Malignant Facial Neoplasms Detected During the Comprehensive Optometry Exam

Leslie R. Wilderson, OD, FAAO; Sujata Khosla, MD

Abstract
Skin carcinomas are the result of the malignant proliferation of epithelial keratinocytes. The two most common nonmelanoma skin cancers are basal cell carcinoma and squamous cell carcinoma and the latter has the potential to metastasize and cause morbidity and mortality. During the comprehensive eye exam, clinicians have an opportunity to conduct a visual inspection of the face to detect skin cancers that may be undiagnosed. The optometrist is trained to detect and describe malignant lesions of the eyelids and periorbital region, and so, extending the exam to include the detection of facial neoplasms can be a life-saving measure. This article provides a review of the clinical appearances of basal and squamous cell carcinomas of the face and ears and discusses lesion characteristics that warrant dermatologic intervention.

Introduction
In an inter-disciplinary healthcare team approach, the eye exam presents a distinct opportunity for a general assessment of a patient's overall health. In addition to the identification of systemic diseases that present with ocular manifestations, when the exam focus is extended to include a deliberate visual inspection of the face, the early diagnosis of skin cancers can also increase. Since the eye clinician is well-versed in describing the benign and malignant skin lesions that occur on the eyelids and periorbital region of the ageing population, these professionals can also aid in the detection of suspicious facial lesions that commonly occur on sun exposed areas and direct the prompt referral to dermatology.

Basal cell carcinoma (BCC) is the most common form of nonmelanoma skin cancer (NMSC) and squamous cell carcinoma (SCC) is the second, accounting for 80% and 20% of all keratinocyte malignancies respectively. Basal cell carcinomas cause local tissue destruction while squamous cell carcinomas can also metastasize and pose grave threats to a patient's morbidity and mortality. In the U.S. population, it is estimated that one in five Americans will develop skin cancer during their lifetime and over 95% will be NMSC. Therefore, early detection and treatment of these lesions is vital and all healthcare professionals who encounter a patient with suspicious neoplasms have a duty to detect and refer.

Basal Cell Carcinoma
Basal cell carcinoma is the most common skin cancer, responsible for 80% of skin malignancies and studies have shown the incidence rate increases with age. Although most basal cell carcinomas rarely metastasize, they can be locally invasive, aggressive, and destructive to skin and the surrounding structures causing morbidity. Basal cell carcinoma is a malignancy that arises from basal keratinocytes and the interfollicular epidermis of the hair follicle. Intermittent and intense sun exposure appears to increase the risk in sun sensitive subjects that tend to burn rather than tan. Ultraviolet radiation (UVR) is the most important risk factor especially when the exposure occurred during childhood. In America, the rates of nonmelanoma skin cancer were found to correlate inversely with skin pigmentation and most cases occur on the face, consistent with the causative role of ultraviolet radiation. Basal cell carcinoma on the face produces color, shape, size, and textural changes to the epidermis. The most common epidermal transformations of facial skin from basal cell carcinoma development are papules and nodules with pearly or shiny surfaces and arborizing telangiectasias. Basal cell carcinoma can also appear as red scaly plaques and white shiny scar-like plaques with ill-defined borders. The lesion edges may have rolled borders with central ulceration.

Squamous Cell Carcinoma
Squamous cell carcinoma is responsible for 20% of skin malignancies. Although most SCCs are curable, 14% of them metastasize and of these, 40% of patients will eventually die. Additionally, squamous cell carcinoma is responsible for the majority of deaths caused by NMSC. SCC is a keratinocyte derived malignancy that typically occurs during the fifth through sixth decade of life as a result of excessive, cumulative sun exposure. Squamous cell carcinoma occurs most often in persons with skin phototypes that have little to no natural melanin photoprotection. Skin phototype is based on the amount of constitutive skin pigmentation and responds to ultraviolet irradiation.
radiation. The skin’s protection from malignancy is relative to the melanin absorption rate in the UV range. When squamous cell carcinoma develops on the skin of the face, it presents with a range of epidermal appearances and causes changes in color, shape, size, and texture. The most common keratinocyte transformations in SCC include the rough scaly patch, sharply demarcated erythematous velvety plaques, the wart-like bump, the open sore, and the crusted, thick nodule. The lesions can be symptomatic for pruritis and they have been described as painful, non-healing wounds that bleed when traumatized.

Clinical Presentations

Case 1. An 86 year old male presented for a comprehensive eye exam. The patient's ocular history was positive for cancer with a documented choroidal melanoma that was successfully treated with radiation, ten years prior. He suffered no loss of vision from that event. The patient had a low melanin skin phototype and during the visual facial inspection a red lesion on the right side of his forehead was detected (Figure 1A). Upon questioning, the patient reported noticing the lesion for two weeks. He reported that the lesion bled when digitally manipulated. He also reported that he had a prior history of dermatological care for what he described as a wart removal, but there was no known history of skin cancer.

The lesion location was the right frontal region. The lesion measured 10 mm x 9 mm. The lesion was described as a round, raised, erythematous, nodular macule with superficial vasculature (Figure 1B, Figure 1C). A same day tele-dermatology consult was ordered for photo documentation and prompt assessment by dermatology. A shave biopsy was performed to rule out malignancy. Upon initial inspection, the lesion differential diagnosis of squamous cell carcinoma was highly suspected, yet the pathology report confirmed a histological basal cell carcinoma with nodular growth pattern.

Case 2. A 76 year-old male presented for a comprehensive eye exam. The patient had a low melanin skin phototype and during the visual inspection of the face, multiple age-related erythematous epidermal lesions were detected in addition to a prominent elevated lesion on his right ear (Figure 2A). Upon questioning, the patient was not aware of the ear lesion and denied symptoms. There was no prior history of skin cancer.

The lesion location was the right ear helix. The lesion measured 10 mm. The lesion was elevated with rolled borders and central excavation (Figure 2B, Figure 2C). A tele-dermatology consult was ordered for lesion photo documentation and initial assessment by dermatology. The pathology report diagnosed nodular basal cell carcinoma and surgical excision by Mohs technique was performed. The other facial epidermal lesions were kept under observation by dermatology.

Case 3. An 86 year-old male presented for a comprehensive eye exam. During the visual inspection of the face, numerous age-related epidermal changes with varied characteristics were detected involving his entire face and neck (Figure 3A). The patient had a low melanin skin phototype and a history of biopsy proven basal cell carcinoma, squamous cell carcinoma, and actinic keratosis. The patient disclosed that a number of the facial lesions were new onset over the past six to twelve months. He also reported that the lesion on the left zygomatic region had begun to bleed. His last visit with dermatology was more than one year ago.

The most prominent lesion was located on the left medial brow (Figure 3B) and appeared elevated with focal erosion and plaque (Figure 3C). A scaly lesion measuring 6mm x 6mm was located on the left zygomatic region (Figure 3D).
A benign lesion at that location seven months prior. The wound site had shown lesion regrowth and the skin was dry, scaly, and irritated.

The lesion location was the zygomatic region below the left eye. The lesion measured 4 mm. The lesion appeared dry and scaly with scab formation and mild excavation (Figure 5B). The presence of a strand of fiber was observed exiting from the lesion. The patient was referred to tele-dermatology for photos and evaluation of the recurrent keratosis. During the dermatology examination multiple facial actinic keratosis lesions were also detected (Figure 5C). The lesion below the left eye was diagnosed as a benign keratin inflammatory process. Dermatology recommended topical Vaseline® application and observation. The precancerous AK lesions were treated with liquid nitrogen cryotherapy.

**Discussion**

A deliberate visual inspection of the face including the ears, performed during the eye exam can detect the presence of ominous cutaneous lesions. The dermatology referral documentation should include a description of lesion color and shape as well as size measurements. In addition, annotating the presence or absence of features that are specific to known epidermal carcinomas will aid in the initial differentiation of tumor type and determine the dermatology visit urgency. Simultaneously palpating lesions during the visual inspection may disclose tenderness and signal a greater likelihood that the lesion is a carcinoma. The most common clinical differentiation of nonmelanoma epidermal lesions is made between squamous cell and basal cell carcinoma.

**Basal Cell Carcinoma Differentiation**

The clinical presentations of basal cell carcinoma can include the nodular, superficial and morpheaform subtypes. Nodular BCC is the most common subtype and appears on the skin of the face most often. It can present as a small dome shaped pink papule with a pearly or translucent appearance. The lesion edges can have rolled borders when stromal retraction of the thinning epidermis occurs. The normal course of tissue proliferation is arrested when the lesion becomes nodular.
destruction also causes ulceration and exposed telangiectasias are prone to bleeding from mild trauma.²

The superficial basal cell carcinoma is the second most common clinical subtype.¹⁴ It is rarely found on the head but when seen on the face, it manifests as a well-circumscribed, scaly pink to red macule, patch, thin papule, or a thin plaque.⁵,⁷ Superficial basal cell carcinoma may demonstrate crust or thin rolled borders made of fine translucent papules.⁷ Superficial basal cell carcinoma has a tendency to spontaneously regress, leaving atrophic areas.⁷ Melanin pigment may be present.⁷

Finally, morpheaform is a sclerosing or infiltrating form of basal cell carcinoma that accounts for a low proportion of cases.⁸ It appears as a white shiny scar-like plaque with ill-defined borders and tissue atrophy.⁷ When it is mistaken for a scar, the diagnosis is often delayed until unmistakable tissue destruction is apparent.⁷ It is usually more aggressive than the nodular and superficial BCC variations and tends to exhibit subclinical spread with potentially extensive local destruction.⁷ Morpheaform BCC may appear as a scar or like scleroderma.⁷

Squamous Cell Carcinoma Differentiation

Squamous cell carcinoma has a few common variants. Bowen disease, described by John Bowen in 1912 is a chronic atypical epithelial proliferation common to the head and neck. It is an intraepidermal or in situ SCC with slow growing erythematous scaly patches that are variable sizes.²,⁵ It is differentiated from eczema, psoriasis, and actinic keratosis.²

A squamous cell carcinoma of the lip begins as a scaling, rough papule or ulceration in association with dry, atrophic, or leukoplakic lip mucosa.² It is reported to have a metastatic rate higher than SCCs arising from other sun-damaged areas.²

Adenoid SCCs are skin tumors composed of squamous cells that form both solid and gland-like proliferations in the dermis.²¹ They present as cutaneous ulcers or crusted nodules. The anastomosing cordlike arrays of tumor cells forming pseudolumina can suggest a malignant vascular proliferation such as angiosarcoma.² Actinic keratoses with acantholysis changes may precede adenoid SCC and usually develop in close proximity to hair follicles.²

Marjolin’s ulcer of scar tissue develops when cellular mutations arise from vascular compromise and nutritional deficits in the damaged tissues.²² When occurring within scar tissue on the face, this malignancy is associated with burn scars and skin grafts.

In addition to solar radiation, there are other comorbidities that pose a significant risk for the development of squamous cell carcinoma. The history of SCC can be traced to extrinsic factors such as exposure to radiation other than ultraviolet light, and chemical exposure (arsenic, hydrocarbons, tobacco smoking).²² A history of renal transplant and the accompanying immunosuppressive therapy can depress the function of lymphocytes and Langerhans cells, and result in deficiencies in surveillance and the elimination of tumor antigen cells.² In addition, cyclosporine A and azathiaprine are considered mutagens and may contribute to the development of squamous cell carcinomas.²

Furthermore, squamous cell carcinomas that develop within scars, chronic ulcers, or as a result of inflammatory processes
have a greater propensity for metastasis. SCC metastasis can occur laterally, and along vessels or nerves. The peripheral branches of the trigeminal and the facial nerves are most susceptible to invasion. They can spread locally and can infiltrate deeply to the fascial, muscle, and periosteum.

Non-malignant Differentials
Two benign lesions that are often confused with malignancies are actinic keratosis and keratoacanthoma. Actinic keratosis is the most frequently encountered skin lesion in clinical practice. It presents on sun-damaged skin, commonly on the head and neck in lighter skin phototypes. The lesions are rough, erythematous papules with white to yellow scale, and large confluent patches are common. Advanced lesions are typically thicker and well-defined with more visible keratosis and erythema (Figure 6A, Figure 6B). Actinic Keratosis has an increased risk of developing invasive SCC.

Keratoacanthomas are clinically benign keratinocytic lesions located on sun-exposed skin of older individuals. They present as solitary, sharply demarcated, skin colored, hypopigmented or hyperpigmented papules or plaques located on the face, neck or eyelid. They also appear as smooth, firm, dome shaped nodules that can show central keratin filled craters (Figure 7A, Figure 7B). The lesions arise precipitously, followed by a rapid growth phase over weeks to months. The involutional stage can leave a depressed scar. Their differential diagnoses includes actinic keratosis, Bowen disease, and melanoma.

Treatments
After the biopsy or non-invasive gene expression testing of a suspicious lesion confirms either a basal cell carcinoma or a squamous cell carcinoma, there are several removal procedures. Surgical excision, Mohs micrographic surgery, curettage with electrodesiccation, radiation, cryosurgery, photodynamic therapy, laser, and non-surgical treatments including topical 5-fluorouracil are considered based on their therapeutic advantages. The procedures can be done alone or in combination. The goal is to enhance the cure rate while maximizing the cosmetic results. There is a risk of post-therapeutic tumor recurrence and subsequent skin cancers therefore, patients are usually followed regularly for the rest of their lives.

Conclusion
The optometric exam provides another opportunity for the detection and referral of malignant facial neoplasms that the patient may not have realized the significance of or may not have noticed at all. Older populations have a greater prevalence of facial lesions so differentiating the clinical features of basal cell carcinoma and squamous cell carcinoma on the face and ears among the host of other neoplasms that may be present is particularly important. With timely intervention by dermatology and with the utilization of non-invasive gene expression assay tests for earlier diagnosis, the need for deforming surgeries can be minimized. Patients that are introduced to the dermatological health care system for the evaluation of facial lesions are then monitored for skin cancers on other areas of the body and have resounding prognostic benefits. Hence, knowledge in this area is another essential element in the optometric exam arsenal to provide the highest level of care.

Tele-dermatology photo credit: Denise Loya, LPN and Ellen Bibeault, LPN, Lake County Community Based Outpatient Clinic.
North East Ohio VA. Thank you to Ismarelda Simmons, Medical Librarian and Colleen Smith, MLS, Medical Librarian, Cleveland VA Medical Center for their outstanding library services. Sujata Khosla, MD is a Patient-Aligned Care Team (PACT) physician and a first line source of referral for dermatology cases at the Lake County Community Based Outpatient Clinic, North East Ohio VA. Dr. Wilderson has consulted with Dr. Khosla on skin cancer cases detected during her optometric exams for the past six years.

References