

Histological patterns in orbital malignant tumors

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Abstract

There is a wide variety of tumors affecting the orbit. The most encountered histological type of malignant orbital tumor is the basal cell carcinoma followed by the malignant melanoma and the squamous cell carcinoma. The authors conducted a retrospective review of the malignant orbit tumors from the Department of Oral and Maxillofacial Surgery, University Emergency Hospital of Sibiu, Romania. The main surgical methods implied were tumor resection, exenteration and extended exenteration. The reconstruction was performed with the help of local flaps using different techniques: advancement, translation or rotation. The use of local flaps allowed for a good esthetic outcome and a decrease in the healing time.

Keywords: exenteration, extended exenteration, orbit reconstruction, local flaps, sebaceous cell carcinoma.

Introduction

When it comes to dealing with orbital malignancies, the exenteration is still one of the most used surgical curative methods [1]. Although it is a disfiguring procedure, if it is combined with an immediate reconstruction treatment it improves the quality of life of patients with advanced orbit malignant tumors [2].

The exenteration procedure has been classified in four groups in 1971 [3]:

- Type I: the palpebral skin and the conjunctiva are left intact;
- Type II: only the palpebral skin is left intact;
- Type III: both eyelids are removed with orbital contents;
- Type IV: the eyeball, eyelids and appendages of the eye are removed with the involved bone structures.

A simpler classification was proposed by Yeatts (2005), who divided the exenterations in two categories: (a) total exenteration, which involves the removal of the entire orbital content and (b) subtotal involving partial removal of orbital tissues [4].

The main histological types of tumors related to exenteration procedures are basal cell carcinoma (BCC), squamous cell carcinoma and malignant melanoma [5].

The analysis of the data regarding the clinical and histological aspects of orbital malignant tumors is an important step in cancer patients' care; hence, the present study is aiming to highlight the most important feature of this aggressive pathology. This paper presents the authors own experience regarding over 40 cases.

Case series

The study included a group of 40 patients admitted

to the Department of Oral and Maxillofacial Surgery, University Emergency Hospital of Sibiu, Romania, between 2002 and 2012. This group represented 7% of the total patients diagnosed with head and neck malignant tumors. They were classified as primary tumors with the onset being localized in the eye globe, the conjunctive tissue, the tear glands and the optic nerve ($n=14$) and secondary tumors ($n=26$) with the tumor processes arising from the neighboring regions such as: the eye lids, the maxillary sinuses, the zygoma and the ethmoid sinuses. The male gender was predominant (70%). The patient's age ranged from 8 to 87 years, with most of the between 50–70-year-old group. At clinical exam, there were many common signs in all cases: the presence of the tumor mass, exophthalmia, double sight, the decrease in eye motility, chemosis and eyelids edema.

The imagistic exams included skull X-ray, computer tomography and MRI, which was very useful in determining the tumor mass extension.

The surgical procedures performed were tumor resection, exenteration and extended exenteration when the tumor involved the periosteum or the orbit bony walls. Depending on the tumor's extension, the exenteration was combined with hemimaxillectomy and resection of the nasal and sinus walls.

From a histological point of view, the primary tumors were: melanoma ($n=4$), lymphoma ($n=3$), adenocarcinoma ($n=2$), cystic adenocarcinoma ($n=3$), rhabdomyosarcoma ($n=1$), hemangiopericytoma ($n=1$).

The secondary tumors were mainly squamous cell carcinoma ($n=13$), basal cell carcinoma ($n=8$), malignant meningioma ($n=2$), malignant inverted papilloma ($n=2$) and one case of sebaceous gland carcinoma.

The most used flap was the rotated and advanced temporal–parietal–frontal flap followed by the peduncu-

lated temporal and frontal flap with thigh skin graft, the pedunculated myofascial temporal flap with thigh skin graft, the glabella frontal flap with inferior peduncle, the pedunculated occipital–parietal–temporal frontal flap with thigh skin graft and the thoracic–cervical–facial flap.

For patients diagnosed with squamous cell carcinoma who needed a neck dissection, the procedure was performed at a month distance from the first surgery.

Results

We present three cases admitted and treated in our department.

Case No. 1

A 44-year-old female patient presented with a tumor mass in the inferior-internal angle of the right orbit, exophthalmia, eye motility dysfunctions, chemosis and edema. CT and MRI exams showed a tissue mass in the right orbital region, with infiltration in the periocular tissues, without cerebral or pulmonary metastases, with the invasion of right maxillary sinus tissue and the anterior ethmoid cells (Figure 1).

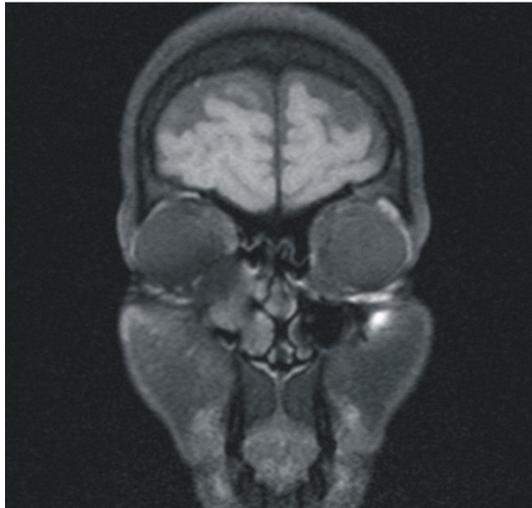


Figure 1 – MRI showing a tumor mass extending in the inferior-internal region of the right orbit and in the right maxillary sinus, with the invasion of internal subcutaneous right tissue in distal area and at the anterior ethmoid cell, without cerebral metastases.

A biopsy was performed and the piece was sent to histological exam. Histological diagnosis: infiltrate sebaceous carcinoma (tumor infiltration in shape of irregular lobes), with undifferentiated cells at peripherals, with nuclear atypias and mitotic activity and central sebaceous cells. Moderate peritumor lymphocytes infiltrate was noted.

Final diagnosis: poorly differentiated sebaceous carcinoma, infiltrating and expanding into the right orbit, right ethmoid and maxillary sinus.

The therapeutic plan was decided: surgical excision of tumor mass with preservation of the eyeball and post-operative radiotherapy. The surgical treatment consisted of excision of the tumor mass, excision of the right ethmoid sinus, excision of the orbital wall of the right maxillary sinus, canthopexy, reconstruction with titan mesh fixed with osteosynthesis screws. The removed tissues were sent to histological exam.

The result of histological exam showed: a tumor composed of epithelial islands with basal-like aspect, some of them with corned necrosis (Figure 2A). The tumor had a polypoid proliferation. The tumor islands presented clear cells with foamy cytoplasm and central hyperchromatic nucleus (Figure 2B). The tumor infiltrated the dense conjunctive tissue and the bones. There were venous and lymphatic tumor embolisms (Figure 2C). There was a perineural tumor infiltration (Figure 2D).

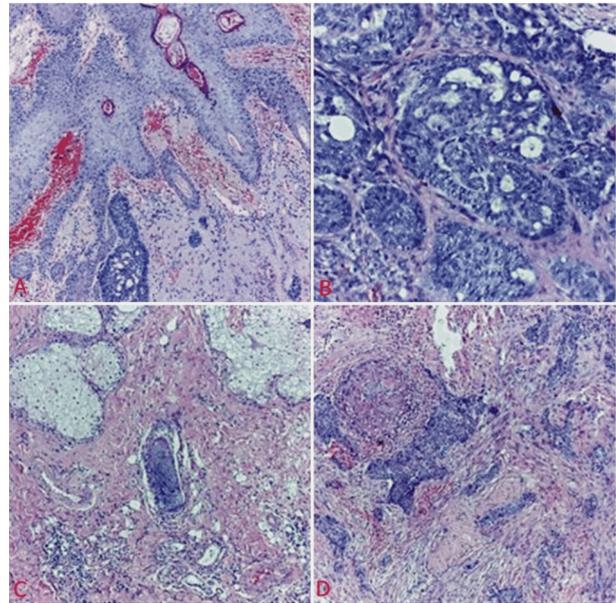


Figure 2 – (A) Basal epithelial cell islands; (B) “Clear cells” with foamy cytoplasm; (C) Venous tumor embolisms; (D) Perineural tumor infiltration. HE staining, $\times 400$.

Case No. 2

A 68-year-old patient presented to our department with a melanin-colored tumor that involved the left eye and extended in the conjunctiva and in the lower eyelid (Figure 3A). The MRI exam showed that the tumor process involved the eye, the inferior and the superior rectus muscle, and both eyelids without affecting the bone. An exenteration was performed removing both eyelids. The defect was covered with a pedunculated temporal parietal local flap. After six weeks free of surgical complications, an ocular prosthesis was fitted in (Figure 3B).



Figure 3 – (A) Melanin tumor mass involving the left orbit; (B) Ocular prosthesis fitted three months post-operative.

The histological examination revealed a nodal cell proliferation at the level of the conjunctive tissue close to the sclera, formed by atypical melanin cell disposed

in fascia with long nucleus. There were areas with round nucleus cells and abundant cytoplasm. The focal melanin pigment was found in low quantity (Figure 4, A and B).

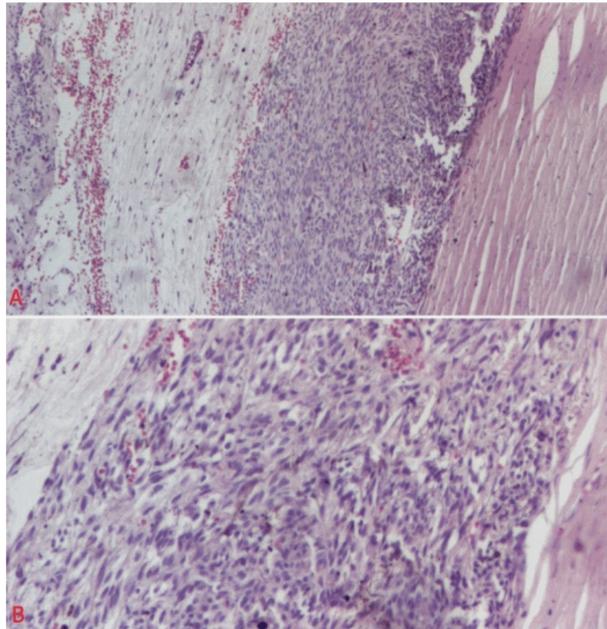


Figure 4 – (A) Conjunctive malignant melanoma, subtype with epithelial and fusiform cells; (B) Detail view. HE staining: (A) $\times 100$; (B) $\times 200$.

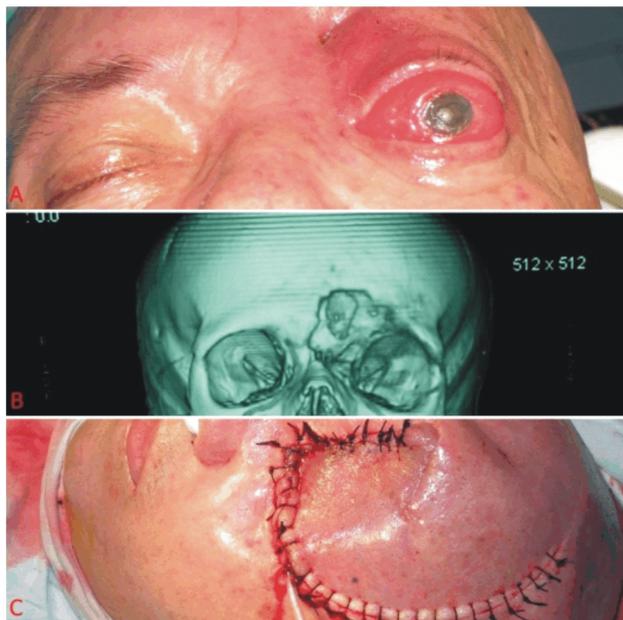


Figure 5 – (A) Clinical view with severe exophthalmia of the left eye; (B) CT-scan showing tumor infiltration in the orbit and postoperative defect after first surgery; (C) Postoperative view of the reconstructed defect.

Discussion

Various forms of tumor masses can occupy the orbit, either benign or malignant. Very important in the diagnosis steps are the CT and MRI scans, which can give an exact view of the tumor extension and structures involved. This study focused on the malignant orbit tumors especially secondary tumors. Often these tumors are very aggressive and tend to occupy many facial regions. Thus, most of the time, the choice of surgical treatment is quite limited

Case No. 3

A 70-year-old patient was admitted to the Department of Ophthalmology for exophthalmia of the left eye (Figure 5A). From the patient’s history, it was noticed that he had been operated for a tumor in the anterior cerebral fossa in the Department of Neurosurgery two years ago. The histological examination revealed squamous cell carcinoma. Approximately two months from the admission, the patient experienced left side headaches, exophthalmia, loss of left eye motility and left eye seeing dysfunctions. At admission time, the patient had severe exophthalmia and eye dysfunctions. The CT-scan showed a tumor mass was observed occupying the orbit and pushing forward the eye (Figure 5B). There was no cerebral invasion this time. The diagnosis was set for left orbital recurrence. A decision was made to perform a wide exenteration. The defect was covered with a rotated pediculate frontal temporal parietal flap (Figure 5C).

The histological examination set the diagnosis to moderate differentiated keratinized squamous cell carcinoma, revealing atypical squamous cell proliferation organized in trabeculae and nests with large nuclei, with loss of normal stratification and mitosis processes in all levels. There was a formation of intracell keratin and keratin pearls. A desmoplastic reaction was observed. A moderate inflammatory infiltrative process was noted (Figure 6, A–C).

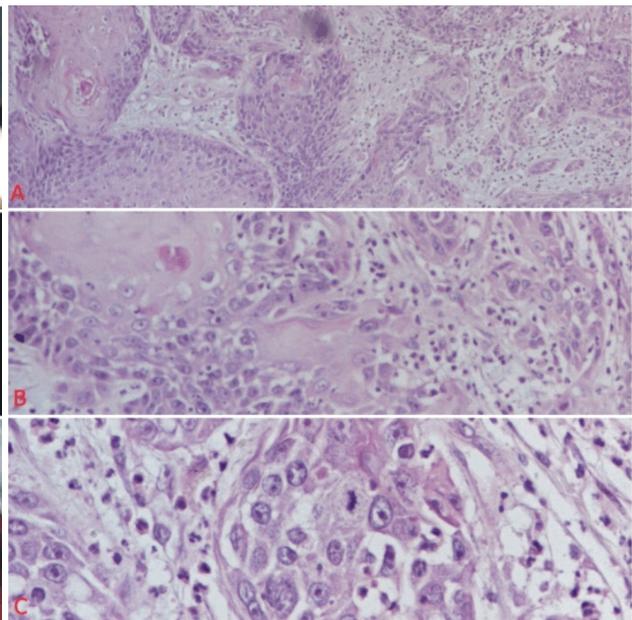


Figure 6 – (A) Keratinized squamous cell carcinoma; (B) Detail view of mitosis process; (C) Detail view of mitosis process. HE staining: (A) $\times 40$; (B) $\times 100$; (C) $\times 200$.

to exenteration or extended exenteration, simple enucleation or evisceration cannot fulfill the oncology principles.

The rhabdomyosarcoma was found at two pediatric patients being the most frequent soft tissue malignant tumor [6]. Primary rhabdomyosarcoma can arise from the ciliary body, the conjunctiva or the iris [7].

The malignant lymphoma is usually B-cell group, often non-Hodgkin, generated from the lymph tissue of the ocular annexes. The orbital localization is quite rare comprising of 1% of all non-Hodgkin lymphoma [8].

The malignant melanoma was encountered in approximately 30% of primary tumors. Usually it arises from orbital melanocytes of neural crest origin and it often spreads along the nerves through the superior and inferior orbital fissures [9].

The most encountered pathology was basal cell carcinoma and squamous cell carcinoma (representing approximately 80% of all the patients in the groups). Similar results have been found by numerous researchers [10]. From the total number of basal cell carcinoma more than 40% ($n=4$) were tumor relapses (more than 80% had previous surgical treatment). Thus, it seems to be a need to apply radical methods (exenteration) when dealing with recurrent BCC of the orbit [11].

The sebaceous gland carcinoma is an aggressive tumor that usually arises from the meibomian glands and occasionally from the glands of Zeiss or the sebaceous glands in the caruncle. Sebaceous carcinoma represents 1–5% of the malignant tumors of the eyelid [11]. It appears more frequently at elderly people, of female gender. The periorbital region, particularly the upper eyelid, is the most common location [12]. The ocular sebaceous carcinoma may metastasize via the lymphatic system, the blood vessels, the lachrymal secretory system, and the lachrymal excretory system. Metastases involve regional lymph nodes, followed by the spread to the liver, lungs, brain, and bones [13].

The authors did not experience any complications after surgery although there are reports of sino-orbital fistulas or cerebrospinal fluid fistulas [14]. The healing time depends on the methods of reconstruction employed. There are reports of healed orbits that were left to granulate [15]. Often these cases develop most of the complications above. The authors used local flaps for reconstructions due to better integration, a more rapid response from the organism and due to patients' age (over 60% of them were above 60-year-old), which would have led to an increased number of problems associated with distant flaps. Another method was the use of facial prosthesis anchored with implants but that would imply an increased cost for the patient and a specialized laboratory.

The temporalis muscle flap is one of the most used flaps in orbit reconstruction and it provides a good closure [16]. The major disadvantage of the muscle flaps is that they can mask tumor recurrence, thus local check-ups are very important [17]. We cannot give an accurate data regarding the actual prognosis off all of these patients, as the follow-up data is scarce (9 to 27 months). The literature reports do not mention long follow-up periods (under five years of tumor free periods) after exenterations [18].

✉ Conclusions

The literature shows an increased incidence of malignant

processes occupying the orbit. Most of them are secondary tumors with multiple relapses due to incorrect initial treatment or patients' lack to present at scheduled follow-up appointments. Because of their aggressive behavior, the surgical treatment consists of different types of exenterations, which can be associated with immediate reconstruction. Due to the late age of this type of patients and the systemic diseases, which they often present, local flaps are more indicated than distant flaps. Local flaps have several advantages that make them a reliable method of primary orbit reconstruction after exenteration.

Author contribution

All the authors had equal contribution to the article.

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