

ACOs and do not benefit from swallowing therapy, antiinflammatory therapy, myorelaxing and antireflux treatment. Surgery will improve the functional swallowing pathologies and will decrease the FOSS and PAS stages. Surgically, due to high postoperative pain and other morbidities, the transoral method is not advised, although it creates easier access to the spine for the physician. The side on which the surgery will be done can be decided based on the dominance of the osteophyte's side. In addition, patients and anesthesia teams have to be informed that preoperative intubation difficulties may be experienced.

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OPEN

Periocular Basal Cell Carcinoma Predictors for Recurrence and Infiltration of the Orbit

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Purpose: To present the proportion of patients with periocular basal cell carcinoma (BCC) who underwent orbital exenteration and to evaluate the significance of the risk factors.

Design: Retrospective, comparative, interventional case series.

Methods: Data of all patients with BCC between 2008 and 2014 were reviewed for patient demographics, previous treatment options, tumor localization, and histopathologic subtype.

Results: In group of 256 patients, orbital exenteration underwent 7 patients (2.7%). For 2 patients (5.1%), orbital exenteration was the first procedure performed. In the exenterated group, the most common tumor site was the medial cantus and lower eyelid, whereas in the overall group, it was the lower eyelid ($P = 0.011$). The proportion of patients initially treated with histopathologic result of infiltration of 1 margin was significantly higher in patients undergoing exenteration ($P = 0.282$). During the 7-year period observership, the authors have

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Received May 29, 2016.

Accepted for publication September 2, 2016.

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The authors report no conflicts of interest.

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ISSN: 1049-2275

DOI: 10.1097/SCS.0000000000003242

seen 13 recurrences (5.08%). In patients with recurrent BCC after surgery, the authors applied adjuvant high dose rate ^{192}Ir brachytherapy. Neoadjuvant therapy with Vismodegib was effective in patient with biorbital infiltration after 1 side exenteration.

Conclusions: Orbital invasion may be clinically silent. Recurrence rate of BCC in our group 5% corresponds to date in the literature. The exenteration for BCC may be significantly higher when the lesion involves a medial canthal location and lower eyelid and initial surgery does not include margin-controlled excision.

Key Words: Exenteration of the orbit, eyelid basal cell carcinoma, HDR ^{192}Ir brachytherapy, Vismodegib

Exenteration surgery indication in orbital and periorbital tumors is rare, about 40% to 50% of exenterations that present to ophthalmologists are required for tumors originating in the eyelid or periocular skin. Tumors arising in the paranasal sinuses and nose may also require exenteration to achieve local control, but these tumors usually do not present to an ophthalmologist.¹⁻³

The incidence of all skin malignancy is increasing worldwide. The relative incidence of periocular skin malignancies varies with geographical area and racial group. Basal cell carcinoma (BCC) is universally the most common malignant skin tumor accounting for approximately 90% in most series; squamous cell and sebaceous gland carcinoma occur in approximately 4% to 6% each. Basal cell and squamous cell carcinoma occur most commonly in the lower lid and medial canthus, sebaceous gland carcinoma is most common in the upper lid, other eyelid malignancies are relatively rare. Any periocular skin malignancy, if neglected, can invade the orbit and raise the probability of exenteration. The incidence of orbital invasion is about 2% to 4% and the risk factors include multiple recurrences, large size, aggressive histological subtype, perineural spread, canthal location particularly the medial canthus and age over 70. Perineural invasion occurs in <1% of BCCs.⁴⁻⁶

In the beginning of BCC, there may be no sign of orbital invasion, but as the disease progresses fixation to bone, limitation of eye globe motility, and globe displacement may occur.⁷

A multidisciplinary team must collaborate in planning management of orbital invasion. Radical surgery and adjuvant radiotherapy or chemotherapy may be needed.

The aim of exenteration is to achieve local control of the disease. Total exenteration removes all orbital tissue, including the periorbital, posterior to the orbital rim. The eyelids may be preserved in tumors placed posteriorly within the orbit and even some arising in periocular skin. Most anteriorly placed tumors, however, require removal of all anterior orbital tissue and periorbital together with the eyelids, but the posterior orbital tissues may be preserved.

The exposed bone of the exenterated orbit may be treated in a variety of ways. The orbit heals by granulation in 3 to 4 months. Frequent dressings with antibacterial packs are needed. Healing by granulation results in a shallower socket than with split skin grafting. Split skin, with or without meshing, generally heals well.⁸⁻¹²

Crusting and general cleanliness of the socket can be a problem. Careful attention to daily hygiene is necessary. After exenteration most patients prefer to wear a patch, rather than a prosthesis, especially with the larger reconstructions. If a standard postexenteration facial-type prosthesis is preferred to a patch, good cosmetic effect can be achieved. Patient satisfaction with implant-retained prostheses is generally high.^{13,14}

Amniotic membrane transplantation (AMT) is used in acute ophthalmological care, to treat chronic diseases of the surface of the eye, and as the newest development, using tissue engineering, as a

biomatrix to treat severe stem cell deficiency of the ocular surface. It provides practicing ophthalmologists with a particularly multifaceted instrument to tackle the challenges posed by disorders of the surface of the eye successfully.

Although the first ophthalmological use of amniotic membrane documented in the international literature took place almost 70 years ago, AMT has only been performed in large numbers of patients since 1995, with promising results.

Various disorders of the ocular surface, including persistent epithelial defects of the cornea, acute chemical burns with long-term loss of integrity of the ocular surface epithelium or conjunctival scarring as a result of the healing of mucous membrane disorders still pose a clinical challenge in ophthalmic surgery.¹⁵⁻²⁰

MATERIALS AND METHODS

Retrospective, comparative, interventional case series to present the proportion of patients with periocular BCC who underwent orbital exenteration and to evaluate the significance of the following risk factors: initial tumor site, pathologic features, and initial treatment. Charts of all patients with BCC referred to Department of Ophthalmology, Faculty of Medicine, Comenius University in Bratislava between 2008 and 2014 were reviewed for patient demographics, previous treatment options, tumor localization, and histopathologic subtype. The main outcomes were recurrence rate, tumor-related deaths, orbital infiltration, rate of exenteration, and treatment options in patients after exenteration.

The study has been submitted to a legally constituted ethics committee and deemed exempt from review and giving the name and study reference of the committee.

Authors do have the patient's consent to print identifiable photographs for the purposes of the archive.

RESULTS

Data (including follow-up) were available for 256 patients. The average age was 58 years (52–82 years). Orbital exenteration underwent 7 patients (2.7%), average age 75 years. For 2 patients (5.1%), orbital exenteration was the first procedure performed. In the exenterated group, the most common tumor site was the medial canthus and lower eyelid, whereas in the overall group, it was the lower eyelid ($P = 0.011$). The proportion of patients initially treated with histopathologic result of infiltration of 1 margin of the excised tumor was significantly higher in patients undergoing exenteration ($P = 0.282$). During the 7-year period observership, we have seen 13 recurrences (5.08%).

In patients with recurrent BCC of the lower eyelid after surgery, we applied adjuvant HDR ^{192}Ir brachytherapy. The isodose curve chosen to prescribe the dose was 5 mm away from the skin surface. For each patient was made individual or fit mask that bore plastic applicators. Tungsten eye shield applicator was applied to protect the eye globe. Treatment of 10 fractions of 4.5 Gy single dose (5 times weekly) were scheduled within 2 weeks. Patients received outpatient treatment.

Acute toxicity postradiation erythema of eyelid and skin around relieved by standard symptomatic treatment within a few days after completion of radiation therapy.

In 2-year interval after HDR ^{192}Ir brachytherapy, we did not record the occurrence of late complications such as corneal ulcers. Our preliminary experience shows excellent early skin tolerance. After 2 to 7 years of follow-up we did not recognize relapse in our group of patients. The proposed technique of HDR ^{192}Ir brachytherapy after surgery should be considered an effective clinical treatment in patients with recurrent nonmelanotic eyelid cancer. Its main advantage lies in the usefulness in all types of basal cell and squamous cell carcinoma and sebaceous carcinoma of the eyelids,

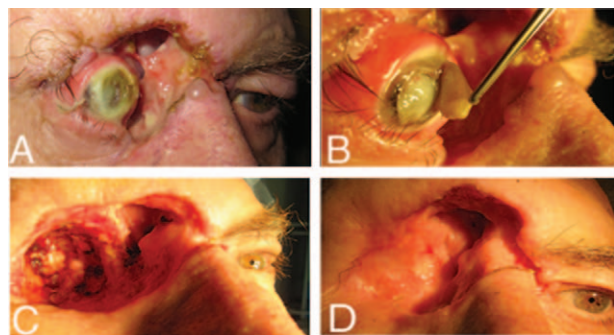


FIGURE 1. Patient 1—from left to right: biorbital infiltration of the orbit by basal cell carcinoma; detail of the eye globe infiltration and corneal perforation; 2 weeks after exenteration of the right orbit; and healing of the orbit 3 months after exenteration before external radiotherapy.

without restriction by site, dimension, clinical or histological type, or the patient's general status.

In 2 patients who were sent to our department after previous surgery in different units, indication of 1 side exenteration was necessary due to biorbital infiltration.

In first patient with BCC of the orbit who was admitted to our department, it was the first visit by the doctor—he was in stage T4 with infiltration of both orbits and 1 eye perforation due to infiltration by BCC (Fig. 1). Exenteration of the orbit has been carried out by removing the orbital contents together with as much of the periosteum as possible allowing the denuded orbital surface to granulate. When postoperative granulation was finished after 2 to 3 months, the external beam irradiation was applied due to infiltration of paranasal sinuses.

In second patient with biorbital infiltration after exenteration of 1 side, we continued palliative therapy of the other side to keep the eye globe (Fig. 2). The defect due to infiltration of the inner angle and nasal part of the orbit resulted lagophthalmos of the other side. Conjunctiva and cornea were covered by amniotic membrane. All surgery was performed by 1 surgeon. After retrobulbar or topical anesthesia, amniotic membranes were placed we performed a patch technique by applying an amniotic membrane over the whole cornea and nasal conjunctiva with the basement membrane side facing down, and sutured with 10-0 sutures. A bandage contact lens was applied on top of the membrane until the epithelial defect was completely healed. Covering defects in contralateral side defects enabled to protect the eye globe and prolonged the time before exenteration of the other side for more than 1 year. In 2015, we invented neoadjuvant therapy with Vismodegib in 1 patient and it

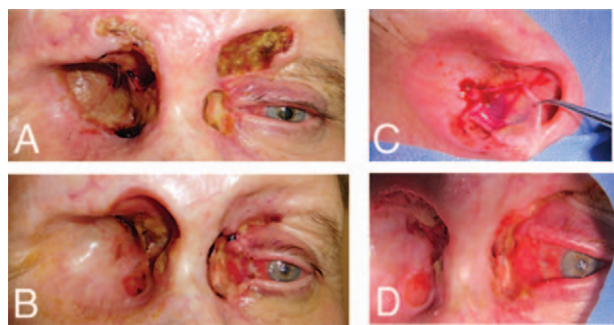


FIGURE 2. Patient 2—from left to right: biorbital infiltration by basal cell carcinoma 6 months after exenteration of the right orbit; epithelization of the right orbit 9 months after exenteration; amniotic membrane covering the defect of the nasal part of the right orbit; and 1 year after exenteration of the right orbit, infiltration of the left orbit.

was effective in patient with biorbital infiltration after 1 side exenteration to reduce size of infiltration of the other orbit.

In patients after exenteration, an individual prosthesis is used to cover the defect (see Fig. 3).

DISCUSSION

Shields et al reported 56 exenterations. Four of the 9 skin tumors allowed some eyelid sparing; in 22 of the 24 conjunctival tumors and all of the 11 orbital tumors, the eyelids were spared.¹²

Ben Simon et al reported 34 exenterations: 13 were subtotal, 14 were total, and 7 were extended. They reported complications in 23.5% of 34 exenterations.¹³ These include fistula formation into a sinus, the nose or the nasolacrimal duct, tissue necrosis with eschar formation, chronic drainage, infection, chronically exposed bone, cerebrospinal fluid leak, and pain. Large fistulae and exposed bone can be managed with a temporalis muscle flap or other local flap. The time taken for healing with granulation can occasionally far exceed the usual 3 to 4 months. Split skin usually takes well but occasionally some skin is lost owing to infection or hematoma or following irradiation.¹²

In planning the surgery, the extent of orbital invasion which may have been underestimated by the investigations the biological behavior of the tumor, and the presence of perineural spread must be taken into account. Aggressive cell types and in particular the possibility of perineural invasion should prompt generous margins of excision.

Perineural tumor spread has a worse prognosis. Williams et al reported 35 patients with clinical perineural spread; 51.4% had positive evidence of perineural spread on imaging. The 5-year survival in this group was 50%. In the group without computed tomography or magnetic resonance confirmation of perineural spread, the 5-year survival was 86%.²¹

It is not always possible to achieve complete clearance of a tumor despite radical surgery. Incomplete clearance was found in 38% of total and 17% of subtotal exenterations by Goldberg et al. Perineural invasion may indicate more extensive spread than anticipated, the risk of incomplete clearance is higher and the prognosis is worse. Exenteration is a radical operation for progressive BCC invading the orbital tissues; clearance is achieved in more than 60% of total exenterations and more than 80% of subtotal exenterations. The 5-year survival is about 55% to 65% for exenterations that present to ophthalmologists: tumors arising in the skin, globe, or orbital tissues. Good cosmetic rehabilitation can be achieved with a facial prosthesis.³

Orbital invasion by periocular BCC may be associated with significant ocular morbidity and, rarely, death. Orbital invasion may often be clinically silent, clinicians need to be alert to the possibility in high-risk tumors and consider appropriate imaging. Surgical treatment with exenteration is mutilating procedure. Recurrence rate of BCC in our group 5% corresponds to date in the literature.

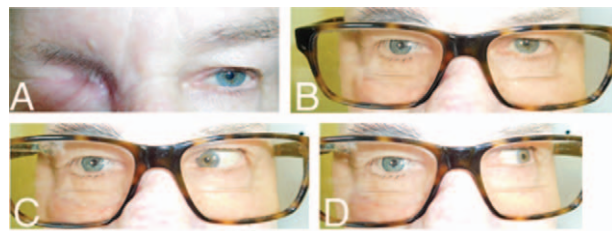


FIGURE 3. Patient 3—from left to right: 1 year after exenteration of the right orbit; prostheses of the right orbit after exenteration sleeve fixed to the frame of the spectacles; prostheses of the right orbit, patient looks to the right; and prostheses of the right orbit, patient looks to the left.

The exenteration for BCC may be significantly higher when the lesion involves a medial canthal location and lower eyelid and initial surgery does not include margin-controlled excision.

The amniotic membrane remains a useful tool in the treatment of several ophthalmic conditions, especially those related to the ocular surface and in patients after radiotherapy to protect the eye surface. In biorbital infiltration after exenteration of one side, it is possible to treat the surface of the other side eye with amniotic membrane to prolong the interval before exenteration of the other side.¹⁶

In patients with recurrent nonmelanotic eyelid cancer, HDR ¹⁹²Ir brachytherapy after surgery should be considered an effective clinical treatment, it can be used in all types of basal cell and squamous cell carcinoma and sebaceous carcinoma of the eyelids, without restriction by site, dimension, clinical or histological type, or the patient's general status.^{22,23}

Iuliano et al reported more than 500 patients and the need for exenteration for BCC may be significantly higher when the lesion involves a medial canthal location. Initial management does not include margin-controlled excision, or pathologic analysis reveals an infiltrative subtype. Margin-controlled excision for periocular BCC and close follow-up after excision for medial canthal BCC is necessary.²⁴ According to our experience, the most common tumor site was the medial canthus and lower eyelid infiltrative BCC as the indication of exenteration of the orbit. Due to our experience infiltration of the orbit might be without pain more than 1 year and it can happen, that patient is coming late in T4 stage, when only radical surgery is necessary. Cosmetic defects after exenteration of the orbit are covered by prostheses to enable the patients to be involved into everyday life.

Though there are various options available for reconstruction after orbital exenteration, a split skin graft and orbital prosthesis provide a simple solution for a very difficult problem of advanced periorbital skin cancer in the elderly population with significant comorbidities. The final outcome is comparable to that of more complex flap reconstruction with comparable satisfaction rates.²⁵

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External Auditory Canal Stenosis After Traumatic Auricular Amputation

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Background: The auricles are easily injured or amputated in case of head trauma. Inadequate treatment of the external auditory canal (EAC) after auricular injury is often seen and can lead to significant complications of the EAC.

Case Report: The authors report 4 cases of auricular injury or amputations. In all patients inadequate first treatment led to stenosis of the EAC. Three patients required recanalization of the EAC because of hearing loss and the risk of further complications.