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Intraorbital Space-Occupying Lesions: The Evaluation of Clinical, Radiological and Pathological Results

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ABSTRACT:

Intraorbital space-occupying lesions: the evaluation of clinical, radiological and pathological results

Objective: To present clinical findings, radiological and pathologic data of the intraorbital space-occupying lesions (ISOL) treated with surgical intervention

Materials and Methods: The medical records of 81 patients who underwent surgery for ISOL between January 2010 and April 2017 were reviewed retrospectively. The demographical data of the patients, preoperative and postoperative ophthalmologic examination findings and the location of mass radiologically were examined in detail. The surgical approach and surgical technique, peroperative and postoperative complications, histopathological results, the duration of follow-up were recorded.

Results: A total of 81 patients (37 female, 44 male) were included in this study. The mean age was 37.14±23.53 year. Intraorbital Space-Occupying Lesions (ISOLs) were intraconal in 3 patients, extraconal in 71 and both intraconal and extraconal in 7 patients. The lesion was in the form of a non-tumoral mass in 25 patients, while tumoral in 56 patients. Trans-conjunctival orbitotomy approach was performed in ten patients, while the orbitotomy via skin incision was performed in 71 patients.

Conclusions: Intraorbital Space-Occupying Lesions (ISOLs) cause functional and cosmetic important problems according to their localizations. The definitive treatment of these lesions is mostly surgical and full surgical excision may provide permanent healing.

Keywords: Extraconal, intraconal, intraorbital mass, orbital tumour

ÖZET:

İntraorbital yer kaplayıcı lezyonlar: Klinik, radyolojik ve patolojik sonuçları

Amaç: Cerrahi müdahale ile tedavi edilen orbitada yer kaplayıcı lezyonların klinik bulgularını, radyolojik ve patolojik verilerini sunmak

Gereç ve Yöntem: Ocak 2010 ile Nisan 2017 tarihleri arasında orbitada yer kaplayıcı lezyon nedeniyle cerrahi geçiren 81 hastanın dosyası retrospektif olarak incelendi. Hastaların demografik verileri, preoperatif ve postoperatif oftalmolojik muayene bulguları ve radyolojik olarak kitlenin yerleşimi detaylı bir şekilde incelendi. Cerrahi yaklaşım ve uygulanan cerrahi teknik, peroperatif ve postoperatif komplikasyonlar, histopatolojik sonuçlar, hasta takip süresi ve seyri kaydedildi.

Sonuçlar: Çalışmaya 81 (37 kadın, 44 erkek) hasta dahil edildi. Hastaların ortalama yaşı 37.14±23.53 yıldı. Orbitadaki kitleler hastaların 3'ünde intrakonal, 71'inde ekstrakonal, 7'sinde ise hem intrakonal ve hem de ekstrakonal yerleşimliydi. Elli altı hastada lezyon tümöral iken 25 hastada ise lezyon non-tümöral özellikte idi. On hastaya konjonktival orbitotomi yaklaşımı ile cerrahi uygulanırken, 71 hastaya cilt yolu ile orbitotomi yapıldı.

Tartışma: Orbital bölgede yer kaplayan lezyonlar lokalizasyonuna göre fonksiyonel ve kozmetik önemli sorunlara neden olurlar. Bu lezyonlarının kesin tedavisi çoğunlukla cerrahi olup tam cerrahi eksizyon kalıcı iyileşme sağlayabilir.

Anahtar kelimeler: Ekstrakonal, intrakonal, intraorbital kitle, orbital tümör

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INTRODUCTION

Anatomically, the orbita has a small volume and contains the eye, which is an important organ for human beings. Space-occupying lesions, both primary and metastatic, cause significant functional and anatomical problems. Intraorbital space-occupying lesions (ISOLs) can clinically result in exophthalmos, double vision, ptosis, limited movement, loss of vision, and even permanent visual loss. When some of the orbital lesions can be diagnosed by radiological examinations such as Magnetic Resonance Imaging (MRI) and Computed Tomography (CT), definite diagnosis is mostly obtained by histopathological examination of the removed mass (1-4).

Our aim in this study is to present the demographic, clinical, radiological and pathological examination results of orbital lesions treated in our clinic.

MATERIAL AND METHOD

The records of 81 patients treated surgically for ISOLs in our clinic between January 2010 and April 2017 were examined retrospectively. Orbital mass was defined as the primary masses and/or metastatic space-occupying lesions origined from structures between the globe and the orbital bone tissue, located behind the orbital septum; or masses with postseptal invasion originating from the eyelids and periorbital structures. Eyelid masses which are located in the orbital region, but not showing invasion to the back of the septum, patients who were not treated surgically, who had no post-surgical file, and who were not followed regularly for at least 3 months postoperatively were excluded from the study.

Patients' demographic data, preoperative and postoperative ophthalmologic examination findings, preoperative clinical and radiological findings were recorded. The masses were classified according to their localization in the orbita: extraconal, intraconal and both extraconal and intraconal masses. Superior (superonasal and superotemporal), inferior (inferonasal and inferotemporal), lateral and medial localization zones were determined for extraconal masses.

After surgical treatment, pathological results were evaluated and orbital masses were divided into two groups as tumoral and non-tumoral orbital masses. The surgical approach and surgical technique, peroperative and postoperative complications, histopathologic results, duration of follow-up and the course were investigated. All patients underwent control scans (CT and/or MRI) at the 1st month postoperative follow-up examination to check whether there was a residual mass. The follow-up duration of the patients ranged from 3 to 90 months with an average of 33.85±24.38 months.

RESULTS

A total of 81 patients (37 female, 44 male) were included in the study. The mean age of the patients was 37.14±23.53 years. Forty-two patients had a mass in their right eye and 39 patients had a mass in the left eye. Fifty-six patients had a mass with tumor origin and 25 patients had a non-tumoral mass. Demographic data of masses and and their intraorbital localizations are shown in detail in Tables-1 and 2. Of the tumoe-origined masses, cases with maxillary adenocarcinoma diagnosis showed secondary invasion to orbit from maxilla, whereas basal cell carcinoma (BCC) lesions showed invasion from the eyelids to the orbit. All remaining tumor-origined masses were originated from primary orbital structures and were located intraorbitally (Table-1). Again, all non-tumoral masses were primarily originated from the orbit (Table-2)(Figure-2).

Orbital masses were intraconal in 3 patients, extraconal in 71 and in 7 patients, both intraconal and extraconal (Table-1,2). Preoperative examination findings of the patients are shown in detail in Table III. Among the most common preoperative findings were limited movement and periorbital pain, respectively. Dermoid/epidermoid cysts were the most common among tumor-origined cases, whereas the most common type of non-tumoral masses were masses of inflammatory granulation. Superior settlement was seen more than inferior in both and non-tumoral masses. Again, nasal settlement was more common than temporal region (Table-1,2).

Symptoms such as periorbital pain, headache, eye enlargement, double vision, epiphora, eye discharge and clinical signs such as limited movement, diplopia,

Table-1: Demographic data of tumoral masses. Epidemiological data of tumor-derived lesions and their locations in the orbit are seen.

Pathological diagnosis	Patient (n)	M/F	Age (Mean, year)	IC	Ec								IC+EC	%
					N	T	S	SN	ST	I	IN	IT		
Dermoid/Epidermoid	21	13/8	19.80		1		6	9	3		1			25.9
BCC	9	5/4	67.11		4			2			2	1		11.1
Cavernous hemangioma	8	3/5	50.10	2	1			1		4				9.8
Capillary hemangioma	3	1/2	10.66 (months)				1			2				3.7
Neurofibroma	3	2/1	39.66				2						1	3.7
Menengioma	2	0/2	40.00										2	2.4
Langerhans cell histiocytosis	2	2/0	6.50				2							2.4
Osteoma	2	1/1	44.00					2						2.4
Maxillary adenocarcinoma	2	2/0	38.00		2								1	2.4
Ewing's sarcoma	1	0/1	19.00							1				1.2
Leiomyoma	1	0/1	41.00				1							1.2
Schwannoma	1	0/1	56.00			1							1	1.2
Malignant epithelial tumor	1	1/0	32.00		1								1	1.2
Total	56	30/26	34.77	2	9	1	12	14	3	7	3	1	6	69.2

M: Male, F: Female, IC: Intraconal, EC: Extraconal, N: Nasal, T: Temporal, S: Superior, I: Inferior, SN: Superonasal, ST: Superotemporal, IN: Inferonasal, IT: Inferotemporal, BCC: Basal cell carcinoma

Table-2: Demographic data of non-tumoral masses. Epidemiological data of non-tumoral lesions and their intraorbital localization sites are seen.

Pathological diagnosis	Patient (n)	M/F	Age (Mean, year)	IC	EC									IC+EC	%
					N	T	S	SN	ST	I	IN	IT	SP		
Inflammatory granulation	6	1/5	37.00						5				1		7.4
Mucosel	4	3/1	57.75		1		3								4.9
Subperiosteal abscess	4	4/0	49.00				4						4		4.9
Hematic cyst	3	2/1	17.66				3						3		3.7
Dacryocystocele	3	2/1	71.00								3				3.7
Granulomatous mass	2	0/2	55.00			1				1				1	2.4
Apocrine hydrocistoma	1	1/0	36.00							1					1.2
Pseudosynovial cyst	1	1/0	1.00							1					1.2
Hydatid cyst	1	0/1	23.00	1											1.2
Total	25	14/11	43.39	1	1	1	10	0	5	3	3	0	8	1	30.8

M: Male, F: Female, IC: Intraconal, EC: Extraconal, N: Nasal, T: Temporal, S: Superior, I: Inferior, SN: Superonasal, ST: Superotemporal, IN: Inferonasal, IT: Inferotemporal, SP: Subperiostal

exophthalmos, ptosis were observed according to the orbital location of the masses. Again, due to the size of the masses and globe pressure, retinal wrinkles, ocular hypertension, chemosis due to pressure on the vessels in the orbit were the other clinical manifestations (Table-3). Intraconal masses caused exophthalmos in the foreground, whereas superior masses caused exophthalmos in addition to ptosis, limited movement, diplopia. Subperiosteal abscess, dacryocytocele, inflammatory granulation masses caused additional findings such as pain in the periorbital region, fever, edema, chemosis (Figure-2).

Surgically, 10 patients underwent transconjunctival

Table-3: Clinical Findings and Symptoms

Clinical findings	Preoperative patient (n)	Postoperative patient (n)
Diplopia	26	5
Exophthalmos	25	2
Limited movement	36	4
Ptosis	21	3
Periorbital pain	36	0
Headache	19	0
Watering and discharge	19	4
Retinal wrinkles	5	0
Ocular hypertension	6	0
Chemosis	14	0

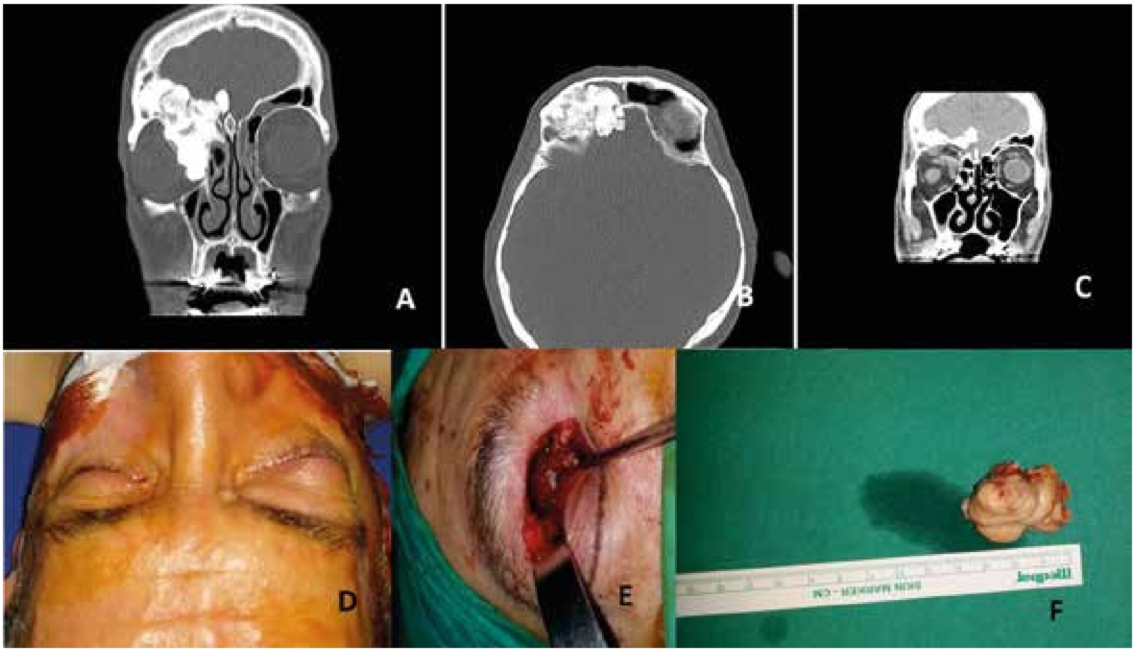

Figure-1: Fifty-five year-old male patient has giant osteoma in preoperative axial and coronal CT (A, B). Residual tissue seems to remain in the upper orbital wall and cranial region after surgery (C). In the lower images (D, E, F), the number of perioperative patients and excised tissue are seen (approximately 40x30 mm)

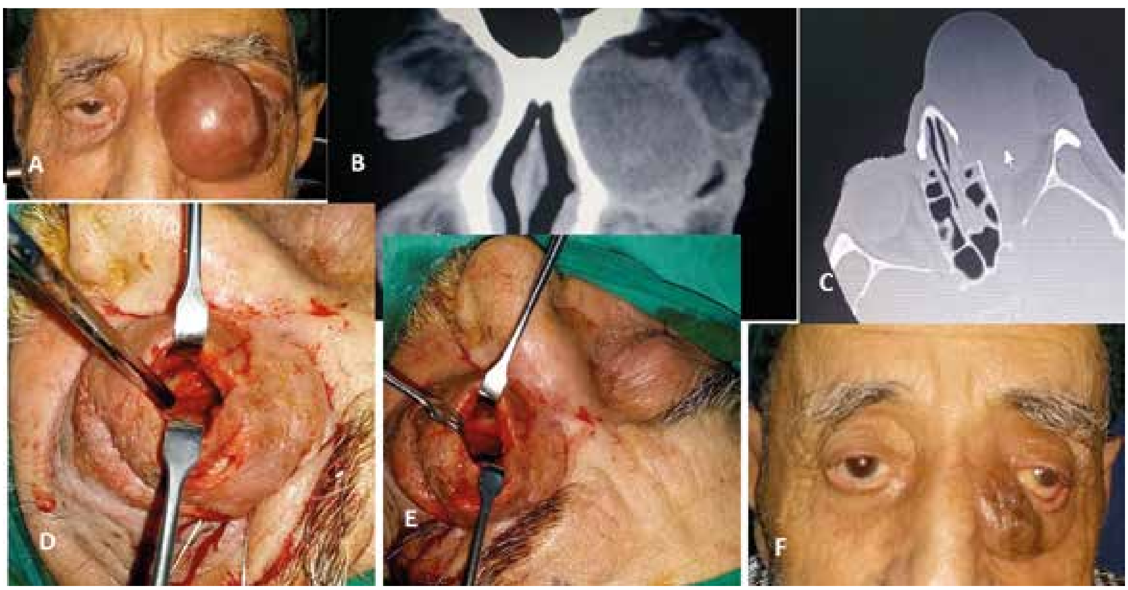

Figure-2: Eighty-eight years old, male patient. Giant dacryocystocele in the nasal region of the left eye (A). It can be seen in the axonal and coronal CT that the mass deviates the globe temporally and is subjected to apply significant pressure (B, C). Lower images show peroperative (D,E) and postoperative (F) 1st week images.

orbitotomy surgery and 71 patients underwent orbitotomy via skin incision. Superior, inferior, medial, lateral, superomedial or superolateral orbitotomy was preferred according to the location of the mass. After surgery, residual masses of 3 neurofibromas, 2 meningiomas, one osteoma and one schwannoma were detected. Again in 2 patients with postoperative maxillary adenocarcinoma, distant metastasis was detected, and an Ewing's sarcoma and a hydatid cyst showed recurrence. No recurrence was detected in all remaining cases. Lacrimal sac and canalicular system in 3 BCCs and one epidermoid cases were excised, supraorbital vessel-nerve bundle in 2 osteomas and 1 leiomyoma cases, inferior rectus muscle in one granulomatous mass perioperatively. While optic atrophy was detected in one Schwannoma and in one intraconal cavernous hemangioma case postoperatively, and transient diplopia and ptosis were detected which lasted up to 3 months in one cavernous hemangioma and one osteoma case. There were no serious complications out of these.

DISCUSSION

The masses in the orbital region show a wide spectrum. This spectrum may include malignant or benign tumors, as well as many infectious, or inflammatory lesions that have a tumor-like appearance. Orbital lesions can be seen as primary, metastatic or as invasion regionally from the surrounding tissues. Demographic data of patients may also cause diversity and difference in orbital lesions (5). Bonavolonta et al. (6) reported as the most common benign lesion in their large series as dermoid cysts (14%) and cavernous hemangiomas (9%), respectively, and as the most common malignant lesions, non-Hodgkin lymphoma (12%). The incidence of dermoid and epidermoid cysts is even higher in children and young adults (7). Similarly, in our study, dermoid and epidermoid masses (26%) as benign lesions, constituted the largest group, and cavernous hemangioma (10%) as the second largest group. However, in our study, BCC (11%), which showed invasion to orbit as malignant masses, was in the first place.

Intraorbital Space-Occupying Lesions (ISOLs) may cause many clinical signs regarding functionally and anatomically. Exophthalmus, diplopia, limited movement, periorbital pain, as well as general findings may be present as mass-specific in some patients, which may be helpful in diagnosis. For example, subperiostal abscesses may cause periorbital pain, fever, edema, and some changes in the laboratory results, whereas lacrimal system-origined dacryocystoceles may cause watering and discharge, leading to additional data for diagnosis. Masses such as cavernous hemangioma with intraconal location on the other side, may not be diagnosed until late stages (8,9). Lacrimal gland-origined or extraconal masses may cause exophthalmos, limited movement and associated diplopia by making globe compression and may give early signs. Again, inflammatory reactions can cause pain in the orbital region and fever, while periorbital mucoceles may cause a more general pain in the face area (10-12).

Radiological imaging of orbital masses is important both for diagnosis and for surgical assistance. CT may provide better data for some masses, and for others, does MRI. CT provides useful information about the relationship of the mass with the periorbital bones, intralesional calcifications and other orbital structures (2,13). MRI imaging provides more detailed information about the morphology of the soft tissue masses, their relationship to the orbital tissues and their borders (2,13-15). We preferred CT and MRI imaging methods as radiological examinations in our patients and we benefited in both preoperative diagnosis and postoperative patient follow-up. As in our study, osteomas, which are bone-derived tumors, are easily recognized by CT, while Langerhans cell histiocytosis may provide additional benefits in diagnosis by making lytic lesions in the periorbital bone. Again, the orbital location of the masses, whether it is intraconal, extraconal or subperiosteal, may be known by scanning, and help the surgeon in both the diagnosis and the surgical approach (1).

Definitive treatment of orbital masses is undoubtedly the complete surgical resection. Especially, it is necessary to remove the dermoid cysts together with the capsule, otherwise the spread of the cyst content into the orbit may cause serious reaction and recurrence (1,16,17). On the other hand, it may be difficult to remove the masses together with their capsules such as large cavernous hemangiomas with intraconal settlement. For this, by making minimizing incisions on the mass, the mass can be totally removed more easily and the possible complications that can arise from the narrowness of the orbital region can be prevented (2,8). We also performed minimizing incisions during surgery on intraconal masses with cavernous hemangioma diagnosis and, obtained very good results. However, it is very difficult to remove deeply seated masses such as meningiomas and schwannomas, and therefore, there is a possibility of recurrence (1,18,19). It is also not easy to fully excise the slowly growing irregular lesions, such as neurofibromas, and the recurrence rate is high (20,21).

The narrowness of the orbital region and containing an important organ such as the eye make the surgery risky. Orbital masses are treated by either the approach via skin or via conjunctival orbitotomy. Superior, inferior, nasal and temporal orbitotomy approaches are possible according to the location of the mass. The subperiostal masses can easily be reached by opening the periosteum over the orbital rim, while the intraorbital masses are partially more difficult to reach. Especially accessing the intraconal masses is very risky in terms of the hazards they contain and requires maximum attention. We seperated the horizontal rectus muscles from their insertion region by medial or lateral conjunctival orbitotomy in approaching intraconal lesions and then reached the intraconal region easily. We think that this method is a successful approach in intraconal surgeries. It is also important to keep in mind that multidisciplinary interclinical surgery can be performed by endoscopic endonasal approach on medially localized masses (22,23).

Many complications may occur in intraorbital surgeries. The narrow surgical field and the difficulty of peroperative comfortable manipulation are the important causes of these complications. Complications may be seen peroperatively or postoperatively. Complications such as intraortibal bleeding and related orbital compartment syndrome, optic atrophy, 3rd, 4th and 6th cranial nerve palsies, periocular muscle injuries and consequent diplopia and limited movement, corneal and/or scleral perforations, ptosis, transient diplopia and ptosis which may be seen as a result of compression on periocular muscles during surgery may be seen. Again peroperatively and postoperatively, different complications may also be seen, especially due to the contiguity to brain and paranasal sinuses. Cerebrospinal fluid (CSF) leakage into the orbital region, cerebral tissue herniation into the orbit, herniation of the orbital content into the paranasal sinuses, meningitis, sinusitis and various infections are complications that can be seen in the foreground.

As a result, intraorbital space-occupying lesions, both the tumors and the non-tumors, cause significant functional problems in terms of localization. The definitive treatment of these site lesions is mostly surgical, and full surgical excision can provide permanent healing. In this study, we wanted to present lesions that occupied the orbital region, which formed a broad spectrum. We believe that our study will make a significant contribution to Turkish literature.

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