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Original Article

Orbital tumors: An analysis of fourteen cases

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Abstract

Aim: Orbital tumors are rarely seen in neurosurgery practice. They have quite variable clinical results, and are often reported in the literature as a series in relation to the patient's age, geographical factors, and whether they were treated at neurosurgery or ophthalmology clinics. In our study, we evaluated the pathological results, demographic characteristics, and clinical results of patients who had undergone surgery for orbital tumors in our clinic.

Material and Methods: Fourteen patients who were operated on between 2012 and 2017 at the Adana City Training and Research Hospital were investigated in this study. The patient files and radiological investigations were evaluated retrospectively, and the patients were followed up for 22 months (min-max: 14-28 months) ona verage. The patients were evaluated in terms of their admission complaints, preoperative and postoperative neurological examination findings, surgical approaches, pathologic results, and complications.

Results: Eight patients (57%) were females, 6 (43%) were males, and their average age was 49.4 years old (min-max:19-86). The most common admission complaint was swelling around the eye, which was observed in 12 (85%) of the patients. The computed tomography and magnetic resonance imaging scans of all of the patients were investigated before their operations. The masses were removed from 5 (35%) patients with lesions located in the anterior and lateral areas using a lateral canthotomy technique. A fronto-orbital zygomaticapproachwas preferred for5 (35%) patients with intracranial extensions of the tumors toward the temporal fossa or frontal region. A fronto-orbitalapproach was preferred in 4 (28%) of the patients with tumor locations in the posterior and medial chambers. The masses were totally removed in 11 (79%) of the patients and subtotally removed in 3 (21%) patients.

Conclusion: Overall, orbital masses are rarely observed, and their pathological profiles vary according to the patient's age, geographical region, and location. Different approaches may be preferred during surgical removal; however, the overall purpose is to remove the mass without leading to neural and cosmetic complications.

Keywords: Orbital Meningioma; Orbital Tumors; Vasculogenic Lesions.

INTRODUCTION

Orbital tumors are rarely encountered lesions that exhibit a wide range of subtypes, including primary, secondary, and metastatic. The most frequently encountered subtypes have been reported with varying degrees of seriousness in neurosurgery and ophthalmology clinics in different age groups and in different geographic locations (1-5). A relationship has been demonstrated between the age and pathological profile in many studies (4,6-10), with the pathological diagnosis varying according to the patient's age. For example, while the most frequently encountered orbital tumor found in children is a dermoid cyst (50%), this pathology is rarely observed in adults (10,11). Cavernous hemangiomas (7%) and lymphomas (5%) are observed most frequently in both young and old patient groups. The malignant tumor frequency has increased in the elderly age group, when compared to the middle age and pediatric age groups (2-4). Overall, the frequency of observing orbital tumors increases with the progression of the patient's age (12).

Patients with orbital tumors may complain of a loss of vision, eye movement disorders, crossed eyes, double vision, lowered eyelids, pain, palpable masses, exophthalmos, and cosmetic problems. Often, asymptomatic patients are incidentally detected using radiological interventions. Generally, superolateral settlement is frequently lodged anteriorly in the extraconal space (6). The recommended treatment is to surgically remove the mass using transcranial [fronto-orbital (FO) and fronto-orbitozygomatic (FOZ)], lateral orbital, transconjunctival, endoscopic transsinonasal, transeyelid (passing through the eyelid), or a combination of these approaches inthe surgical planning (13-17).

Quite variable clinical results have been reported in

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different departments for orbital tumor series in relation to age and geographical factors. In our study, we investigated patients that were operated on for orbital tumors based on the pathology results, demographic characteristics, and clinical results.

MATERIAL and METHODS

Fourteen patients who underwent surgery for orbital tumors between 2012 and 2017 at the Adana City Training and Research Hospital in Turkey were included in this study. The patients' files and radiological investigations were evaluated retrospectively, and the protocol was approved by the Ethics Committee for Clinical Investigations of the Adana City Training and Research Hospital. The participants were followed up for an average of 22 months (min-max: 14-28 months). The patients were evaluated in terms of their admission complaints, preoperative and postoperative neurological examination findings, surgical approaches, pathology results, and complications.

RESULTS

Of the patients, 8(57%) were females and 6 (43%) were males, and their average age was 49.4 years old (min-max:19-86). The most common admission complaint was swelling around the eye, which was observed in 12 (85%) patients. Exophthalmos was present in 9 (64%) patients in their physical examinations (Figure 1), and 5(35%) patients were admitted with a loss of vision. Four (29%) of the patients had pain around their eyes, which was spreading to their heads. The most important examination finding was proptosis in 4 (29%) of the patients, while limitations in the eye movements and double vision were observed in 3 (21%) of the patients (Table 1).

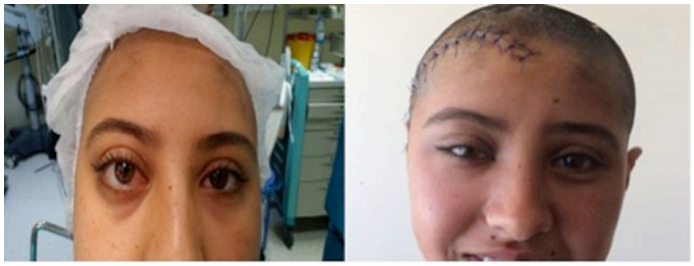


Figure 1. Preoperative and postoperative images of the patient with exophthalmos in the right eye

The computed tomography (CT) and magnetic resonance imaging (MRI) investigations were inspected for all the patients before they underwent their surgeries. In the radiological investigations, the lesions of 5(35%) of the patients showed both intraorbital and intracranial locations. The lesions were lodged in the anterior and lateral parts of the eye in 6 (43%) patients, themedial wall in 4 (8%) patients, the inferior optical nerve posterior chamber in 2 (14%) patients, and the superior optical nerve posterior chamber in 2 (14%) patients. Table 1.

The surgical approaches were chosen according to the location, size, and intracranial extension of the lesion. The lateral orbital approach used a transcranial or lateral canthotomy with FO or FOZ interventions. The trans-conjunctival or trans-eyelid approach from the anterior aspect was not used in any of the patients. The masses were removed from 5 (35%) patients with lesions located in the anterior and lateral chambers by applying a lateral canthotomy. The FOZ approach was preferred in 5 (35%) of the patients with intracranial extensions toward the temporal or frontal fossa. The FO approach was preferred in 4 (28%) of the patients with tumor locations in the posterior and medial chambers. The masses were totally removed in 11 (79%) patients and subtotally removed in 3 (21%) patients (Figure 2 and 3).

Table 1. Demographic and clinic findings of the patients

Age	**Average 49,4 (19-6)**
Gender M/F	**6/8**
Symptoms and compliants	
Swelling around the eye	12 (%85)
Exophthalmos	9 (%64)
Loss of vision	5 (%35)
Proptosis	4 (%29)
Pain	4 (%29)
Limitation in eye movements and double vision	3 (%21)
Ecchimosis in the eyelid	1 (%7)
Subconjunctival bleeding	1 (%7)
Asymptomatic	2 (%14)
Settlement place	
In anterior lodge and latera	6 (%43)
Medial wall	4 (%29)
In optic nerve inferior in posterior lodge	2 (%14)
In optic nerve superior in posterior lodge	2 (%14)

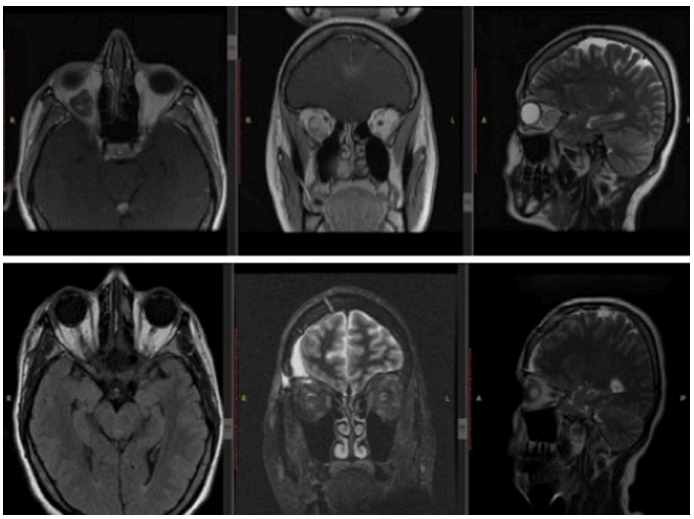


Figure 2. Magnetic resonance imaging sections of the mass located in the posterior chamber of the inferior optical nerve during the preoperative and postoperative periods

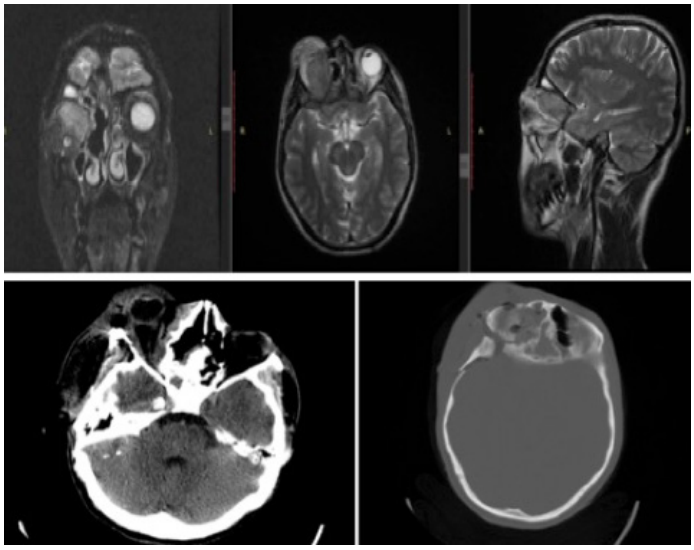
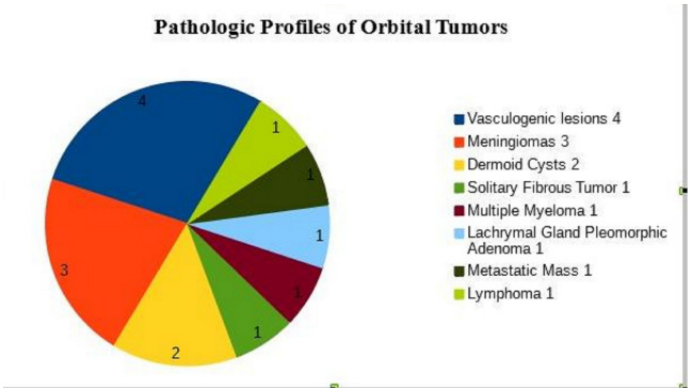


Figure 3. Magnetic resonance imaging sections of a superomedial mass during the preoperative period and computed tomography images during the postoperative period

Vasculogenic lesions were detected in 4 (29%) of the patients in the pathological investigation. Two of them were diagnosed with cavernous hemangiomas, 1 of them was diagnosed with a lymphangioma, and 1 of them was diagnosed with papillary endothelial hyperplasia. The pathology reports included meningiomas in 3 (22%) patients, dermoid cysts in 2 (14%) patients, a solitary fibrous tumor in 1 (7%) patient, a multiple myeloma in 1 (7%) patient, a lachrymal gland pleomorphic adenoma in 1 (7%) patient, a lymphoma in 1 (7%) patient, and a metastatic mass in 1 (7%) patient. The metastasis originated from breast cancer (Graphic 1).

Graphic 1.Pathological profiles of the orbital tumors



No deaths occurred due to surgery; however, the most frequently observed complication was ophthalmoparesis, which was seen in 3 patients (21%). Three of the patients had 3rdcranial nerve involvement, one was in the 4thcranial nerve and one was in the 6thcranial nerve. Two of the patients recovered completely from the ophthalmoparesis, but one of them had permanent paralysis during the follow-up. A subdural hematoma developed in one patient, who did not require surgical intervention, and it healed during the follow-up. A superficial wound site infection developed in one patient that was treated using antibiotherapy.

DISCUSSION

Orbital tumors are rarely encountered, and they have a wide range of pathological profiles. Different subtypes have been reported at different frequencies in various series, with different results reported based on the age and location (10,11,18). In our series, the age of the patients ranged between 19 and 86 years old, with an average of 49.4 years. There were no pediatric patients included in this study.

The most frequently encountered pathologies in our cases were vasculogenic lesions (29%) and meningiomas (22%). Two of the vasculogenic lesions were diagnosed as cavernous hemangiomas, one was a lymphangioma, and one was papillary endothelial hyperplasia. Shields et al. reported in their quite wide series consisting of 1,264 cases that they often found dermoid cysts in children, vasculogenic lesions in the middle age group, and lymphoid and leukemic lesions in their elderly patients (19). Ohtsuka et al. reported malignant lymphomas in the elderly patients, while dermoid cysts, optical gliomas, and capillary hemangiomas were detected in the children (20). In their series of 183 patients over 60 years old, Demirci et al. reported that 63% of the lesions were malignant, and that the most frequently encountered lesions were lymphomas and metastases (6). It is believed that these differences occurred due to the different age distributions of the patients.

The pathological profiles varied according to the clinics. Meningiomas, which were observed relatively less often, were the second most common pathology seen in our clinic. Secondary orbital tumors originating from the surrounding tissues (11%) and inflammatory lesions (11%), which were detected as the second and third most common frequencies by Shields et al., were not detected in our series (19). The referral of pure orbital lesions to ophthalmology clinics may be the reason for this difference, while lesions with connections to the meninges and intracranial extensions are referred to neurosurgery clinics rather than ophthalmology clinics.

Admission complaints and clinical findings vary, just like pathological profiles, and the complaint most frequently seen from our patients was swelling around the eye, which was observed in 85% of the patients. Exophthalmos was the second most common complaint and loss of vision was the third. In the study by Demirci et al., the most common complaints were swelling of the eyes and mass impacts, which were observed in 44% of the patients (6). The next most common complaint was pain (15%), followed by vision loss (10%). However, their series included patients over 60 years old from an ophthalmology clinic. Gonen et al. specified that the most frequently encountered symptoms and complaints were proptosis (92%), loss of vision (37%), and pain (37%) (21); although, this series was compiled from a neurosurgery clinic, it only involved meningiomas. The complaints and symptoms of the patients varied similarly to the pathological profile.

The “gold standard” in terms of the diagnosis of orbital lesions is contrasting enhanced MRI, while a CT scan is definitely required for a bone structure evaluation. While MRI and CT scans are used in purely orbital lesions, cranial MRI and CT scans should be performed in lesions with cranial extensions. Since an MRI scan shows the mass and the relationship with the anatomical structures around it very well, it can decrease the complication rates (22). Many benign lesions, such as capillary hemangiomas, lymphangiomas, and cavernous hemangiomas, that could not be diagnosed previously or that required surgical interventions for diagnostic purposes may now be diagnosed radiologically and followed up for a long time without any surgery due to new developments in imaging techniques (7,23). Treatments can be planned according to prediagnoses in light of radiological investigations. For example, surgery should be conservative in lesions in which optical gliomas or optic nerve sheath meningiomas are considered, biopsies are recommended in lymphoproliferative pathologies without delay, and small size schwannomas or cavernous hemangiomas may be followed up without surgery; however, total resection and radiotherapy should be planned in those cases, in which rhabdomyosarcomas are considered.

In the differential diagnosis of orbital tumors, thyroid related orbitopathies, inflammatory processes, and pseudotumors can be misdiagnosed. Overall, the diagnosis of inflammatory lesions of the orbit is challenging. Idiopathic nongranulomatous lesions, infections, inflammation secondary to tumor necrosis, granulomatous inflammations like sarcoidosis or Wegener's granulomatosis, and Kimura's disease could be examples of differential diagnoses for orbital tumors.

The purpose for surgery in orbital tumor cases is to remove the mass without creating cosmetic and neurological complications, and the effects are based on the location and pathology of the mass. Mass removal without the development of complications is more likely in extraconally located lesions; however, a total resection may not be the first choice of treatment in intraconally located masses. Several of the complications that can be encountered are more likely due to the neighboring neural and vascular structures (24).The transcranial (FO, FOZ), lateral orbital, transconjunctival, endoscopic transsinonasal, transeyelid, or combinations of these approaches could be chosen for surgical planning (12-14). For instance Maroon and Kennerdell used an FO approach to the tumors located medial to the optical nerve, and they reco mmended the route between medial rectus and superior levator palpebrae superior/ rectus muscles in order to prevent injuries to the optical, oculomotor, and abducens nerves (25). Mine et al. recommend a superolateral orbitotomy since it provides a wide point of view and less neural complications (24). In our clinic, we preferred mass removal by using a lateral canthotomy and lateral orbital approach in 5 (35%) patients with lesions located anteriorly and laterally, by using the FOZ approach in 5 (35%) patients with intracranial extensions toward the temporal fossa or frontal bone, and by using the FO approach in 4 (28%) patients with masses located in the posterior and medial chambers. The lesions were totally removed in 11 patients, and they were subtotally removed in 3 patients.

None of the patients died as a result of the operations that we performed. However, the most frequently encountered complication was newly developing ophthalmoparesis, which was observed in 3 patients (21%). It was persistent in only in one patient during the follow-up. A subdural hematoma developed in 1 patient who did not require a surgical intervention, and it was resorbed during the follow-up. A superficial wound site infection developed in 1 patient, which was treated using antibiotherapy. In addition, 3rdcranial nerve paralysis, followed by 4thand 6thcranial nerve involvement, the loss of vision, and pupillary changes were reported, especially, as the most frequent complications in the different series (3,13,21,24). The results in the literature varied due to the different patient groups and sizes. For example, one limitation of our study was that we had a small patient group.

CONCLUSION

Orbital masses are rarely observed, and their pathological profile varies according to the patient's age, geographical region, and location. Different approaches may be preferred when considering surgical removal; however, the ultimate purpose is to remove the mass without leading to neural and cosmetic complications.

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