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) on average. 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 zygomatic approach was preferred for 5 (35%) patients with intracranial extensions of the tumors toward the temporal fossa or frontal region. A fronto-orbital 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%) 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 transsinosal, transeyelid (passing through the eyelid), or a combination of these approaches in the surgical planning (13-17).

Quite variable clinical results have been reported in
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).

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 transconjunctival 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

<table>
<thead>
<tr>
<th>Symptom and complaint</th>
<th>Number (%)</th>
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<tbody>
<tr>
<td>Swelling around the eye</td>
<td>12 (85%)</td>
</tr>
<tr>
<td>Exophthalmos</td>
<td>9 (64%)</td>
</tr>
<tr>
<td>Loss of vision</td>
<td>5 (35%)</td>
</tr>
<tr>
<td>Proptosis</td>
<td>4 (29%)</td>
</tr>
<tr>
<td>Pain</td>
<td>4 (29%)</td>
</tr>
<tr>
<td>Limitation in eye movements and double vision</td>
<td>3 (21%)</td>
</tr>
<tr>
<td>Ecchymosis in the eyelid</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Subconjunctival bleeding</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>2 (14%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Settlement place</th>
<th>Number (%)</th>
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</thead>
<tbody>
<tr>
<td>In anterior lodge and latera</td>
<td>6 (43%)</td>
</tr>
<tr>
<td>Medial wall</td>
<td>4 (29%)</td>
</tr>
<tr>
<td>In optic nerve inferior in posterior lodge</td>
<td>2 (14%)</td>
</tr>
<tr>
<td>In optic nerve superior in posterior lodge</td>
<td>2 (14%)</td>
</tr>
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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 3rd cranial nerve involvement, one was in the 4th cranial nerve and one was in the 6th cranial 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.
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 antiobiotics. In addition, 3rd cranial 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.

Competing interests: The authors declare that they have no competing interest.

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Ethical approval: The Ethics Committee for Clinical Research and Training Hospital 19-06-2018 -200.

REFERENCES