Our experience in surgical treatment of intraorbital tumors

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Abstract

Orbital tumors are complex lesions representing a great challenge for the neurosurgeons and ophthalmologist.

Methods: We analyse the database for 57 patients who underwent surgery for the treatment of orbital tumors at our institution between 2001 and 2010. Data from clinical notes, surgical reports, and radiological findings were extracted for the statistical analysis.

Results: Predominant symptoms were exophthalmos (68%), visual disturbance (42%) and ocular mobility limitation (37%). The most used surgical approache was superior orbitotomy. Orbital tumors histopathological results showed that hemangiomas were the most common tumors type (35%). Malignant tumors accounted for 23% of cases. Total resection of tumors was achieved in 78% of patients.

Conclusion: Surgical treatment could be considered an optimal treatment option for most of the orbital tumor. A better imaging anatomy analysis of the orbit correlated with good surgical skills is needed to overcome the pitfalls of intraorbital surgery.

Introduction

Tumors of the orbit are rare but complex diseases in neurosurgical pathology with a frequency of 3.5 - 4 % [1, 2]. Their direct relation with all anatomic structures of the orbit makes these lesions a great challenge for the neurosurgeons and ophthalmologist. Based on the relationship between the tumor and muscle cone the orbital tumors are anatomically divided into three categories: intraconal, extraconal and intracanalicular. The muscle cone is reprezented by the extraocular rectus muscles and their intermuscular septae, and devides the orbital space into: intraconal and extraconal space. Patients with orbital tumors commonly present with a variety of signs and symptoms and they are often difficult to diagnose especially in their initial stages. Imaging diagnostic methods involves orbital CT and MRI either alone or in combination. If the CT scan offers a better evaluation of orbital bones, MRI provides a better soft tissue discrimination with superior imaging for the visual pathways. The surgical techniques for orbital lesions involve classic transcranial extradural approaches as subfrontal, frontotemporal or pterional, or directed approaches as transconjunctival, medial or a more extensive lateral orbitotomy.

In the present study, we describe our surgical experience on 57 orbital tumors at single institution, with special focus on the clinico-imagistic particularities and treatment results.

Materials and methods

A total number of 57 patients who underwent surgery for the treatment of

orbital tumors at our institution between 2001 and 2010 were statistically analyzed. The clinical dates, surgical reports, and imagistic findings were extracted from a database for our analysis. The preoperative radiological investigation by computed tomography (CT) and magnetic resonance (MR) imaging allwowed a detailed study in matters relating to tumor location, size and its relation to neighboring anatomical structures. All surgeries were performed by two neurosurgical teams, lesion being approached as per their anatomical location. Morbidity, follow-up and outcome were also analyzed. All the lesions of the present series were histopathological diagnosed after partial or total excision.

Postsurgical monitoring of these patients in terms of clinical, biological and imaging aspects corelated with applied treatment effectiveness and a clear complications diagnose led us to a prediction parameters for patient with orbit tumor. Patients were clinically invetigated at each postinterventional control (at least 6 months, a year, or as needed) and the biological and imagistic balance was made possible quarterly or annually, depending on the rhythm imposed by the surveillance protocol. Patients who received active treatment by sterotactic radiation were guided or monitored by a medical letter from our clinic.

Information resulting from the collection of clinical observations, laboratory and imaging were recorded in a database that was used in statistical processing of the study group in terms of transverse (incidence and prevalence of studied factors and events) and in terms of view of statistical significance of various combinations of factors suspected to have prognostic importance in multimodal treatment of patients with tumors of the orbit.

Results

From a total of 57 patients who underwent surgery for the treatment of orbital tumors 82% presents proptosis at admission. The patients series were separated in to groups based on age categories: 17 children and 40 adults. All the patients were analysed with regard to their sex, age, clinical symptoms, site of involvement, surgical approaches employed for their resection and histological diagnoses.

Sex and age distribution

There were 28 males and 29 females with age ranged from 1 to 72 years (mean age was 38.4 years and median of age was 40.5 years). Figures 1 a, b show age distribution of the patients.

Clinical symptoms

The major symptoms recorded at presentation were exophthalmos (68% to adults and 71% to children), visual disturbance (45% to adults and 35% to children) and ocular mobility limitation (35% to adults and 39% to children). The exophthalmos was appreciated as big in 7 cases, mean in 19 cases and small in 13 cases.

Site of involvement

Concerning the lateralisation of orbital tumors we detected a 57% of right eye involvement versus 43% of left eye. Intraconal tumoral masses were encountered in 18 cases, extraconal tumor masses in 28 cases, intra-extraconal tumor masses in 8 cases and lateral wall in 3 cases. Quadrant of involvement was superonasal in 16 patients, superotemporal in 21 patients, inferior quadrant in 11 patients and superior quadrant in 19 patients. Among the paraorbital tumors, 1 patients had orbital extension of naspoharyngeal mass and 2 patient had a nasoethmoidal mass extending into orbit.

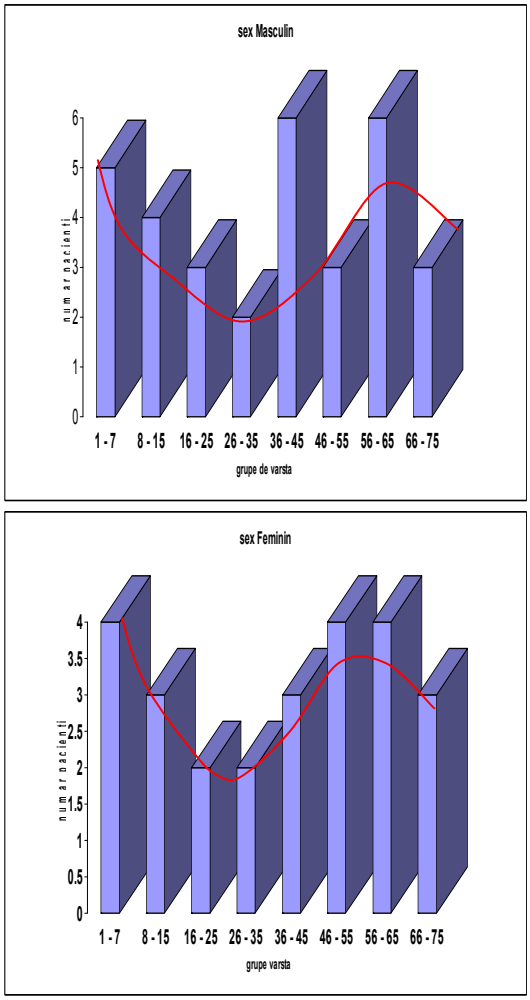

Figure 1 Patients distribution by age and sex

TABLE 1

Clinical symptoms

Symptoms	Pat.nr.	%
Eye pain	15	26
Ptosis	16	28
Exophtalmos	39	68
Visual disturbance	24	42
Ocular mobility limitation	21	37
Palpable mass	18	32

TABLE 2

Sites of involvement

Primarily orbital tumor			Paraorbital tumor with orbit extension		
	Nr.	%		Nr.	%
Intraconal mass	16	28	naspoharyngeal mass	1	33
Extraconal mass	27	47	nasoethmoidal mass	2	66
Intra-extraconal mass	8	14			
Lateral wall mass	3	5			
	54			**3**	

Table 3

Surgical approaches

Surgical approache	Pat.nr.	%
Superior orbitotomy	19	33
Fronto-pterional approaches	12	21
Fronto-orbital	6	10
Bicoronal craniotomy	8	14
Fronto-orbito-temporal	10	18
Trasfacial	1	2
Transpalatal and Weber orbitotomy	1	2

Surgical approaches

Total, subtotal resection and biopsy were performed for all patients. Supraorbitar craniotomy was the most frequent used approach (35%) in this study followed by the fronto-pterional approaches (23%) and fronto-orbito-temporal approaches (19%). In one case of naspoharyngeal angiofibroma with orbital extension a transpalatal and Weber orbitotomy approach was used. Total or partial orbital exenteration were needed in 3 patients.

Histology results

The anatomo-pathological results is summarized in table 4. Overall, hemangiomas were the most common tumors in our study (35%), followed by benign lesions (meningiomas 14%,

neurofibromas 5%) and inflammatory lesions (15%). Malignant tumors accounted for 23% of cases amoung witch carcinoma was the most frequent (9%).

TABLE 4

Histological results

Tumor type	Nr. Pat.	%
Carcinoama	5	9
Cholesteatoma	1	2
Hemangioama	20	35
Cystic tumor	2	3
Neurofibroma	4	7
Glioma	2	3
Meningioma	8	14
Malignant lymphoma NH	3	5
Malignant melanoma	1	2
Orbital metastasis	4	7
Orbital bone metastasis	1	2
Orbital cellulitis	1	2
Inflammatory pseudotumor	3	5
Miozit	1	2
Dacryoadenitis	1	2

Complication and monitoring

The median follow-up duration was 17 months (range from 7 to 62 months).

Thus, in the group of patients included in the study, during surveillance, we recorded 11 adverse events: 2 ischemic attacks (one meningioma and an intraconal metastasis with partial resection subsequently to radiotherapy by Gamma-Knife and conformational irradiation and optic nerve ischemic necrosis corresponding to 7-11 months after irradiation), 2 postsurgical bleeding (one intra-orbital in to the bed tumor after resection of a hemangioma and one epidural after a microsurgical approach of an orbital metastasis through a fronto - orbito – temporal approach), 2 tumor recurrences (lacrimal gland adeno-carcinoma), 1 retinal edema (a giant cavernous hemangioma surgically resected and irradiated Gamma-Knife with perilesional edema at 7 months after irradiation, probably by early thrombosis of a drainage vein, with favourable evolution under treatment with corticosteroids), 2 damage field and visual acuity (direct traction on ON) and 2 cases of ptosis due to intaroperative III n traumatic injuries (a case of extra-intraconal meningioma and a case of intraconal carcinoma).

Discussion

Analysis of symptoms to admission between the two groups of patients with intraorbital tumors showed no significant differences, with one exception. Thus, there were more cases of childhood patients with palpable masses at admission compared to adult patients (53% versus 33%). This is explained primarily by smaller dimensions of the orbit in childhood related to tumor growth rate.

If in the childhood group the small exophthalmia was dominant, the adult group was dominated by medium and large exophthalmia. This is caused mainly by the difference between the child and adult orbital space and aesthetic deformities tolerance of the adult.

Based on the benign and malignant tumor pathology criteria we have seen that, the childhood group did not reveal any malignant tumor, while, in adult group 13 cases with neoplasic intraorbitar lesions were diagnosed. Thus, about one third of intraorbitar lesions causing proptosis proved to be malignant. Synthesis of histological types of intraorbitar tumors had showed that the percentages of different histological types approach those listed in the literature published in recent years.

The rate of complications was 8.7% over a period of 3 years, so with an average 2.9% / year, which mean that the risk of late

complications of various treatment methods included in our study is similar to the risk and complications described in the literature, assessed at 1.5 - 3% / year.

Study of relative risk of complications depending on the lesions size showed a very uneven distribution, with two peaks, one in the range between 0.9 -1.3 lcc being clearly superior to all other dimensions found in the patients studied. From statistical analyses we cane conclude that the dimension of intraorbital lesions represented a significant risk factor on the natural history of patients studied. The p= 0.0088 value recorded by us, was similar with the literature reports, most of them highlighting their size influence on prognosis (parameter included also into prognostic scale).

Location is generally considered to have a great influence on the prognosis of patients with intraorbital tumors being obvious the neurological disasters that can result from a bleeding / recidive / radionecrosis in ON. After a uni-factorial analysis of the statistical significance of the intraorbital tumor location showed that their location in a certain area of the orbit has prognostic importance of the natural evolution of the disease, even if lateralization distribution (left-right) did not influence the prognosis.

The predictive value of the method of treatment is insignificant, p = 0.6536, which leads to the conclusion that regardless of the method used, as long as it is effective and correct choose, the natural progression of disease prognosis is the same.

Since, despite the minimal invasiveness of modern treatment methods and postoperative favorable evolution of all patients included in this study, any micro-surgical intervention or irradiation is still encumbered by procedural risks and certain consecutive late complications of surgery.

Conclussion

Although the orbit is an extremely difficult anatomical entity approached, so that over the years various specialists were limited to clinical diagnosis, imaging data and recently acquired therapeutic experience make this pathology to be more permissive for specialists with various specializations. Frequency of orbital pathology imposed a bigger interest in diagnostic solutions development, but especially for election of miniminvazive surgical solutions with optimal results for the patient. Based on an experience that is gained with each patient investigated and observed, together with a close collaboration between different specialists involved, we can say that for this segment of pathology, neurosurgeon is one who must assume the responsibility as receiver and mediator, settlement as decision maker and postoperative observation of these cases.

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