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ORIGINAL ARTICLE

Assessment of Lateral Orbitotomy Approach in Management of Extraconal Orbital Lesions

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Abstract

Background: **A variety of tumors and pseudotumors can occur in the orbital region, requiring distinct surgical approaches based on lesion characteristics.**

Aim: **To evaluate the effectiveness of the lateral orbitotomy approach in the surgical management of extraconal orbital lesions.**

Patients and methods: **A retrospective review of 14 patients who underwent lateral orbitotomy for extraconal orbital lesions at Al-Azhar University Hospitals and Al Salam Specialized Hospital between July 2019 and July 2022. The main outcomes measured included postoperative complications and symptom resolution.**

Results: **A total of 14 patients were included (seven males, seven females), with a mean age of 41.50 ± 8.02 years. Proptosis was the most common symptom presented. All lesions were extraconal, with a diverse range of pathologies. Transient postoperative complications were observed in 71.4 % of cases, including diplopia, chemosis, and postoperative hematoma, all of which improved during follow-up. No cases of significant visual impairment were reported.**

Conclusion: **The lateral orbitotomy approach demonstrated efficacy in managing extraconal orbital lesions with manageable postoperative complications and satisfying cosmetic results. Further research with larger sample sizes and multicenter collaboration is encouraged to confirm these findings.**

Keywords: Complications, Extraconal, Lateral orbitotomy, Periorbita

1. Introduction

Nearly all of the bones forming the anterior and middle cranial base contribute to the formation of the orbit's walls.[1] The larger wing of the sphenoid bone and the frontal process of the zygoma shape the bony lateral wall. A continuity is observed between the lateral orbital wall anterosuperiorly and the orbital roof, while the superior orbital fissure marks the posterior separation between the two.[2] Orbital tumors in adults, benign or malignant, may originate within the orbit or secondarily from adjacent areas such as the eyelid or intracranial compartment. The significance of orbital imaging in differentiating these lesions is undeniable, given the diversity of tumors and pseudotumors that can involve the orbit.[2–4]

The four rectus muscles form a muscle cone that bifurcates the orbit into intraconal and extraconal compartments. Recognition of these compartments simplifies the diagnostic approach and narrows down the differential diagnosis. Accessible lesions are preferably addressed through excisional or incisional orbital biopsies, while MRI and computed tomography (CT) scans of the orbit guide cautious diagnosis when surgical access is fraught with risk or unfeasible.[5,6] It is noteworthy that specific tumors demonstrate a predilection towards particular orbital regions, despite a lack of stringent anatomical distribution. Dermoid cysts, lacrimal gland tumors, and lymphoma predominantly appear in the upper outer quadrants, while mucoceles usually manifest in the upper inner quadrants.

Since its initial description by Kronlein7, the lateral orbitotomy approach has undergone numerous adaptations. Initially conceived to facilitate access to retrobulbar lesions, Kronlein removed the lateral orbital wall following a curved skin

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incision over the temporal fossa towards the ear. Berke[8] revised Kronlein's skin incision in 1953, and in 1976, Maroon and Kennerdel[9] introduced specialized microinstrumentation, a self-retaining orbital retractor, and championed the use of a surgical microscope.

The advancement in techniques and image guidance, coupled with superior aesthetic results, have progressively allowed lateral orbitotomy to replace transcranial methods for treating specific complex orbital lesions.[10] Furthermore, these advancements have permitted the more frequent implementation of lateral orbitotomy modifications for accessing the middle fossa and sphenoidal wing lesions, hence minimizing the morbidity associated with extensive transcranial access. The surgical approach to orbit and orbital tumors has sparked a territorial debate among various specialists, including ophthalmologists, neurosurgeons, head and neck surgeons, and plastic surgeons.[10–13] This study aimed to determine the efficacy of lateral orbitotomy in the management of different orbital lesions.

2. Patients and methods

2.1. Study design, setting, and population

This retrospective study was conducted on 14 patients with extraconal orbital lesions treated between July 2019 and July 2022 at Al-Azhar University Hospitals and Al Salam Specialized Hospital. The study adheres to the ethical guidelines, and all patients provided written informed consent for their inclusion. All patients who underwent lateral orbitotomy for extraconal orbital lesions during the study period were eligible for inclusion. There were no exclusion criteria. The patient cohort was randomly selected and equally distributed among both sexes.

2.2. Data collection

Data regarding the patient's medical and surgical history were recorded. In addition, all patients were examined clinically and radiologically. The initial symptoms, type of lesion, and postoperative complications were documented.

2.3. Surgical approach

The lateral orbitotomy procedure was consistently utilized for all patients. Further specifics of the surgical approach and subsequent patient management are detailed in the Surgical Approach subsection. The skin incision extended along the lid crease to the angulus oculi lateral or sometimes beyond it. Following this, a cut was made in the temporalis fascia extending posteriorly from the midpoint of the frontozygomatic bone. The lateral orbital rim was cut above the zygomatic arch (lower limit) and above the zygomaticofrontal suture line (upper limit) using a reciprocating saw. These cuts were made in a 'V' shape to facilitate reconstruction. A careful medial retraction and shielding of the orbital contents were performed. Drill irrigation was used extensively to prevent heat transfer to the optic nerve and the globe, and the lateral orbital wall was removed to reveal the sphenoid wing. The orbital fascia was then incised in relation to the pathology's location and the lateral rectus muscle. Despite rare occurrences of complications such as orbital structure injury, dural tear, and orbital hemorrhage leading to compartment syndrome, all were promptly managed during surgery.

2.4. Data analysis

A descriptive analysis was performed on the collected data. The frequencies and distributions of various factors, such as the types of lesions, patient symptoms, and postoperative complications, were analyzed. Specific details on data analysis are presented in the results section.

3. Results

The lateral orbitotomy approach was used to treat all the extraconal lesions, which comprised four cases of meningioma, two cases each of osteoma, dermoid cysts, pleomorphic adenoma, and fibrous dysplasia, along with 1 case each of metastasis and cavernous malformation. The study comprised a balanced sample of both sexes (seven males and seven females) with a mean age of 41.50 ± 8.02 years.

The primary symptom observed was proptosis, which exhibited gradual progression in 13 cases and was rapid in one case. Accompanying symptoms included ocular pain, headaches, and diplopia, as illustrated in Fig. 1. Prior to surgical intervention, the average duration of symptoms was 16.79 months, with a range between 2 and 36 months. Clinical examinations revealed exophthalmos in all patients, while other findings varied between mild visual and mobility defects.

Out of 14 patients, 10 (71.4 %) experienced at least one postoperative complication, while four (28.6 %) did not report any complications. However, all complications were transient and showed subsequent improvement. The most frequent complications observed were chemosis and transient

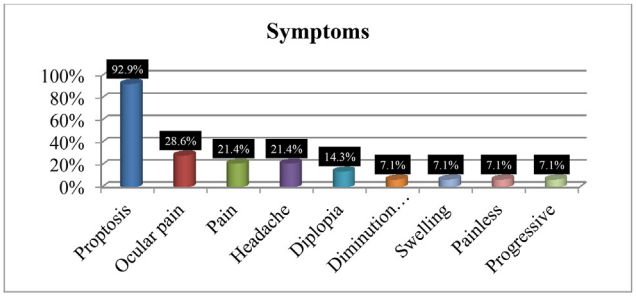

Fig. 1. Symptoms distribution among the study group.

diplopia, each affecting two (14.3 %) patients. A variety of complications were reported in a single patient each (7.1 % for each), which included: cerebrospinal fluid leak, persistent diplopia, enophthalmos, mild lateral rectus paresis that resolved within a week postoperatively, partial debulking, partial ptosis, postoperative hematoma, postoperative wound infection, and wound dehiscence, as shown in Table 1.

3.1. Case presentation

A 30-year-old female patient presented with a clinical history of ocular pain and right-eye proptosis persisting for a period of 18 months. Imaging studies, specifically a CT scan of the orbit, revealed the presence of an osteoma originating from the roof of the right orbit (as shown in Fig. 2). Surgical intervention was initiated via a lateral orbitotomy approach, leading to the complete excision of the lesion. The postoperative course was favorable, yielding excellent results. A follow-up CT scan postoperatively confirmed the successful outcome of the surgery (Fig. 3).

4. Discussion

The orbit can become a host to a wide range of tumors and pseudotumors, necessitating various intraorbital approaches to manage these conditions. Factors such as the tumor's location, size, and anticipated pathology significantly influence the choice of the most appropriate approach for intraorbital lesions.[3,14,15] The lateral orbital approach, thanks to the groundbreaking efforts of previous surgeons, has evolved into a reliable, effective, and cosmetically pleasing surgical technique.[16]

Table 1. Complications distribution among the study group.

Complications	*n* (%)
No	4 (28.6)
Yes	10 (71.4)
Chemosis	2 (14.3)
Transient diplopia	2 (14.3)
Cerebrospinal fluid leak	1 (7.1)
Diplopia	1 (7.1)
Enophthalmos	1 (7.1)
Mild lateral rectus paresis improved 1 week post	1 (7.1)
Partial debulking	1 (7.1)
Partial ptosis	1 (7.1)
Postoperative hematoma	1 (7.1)
Postoperative wound infection	1 (7.1)
Wound dehiscence	1 (7.1)

The lateral orbital approach is usually recommended for lesions confined to the lateral aspect of the orbit, such as lacrimal gland tumors. However, for orbital tumors extending into the cranium, tumors present in the orbital apex or optic canal, and intracranial tumors that encroach on the orbit, the transcranial approach is typically preferred.[17–19]

Our study comprised a balanced sample of both sexes (seven males and seven females) with ages ranging from 30 to 60 years. The mean age was 41.50 ± 8.02 years, a demographic profile that aligns with the findings of Okay et al.[20] Proptosis emerged as the most prevalent symptom in our study, and the duration of symptoms varied from 2 to 36 months, with an average of 16.79 months. This symptom duration is consistent with the results reported by Montano et al.[21]

In our surgical interventions, we ensured the extent of bone removal was minimally invasive. One of the major complications often described in the literature is visual loss, which can result from optic nerve damage due to stretching or compression or from disruption of its vascular supply.[22] However, our series did not record any cases of visual impairment. Our most frequently observed complications were transient diplopia and chemosis. Other complications included postoperative hematoma, cerebrospinal fluid leak, wound dehiscence, partial ptosis, and mild lateral rectus paresis, all of which improved in follow-up sessions.

To minimize complications, it is vital to take meticulous care during dissection to preserve the anatomical structures.[23] Furthermore, we tailored our skin incisions to ensure optimal cosmetic outcomes postoperatively.

Despite the valuable insights gleaned from this study, several limitations should be acknowledged. The small sample size of 14 patients might limit the generalizability of the findings, and larger-scale studies are needed to validate these results. Additionally, our research was conducted in a single-center setting, which may not represent the larger population. As a retrospective study, there could be biases related to selection and recording. The lack of a control group also prevented us from making direct comparisons with alternative surgical techniques. Lastly, the follow-up period varied among

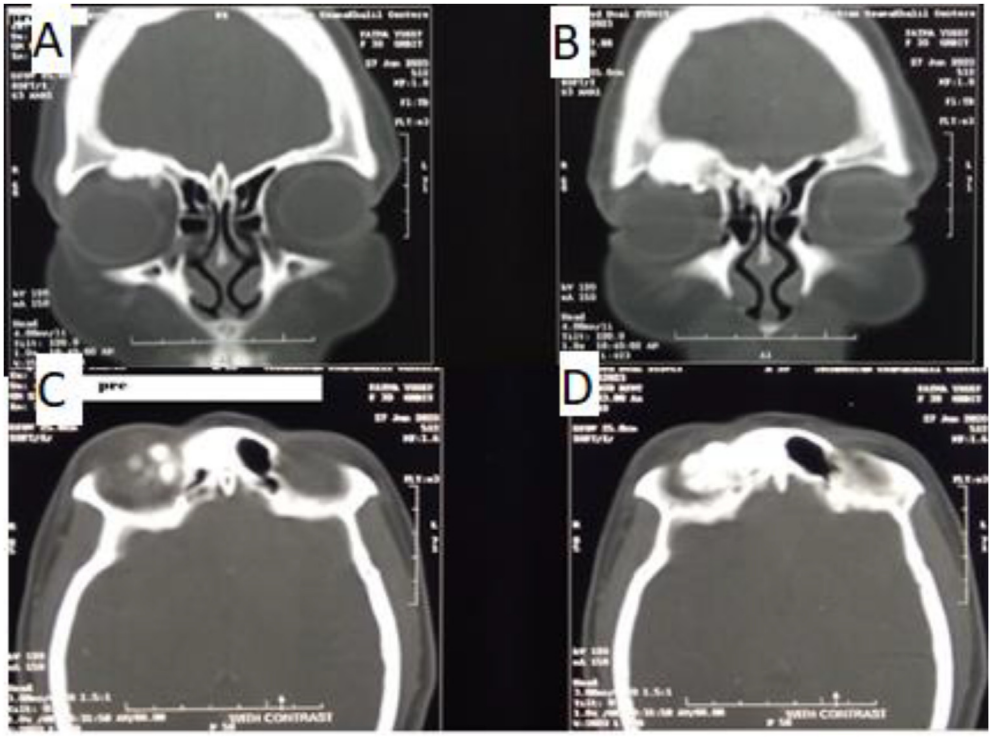

Fig. 2. CT coronal (a and b) and axial cuts (c and d) showing the osteoma arising from the roof of the orbit. CT, computed tomography.

patients, which may influence the assessment of long-term outcomes.

In conclusion, our findings highlight the effectiveness of the lateral orbitotomy approach in treating a variety of extraconal orbital lesions. Despite some transient postoperative complications, the approach offered excellent outcomes, with no significant visual impairment reported. Additionally, the tailored skin incision design helped achieve satisfactory cosmetic results. Further studies with larger sample sizes and multicenter collaborations would be beneficial to corroborate these findings and explore the efficacy of other surgical approaches.

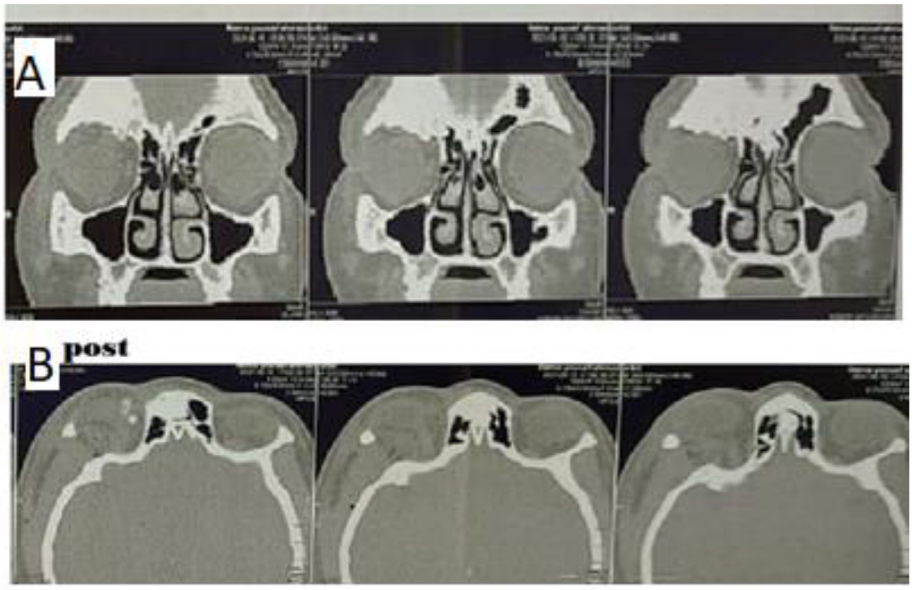

Fig. 3. CT coronal (a) and axial (b) cut postoperatively, showing excision of the lesion. CT, computed tomography.

Conflicts of interest

There are no conflicts of interest.

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