopsy site appeared as a white excavated area near the center of the tumor. A small amount of intrastromal corneal blood was observed in the peripheral cornea inferotemporally. Gonioscopy revealed grayish-white discoloration and inward bowing of the peripheral cornea inferotemporally but did not show any tumor cells suspended in the anterior chamber aqueous humor or layered on the anterior surface of the iris.

50-MHz UBM imaging OS (Figure 2B) showed a thickened, heterogeneously sonoreflective conjunctival tumor overlying the peripheral cornea and anterior bulbar sclera, abnormal moderately sonoreflective tissue involving the cornea under and slightly central to the conjunctival tumor, more sonoreflective tissue thickening the peripheral cornea under the conjunctival mass and bowing of thickened cornea inwardly, and an ill-defined tract of heterogeneously sonoreflective tissue extending through the peripheral corneosclera to reach the ciliary body near the iris root. The biopsy site appeared as a focal crater near the anterior aspect of the conjunctival tumor, and a large caliber intralesional blood vessel appeared as a focal cavity deep within the epibulbar tumor.

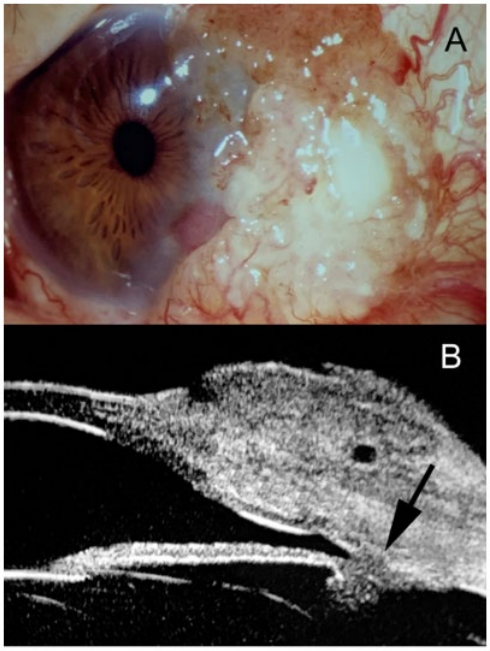

Figure 2: *Images of Case 2. A: Color external photograph of affected left eye. Note multilobulbar limbal-bulbar tumor, white excavated area within tumor corresponding to site of recent prior incisional biopsy, prominently dilated epibulbar blood vessels, and focus of deep intracorneal blood adjacent the limbus inferotemporally. B: Composite 50 MHz UBM radially oriented image of anterior ocular segment through inferotemporal meridian. Note prominent heteroreflective epibulbar primary tumor, an irregular tract of tumor tissue extending through the anterior sclera into the ciliary body (arrow), inward bowing of the infiltrated peripheral cornea, a focal sonolucent circle within the epibulbar tumor corresponding to a large caliber blood vessel imaged in cross section, and a focal excavation of the external aspect of the tumor corresponding to the site of the prior incisional biopsy.*

Our clinical diagnosis was conjunctival squamous cell carcinoma of the left eye with intraocular invasion. We recommended enucleation of the affected eye, but the patient refused to consent to that procedure. We then offered excision of the epibulbar portion of the tumor followed by episcleral plaque radiotherapy as a heroic effort to eradicate the tumor and preserve the eye. The patient consented to this procedure. The patient underwent excision of the conjunctival tumor OS followed immediately by implantation of a specially designed I-125 plaque. The plaque was designed to deliver a radiation dose of approximately 60 Gy to a depth of 2 mm during a single 48-hour treatment session. The plaque was removed without complications two days later, and the retained bulbar conjunctiva was advanced to the limbus to cover the excision and treatment site at that time. Histopathological analysis of the excised tumor specimen confirmed invasive conjunctival squamous cell carcinoma and showed tumor cells extending to both the horizontal and deep margins of the specimen. In addition, the examining pathologist noted a small focus of mucoepidermoid carcinoma within the tumor.

Follow-up examination 1 month after treatment revealed satisfactory healing of the conjunctiva without evident locally recurrent tumor. The discoloration and thickening of the iris appeared slightly less pronounced. The patient elected to return to his referring ophthalmologist at this time for further monitoring. Unfortunately, 6-months following the initial ocular surgery, the patient's treated eye developed massive anterior corneoscleral necrosis inferotemporally with globe perforation and became blind and painful. Enucleation was recommended again, and this time the patient consented to this surgery. This procedure was performed by the referring ophthalmologist. Unfortunately, we did not receive a pathologist's report of the enucleated eye or receive any pathology slides for review, and we also never received any clinical follow-up information about the patient. The patient died at age 93 years 6 months post-enucleation.

Discussion

Although conjunctival squamous cell carcinoma is generally regarded as one of the most frequently encountered ocular malignant neoplasms in general eye care practices, it is still fortunately relatively uncommon. Sun and coauthors have estimated the average annual incidence of conjunctival squamous cell carcinoma in adults in the United States to be approximately 0.3 new cases per million persons per year [4], and McClellan and coauthors have reported the prevalence of active or prior conjunctival squamous cell carcinoma among US military service veterans (average age 66 years) encountered in a single south Florida Veterans Affairs medical center system to be approximately 1.16 cases per 1000 veterans [5]. Both frequencies are higher among whites than non-whites and among males than females [4,5]. While investigators who analyzed 60 cases of conjunctival squamous cell carcinoma in an eye pathology laboratory associated with a major referral center found scleral or corneoscleral invasion in 37% and intraocular invasion in 13% [3], both percentages are likely to be substantially higher than what one would find in an unselected series of conjunctival squamous cell carcinoma cases. Recognizing the infrequency of conjunctival squamous cell carcinoma in the general population, intraocular invasion by this type of primary epibulbar cancer is quite uncommon.

The typical setting in which intraocular invasion by conjunctival squamous cell carcinoma has been noted is that of a long-standing, neglected, relatively large limbal-bulbar conjunctival tumor [3,6,7] or a recurrent tumor following prior unsuccessful attempted surgical excision, especially if recurrence and attempted excision have occurred multiple times [1,3]. Tumors that exhibit prominent clinical ulceration [8] and ones that occur adjacent to or overlying sites of prior intraocular incision during ocular surgery [9-12] are particularly likely to develop intraocular invasion. Intraoperative finding of strong adhesion between the conjunctiva tumor and underlying sclera or corneosclera should alert the ophthalmic surgeon to the likelihood of scleral or corneoscleral invasion by a conjunctival squamous cell carcinoma and should prompt further action such as referral to an ocular oncology center, excision of partial thickness sclera or cornea and sclera underlying the conjunctival tumor, supplemental cryotherapy to the invaded sclera or corneosclera, or focal irradiation of the invaded eye wall tissue [1]. Because intraocular invasion by conjunctival squamous cell carcinoma occurs by direct trans-eye wall extension and not by metastasis, scleral or corneoscleral invasion must be present in an eye that develops intraocular invasion.

Pathological reports that describe malignant tumor cells extending to the deep margin of the submitted surgical specimen [3,6] and especially ones that identify a component of mucoepidermoid carcinoma [13] or spindle cell carcinoma [14], two particularly invasive forms of cancer arising from the stratified squamous epithelium of the conjunctiva, should also alert the ophthalmic surgeon about the potential for intraocular invasion.

Intraocular features detectable by ocular physical examination that should alert the examiner of the possibility of intraocular invasion include (1) suspended pale cells or clump of aggregated cells in the anterior chamber aqueous humor, matted on the surface of the iris and trabecular meshwork, or both in an eye with an active epibulbar tumor consistent with squamous cell carcinoma (untreated case) or confirmed pathologically to be squamous cell carcinoma (residual tumor after incisional biopsy or recurrent following prior attempted excision) [15,16]; (2) otherwise unexplained acquired high peripheral anterior synechiae corresponding to the ocular sector where the conjunctival tumor is or was located [1,3]; (3) a well-defined pale intrastromal iris mass or ill-defined thickening of the iris corresponding to the meridional location of the conjunctival tumor [17]; (4) a sheet or membrane that appears to cover a portion of the iris and trabecular meshwork and is consistent with neoplastic epithelial ingrowth [10,12]; (5) otherwise unexplained ipsilateral substantial elevation of intraocular pressure in the context of an active or prior conjunctival squamous cell carcinoma [1,17]; and (6) prominent localized deep corneal neovascularization in the sector of the eye occupied by the conjunctival tumor [18].

Ultrasound biomicroscopy findings suggesting intraocular invasion by conjunctival squamous cell carcinoma include (1) an unequivocal tract of abnormally sonoreflective cells extending through the sclera or corneosclera underlying the current or prior location of the epibulbar tumor [19,20]; (2) thickening of the underlying iris, ciliary body, or both which is usually ill-defined but can be well-defined in some cases [21,22]; (3) a membrane consistent with epithelial ingrowth on the surface of the iris in the appropriate context [10,12]; and (4) discrete particles or aggregates of particles suspended in the anterior chamber's aqueous humor or layered on the surface of the iris or trabecular meshwork [18,21,22]. Clinicians must realize that not all UBM instruments provide the same level of tissue resolution. 20 MHz units produce wider angle images that show a broader area in a single slice and reveal deeper structures than do 50 MHz units, but they do so at the cost of lower image resolution [19]. In our opinion, 50 MHz UBM imaging of the affected eye is most appropriate if intraocular invasion is suspected clinically.

We are certainly not the first to present and describe UBM images of eyes with intraocular invasion by conjunctival squamous cell carcinoma. Kaliki and coauthors presented an outstanding UBM image of such a case showing ill-defined, heterogeneously sonoreflective massive ciliary body invasion [23] (Figure 1c). Ong and coauthors presented an excellent UBM image showing invasive tumor cells matted in the angle and on the anterior surface of the iris and endothelial surface of the peripheral cornea [20] (Figure 2c). Char and coauthors presented a UBM image that shows massive replacement of the peripheral corneosclera by hyporeflective tumor tissue, a hyporeflective tract extending completely through the eye wall to the underlying uvea and thickening of the invaded iris and ciliary body [19] (Figure 1). Pike and coauthors presented an outstanding UBM image showing an irregular mass of moderately sonoreflective tumor cells in the anterior chamber [22] (Figure 2a).

One might think, based on the UBM images of the cases we presented and those published in several of the articles we cited, that UBM imaging of eyes affected by conjunctival squamous cell carcinoma has been shown reliably to detect scleral invasion and intraocular invasion when they are present and rule out these types of ocular invasion when they are absent. Unfortunately, the sensitivity and specificity of UBM imaging for detecting and excluding scleral invasion and intraocular invasion by conjunctival squamous cell carcinoma have never been evaluated in a prospective study [23]. To do this, investigators would need to enroll a substantial number of patients with conjunctival squamous cell carcinoma prospectively, perform satisfactory UBM imaging on every case, analyze the obtained images systematically, decide whether the obtained images do or do not show scleral invasion, intraocular invasion, or both, and then determine in some objective fashion (which would probably require biopsy or enucleation of every case) whether the determination of absence or presence of these invasive features was true or false. Obviously, such a study is unlikely ever to be performed.

When intraocular invasion by conjunctival squamous cell carcinoma is detected, the managing ophthalmologist must decide how to treat the affected patient. Although an occasional case in which a well-defined focal invasion of the peripheral iris and anterior ciliary body was detected and managed successfully by transscleral eye wall resection [17] and although some cases with limited intraocular invasion have been treated successfully by focal radiation therapy [24], most eyes with intraocular invasion by conjunctival squamous cell carcinoma still come to enucleation ultimately if not primarily [1]. In our case 2, the patient refused enucleation initially but developed a blind painful eye after scleral necrosis and eye wall perforation occurred. The scleral necrosis in this case was probably a radiation-induced effect on the patient's massively infiltrated corneoscleral tissue; however, focal necrotizing scleritis with ocular perforation has been reported in some eyes with conjunctival squamous cell carcinoma that were not treated by any form of radiation therapy [25].

Some type of biopsy can be performed prior to treatment if the diagnosis of intraocular invasion by conjunctival squamous cell carcinoma is equivocal or the patient desires confirmation of the diagnosis prior to submitting to recommended treatment, which may be enucleation. In the case of suspended or aggregated tumor cells in the anterior chamber aqueous humor, a translimbal fine needle aspiration of a small amount of aqueous fluid usually yields a sufficient number of cells for cytopathologic confirmation of the diagnosis [10,26]. In cases with a membranous epithelial ingrowth of tumor cells, a translimbal vitrector biopsy or an open incisional biopsy using microscissors may be required to obtain a sufficient specimen for histopathological analysis and diagnosis [12,27]. In case of solid invasion of the iris, ciliary body, or both, fine needle aspiration biopsy or even a transscleral incisional biopsy of the involved uveal tissue may need to be performed to confirm the clinical diagnosis.

Conclusion

Intraocular invasion by conjunctival squamous cell carcinoma can usually be detected and diagnosed if one pays attention to the clinical setting and identifies some of the characteristic clinical features of the case determinable by ophthalmic physical examination. Ultrasound biomicroscopy appears to provide important supporting evidence for this diagnosis and should probably be employed routinely when intraocular invasion is suspected.

Key Messages

- What is known: Ultrasound biomicroscopy is a valuable tool for diagnosing intraocular invasion by conjunctival squamous cell carcinoma.
- What is new: Based on analysis of the described cases in this study and the academic literature, ultrasound biomicroscopy features suggestive of intraocular invasion by conjunctival squamous cell carcinoma include a tract of sonoreflective cells extending through the sclera or corneosclera underlying the current or prior location of an epibulbar tumor, and thickening of the underlying iris, ciliary body, or both. Other features include a membrane consistent with epithelial ingrowth on the surface of the iris and discrete particles or aggregates of particles suspended in the anterior chamber's aqueous humor or layered on the surface of the iris or trabecular meshwork.

Ethics Approval

The Institutional Review Board of the University of Cincinnati College of Medicine (Federalwide Assurance #00003152) approved protocol #2024-0054 (Retrospective Studies of Patient Information in Ocular Oncology Research Records, James J. Augsburger, MD, Principal Investigator) on March 27, 2024. This protocol includes the analysis and reporting of deidentified clinical data contained in the charts of patients evaluated in the Augsburger & Correa Ocular Oncology Practice. The study was performed in accordance with federal and state laws and in adherence to the Declaration of Helsinki tenants.

Consent to Publish

The Institutional Review Board of the University of Cincinnati College of Medicine (Federalwide Assurance #00003152) waived the requirement for informed consent to participate in studies performed under protocol #2024-0054 (Retrospective Studies of Patient Information in Ocular Oncology Research Records, James J. Augsburger, MD, Principal Investigator). Patients signed informed consent to publish health information including clinical data and photographs at their initial clinic visit.

Conflict of Interest

The authors of this study have no conflicts of interest.

Funding Support

The authors of this study received no funding or support for this project.

Bibliography

1. Höllhumer R., *et al*. "Ocular surface squamous neoplasia: management and outcomes". *Eye (London)* 35.6 (2021): 1562-1573.
2. Patel U., *et al*. "Update on the management of ocular surface squamous neoplasia". *Current Ophthalmology Reports* 9.1 (2021): 7-15.
3. Tunc M., *et al*. "Intraepithelial and invasive squamous cell carcinoma of the conjunctiva: analysis of 60 cases". *British Journal of Ophthalmology* 83.1 (1999): 98-103.
4. Sun EC., *et al*. "Epidemiology of squamous cell conjunctival cancer". *Cancer Epidemiology, Biomarkers and Prevention* 6.2 (1997): 73-77.
5. McClellan AJ., *et al*. "Epidemiology of ocular surface squamous neoplasia in a Veterans Affairs population". *Cornea* 32.10 (2013): 1354-1358.
6. Cervantes G., *et al*. "Squamous cell carcinoma of the conjunctiva: clinicopathological features in 287 cases". *Canadian Journal of Ophthalmology* 37.1 (2002): 14-19.
7. Grossniklaus HE., *et al*. "Conjunctival lesions in adults. A clinical and histopathologic review". *Cornea* 6.2 (1987): 78-116.
8. Kaliki S., *et al*. "Nodulo-ulcerative ocular surface squamous cell neoplasia in 6 patients: a rare presentation". *Cornea* 36.3 (2017): 322-326.
9. Rootman DB., *et al*. "Intraocular extension of conjunctival invasive squamous cell carcinoma after pterygium surgery and cataract extraction". *Eye Contact Lens* 38.2 (2012): 133-136.
10. Murillo JC., *et al*. "Intracorneal and intraocular invasion of ocular surface squamous neoplasia after intraocular surgery: report of two cases and review of the literature". *Ocular Oncology and Pathology* 3.1 (2017): 66-72.
11. Cano-Suarez MT., *et al*. "Infiltrative intraocular conjunctival squamous cell carcinoma after local resection and brachytherapy: clinical and pathological findings". *Ocular Oncology and Pathology* 3.3 (2017): 216-219.
12. Laura DM., *et al*. "Invasion of ocular surface squamous neoplasia through a corneal wound". *Ophthalmology and Therapy* 9.4 (2020): 1083-1088.
13. Searl SS., *et al*. "Invasive squamous cell carcinoma with intraocular mucoepidermoid features. Conjunctival carcinoma with intraocular and diphasic morphology". *Archives of Ophthalmology* 100.1 (1982): 109-111.

14. Chen CY., *et al*. "The clinical presentation and treatment of an invasive conjunctival squamous spindle cell carcinoma". *Taiwan Journal of Ophthalmology* 12.3 (2021): 370-373.

15. Zhang Z., *et al*. "Intraocular extension of conjunctival squamous cell carcinoma". *Ophthalmologica* 221.3 (2007): 200-203.

16. Rajabi MT., *et al*. "Conjunctival squamous cell carcinoma with intraocular invasion after radiotherapy in epidermodysplasia verruciformis". *Canadian Journal of Ophthalmology* 49.2 (2014): e43-e46.

17. Char DH., *et al*. "Resection of intraocular squamous cell carcinoma". *British Journal of Ophthalmology* 76.2 (1992): 123-125.

18. Finger PT., *et al*. "High-frequency ultrasonographic evaluation of conjunctival intraepithelial neoplasia and squamous cell carcinoma". *Archives of Ophthalmology* 121.2 (2003): 168-172.

19. Char DH., *et al*. "20 MHz high frequency ultrasound assessment of scleral and intraocular conjunctival squamous cell carcinoma". *British Journal of Ophthalmology* 86.6 (2002): 632-635.

20. Ong SS., *et al*. "Anterior segment imaging in ocular surface squamous neoplasia". *Journal of Ophthalmology* (2016): 5435092.

21. Feizi S and Esfandiari H. "Recurrent conjunctival squamous cell carcinoma and intraocular tumor extension after topical erythropoietin: a case report". *Case Reports in Ophthalmology* 13.1 (2022): 89-95.

22. Pike S., *et al*. "Intraocular spread of ocular surface squamous neoplasia presenting as a postoperative anterior chamber opacity after excisional biopsy". *Case Reports in Ophthalmology* 14.1 (2023): 194-202.

23. Kaliki S., *et al*. "Ocular surface squamous neoplasia with intraocular tumour extension: a study of 23 patients". *Eye (London)* 34.2 (2020): 319-326.

24. Rospond-Kubiak I., *et al*. "Ruthenium brachytherapy for intraocular growth of a conjunctival squamous cell carcinoma: a case report". *Journal of Contemporary Brachytherapy* 10.2 (2018): 174-177.

25. Lindenmuth KA., *et al*. "Invasive squamous cell carcinoma of the conjunctiva presenting as necrotizing scleritis with scleral perforation and uveal prolapse". *Survey of Ophthalmology* 33.1 (1988): 50-54.

26. Nicholson DH and Herschler J. "Intraocular extension of squamous cell carcinoma of the conjunctiva". *Archives of Ophthalmology* 95.5 (1977): 843-846.

27. Berenbom A., *et al*. "FIT biopsy for conjunctival squamous cell carcinoma with extensive intraocular invasion". *Graefe's Archive for Clinical and Experimental Ophthalmology* 246.3 (2008): 467-469.

Volume 16 Issue 1 January 2025