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CASE REPORT

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Orbital apex squamous cell carcinoma*

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Abstract

A middle-aged lady was referred to the Otolaryngology department for consideration of an endoscopic biopsy of a mass located in the right orbital apex. She had initially presented to the eye clinic with complaints of right proptosis and worsening vision. Upon examination, her right eye showed no perception of light, an amaurotic right pupil, and limited extraocular movement in all directions of gaze. Hertel's ophthalmometer revealed proptosis, and there was a loss of corneal sensation. Magnetic resonance imaging (MRI) of the orbits revealed an enhancing mass in the right orbital apex, extending into the cavernous sinus.

She subsequently underwent an endoscopic trans-sphenoidal biopsy of the lesion. Histopathological analysis confirmed the presence of squamous cell carcinoma (SCC). Further systemic evaluation did not reveal any other primary site or metastasis. Considering the unresectable nature of the tumor and her poor candidacy for chemotherapy and radiotherapy, the patient was managed with best supportive care.

Key words: orbital apex, rhinology, head and neck oncology, ophthalmology, endoscopic sinus surgery

Introduction

Orbital apex squamous cell carcinoma (SCC) is a rare condition that typically arises from direct invasion originating from the nasopharynx, nasal cavity, or paranasal sinuses. It can also occur through secondary spread via hematogenous routes. In this report, we present a rare case of primary orbital apex SCC in a patient. To our knowledge, there have been only five documented cases of primary orbital apex SCC reported in the literature.

Case summary

A middle-aged lady was referred to the Department of Otolaryngology for consideration of an endoscopic biopsy of a mass located in the right orbital apex. She has a past medical history of nasopharyngeal carcinoma (NPC) in 2003, which was in complete remission following curative chemoradiation. Additionally, she has several comorbidities, including poorly controlled asthma, previously treated pulmonary tuberculosis, a history of subarachnoid hemorrhage and stroke, hypertension, dyslipidemia, and type 2 diabetes mellitus.

In 2019, she had been under the follow-up care of the Ophthalmology clinic for radiation-induced right optic neuropathy. However, due to the restrictions imposed during the COVID-19 pandemic, she was lost to follow-up.

She re-presented to the Ophthalmology clinic in September 2022 with complaints of worsening vision and right eye proptosis that had been ongoing for six months. On examination, her right eye showed no perception of light, an amaurotic right pupil, and limited extraocular movement in all directions of gaze. Hertel's ophthalmometer measurements revealed proptosis, and there was a loss of corneal sensation in the right eye.

Investigations

Magnetic resonance imaging (MRI) of the orbits revealed a large enhancing mass in the right orbital apex, measuring 3.3 x 1.5 x 2.0 cm. The mass showed intraconal fat stranding and significant enlargement of the superior oblique, medial, and inferior recti muscles, with increased T1 weighted signals. Additionally, abnormal enhancement extended to the right cavernous sinus through the right superior orbital fissure (Figure 1). Imaging of the nasopharynx did not reveal any signs of recurrence of NPC

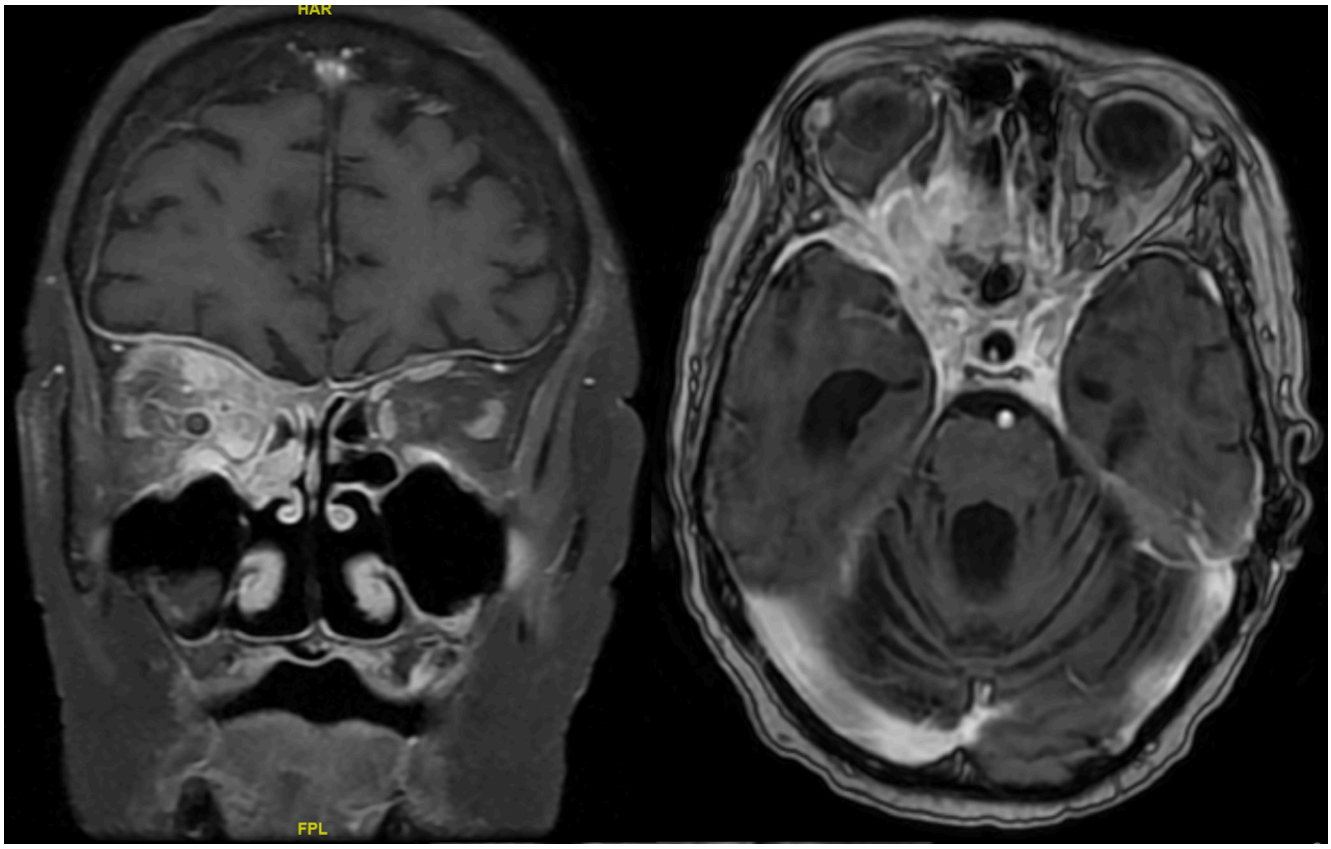

Figure 1. T1-weighted MRI with contrast in coronal and axial view depicting a hyperintense lesion in the right orbital apex with thickened superior oblique, medial and inferior rectus muscles. It causes mass effect on the right orbit anteriorly and extends posteriorly into the right cavernous sinus.

(Figure 2). Enhancement consistent with radiation-induced changes from previous radiotherapy was also observed at the skull base.

A prior orbital MRI conducted in February 2021 did not indicate the presence of a right orbital apex lesion at that time.

In consideration of the MRI findings, the patient underwent an endoscopic biopsy of the right orbital apex lesion. Intraoperative examination did not reveal any gross tumor at the right orbital apex, but the right lamina papyracea appeared thin, and the right medial rectus muscle was thickened. The right optic nerve was not visualized (Figure 3). Histopathological analysis of the biopsy specimens obtained from the right orbital apex and the medial rectus muscle confirmed the presence of fibrous tissue infiltrated by squamous cell carcinoma with keratin pearl formation, consistent with a diagnosis of squamous cell carcinoma.

A systemic workup using F-fluorodeoxyglucose-positron emission tomography (FDG PET-CT) did not identify any other primary squamous cell carcinoma or distant metastasis.

Treatment

A multidisciplinary board meeting was held, and after an extensive discussion, it was determined that palliative care was the most suitable option for the patient. Considering her poor candidacy for chemotherapy and radiotherapy, as well as the unresectable nature of the tumor, the decision was made for palliative management. Subsequently, she was referred to the palliative care team and discharged with home hospice follow-up. Unfortunately, approximately one month after the diagnosis, she succumbed to her illness and passed away peacefully at home.

Discussion

The most common primary malignancy affecting the orbit is orbital lymphoma, which comprises 20.8% of all orbital malignancies. Distant metastasis to the orbit typically originates from primary tumors in the breast, prostate, or lung, accounting for approximately 20% of all orbital malignancies as well [(1)]. These metastatic tumors commonly exhibit non-squamous cell carcinoma (non-SCC) histology, such as adenocarcinoma.
Orbital apex squamous cell carcinomas (SCCs) typically arise as secondary tumors due to direct extension from neighboring structures, including the paranasal sinuses, nasopharynx, and facial region, often through perineural spread [(1)].

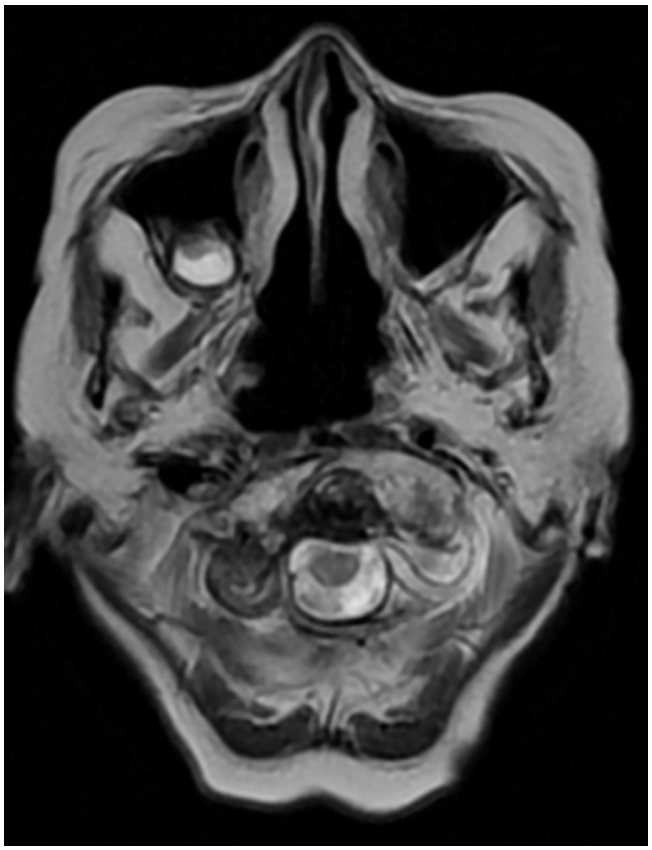

Figure 2. T2-weighted MRI in axial view showing that the post nasal space was flat and had no signal changes.

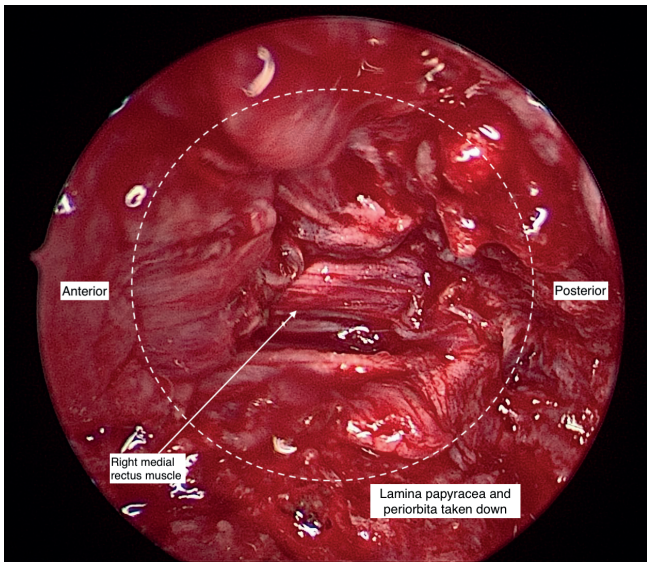

Figure 3. Endoscopic image of right orbital apex on a 45 degree scope. Lamina papyracea and periorbita had been taken down. No gross tumour was seen but the medial rectus noted to be thickened.

Primary orbital squamous cell carcinoma (SCC) is a rare condition, with fewer than 10 cases reported in the literature. Moreover, primary orbital apex SCCs are even rarer, with only 5 documented cases so far [2-4]. This rarity can be attributed to the absence of squamous epithelium in the orbital apex. The development of primary orbital SCCs has been hypothesized to arise from malignant transformation of dermoid cysts [5], squamous metaplasia of lacrimal gland cysts [6], or as a result of post-ocular surgery, potentially due to the implantation of conjunctival epithelium into the orbit [7,8].

Orbital apex syndrome refers to a constellation of symptoms related to structures located in the orbital apex, which involves cranial nerves II, III, IV, V1, V2, and VI. Common symptoms associated with diseases affecting the orbital apex include vision loss, painful and restricted eye movements, as well as diplopia. Pain around or in the skin surrounding the orbit suggests involvement of the ophthalmic nerve, while facial pain localizes to maxillary nerve involvement. Diplopia occurs when the oculomotor, abducens, or trochlear nerves are invaded, either individually or in combination.

During examination, the absence of corneal sensation and reflex, as well as numbness over the forehead or cheek, indicates trigeminal nerve involvement. Pupillary abnormalities can manifest as a relative afferent pupillary defect (RAPD), indicating optic nerve involvement, or anisocoria on the side of the dilated pupil, indicating pupillary fiber involvement of the oculomotor nerve. Ophthalmoplegia occurs because of involvement of the oculomotor, abducens, or trochlear nerves, individually or in combination.

Other signs that may be present include proptosis (bulging of the eye), optic disc edema or optic atrophy due to compression of the optic nerve, and choroidal folds resulting from external compression on the orbital globe [7]. Badakere et al. provide a concise summary of the differential diagnoses for orbital apex syndrome in a table, encompassing inflammatory, infectious, and neoplastic causes [9].

Neuroimaging plays a crucial role in the evaluation of orbital apex syndrome, with contrast-enhanced MRI of the orbit/brain considered the gold standard [10]. T1-weighted sequences with fat suppression should be acquired to assess the orbital apex and cavernous sinus in detail. Contrast-enhanced images enable the evaluation of soft tissue involvement in the cavernous sinus, intracranial extension, bone marrow involvement, as well as perineural spread of tumors, characterized by focal or diffuse thickening of the affected cranial nerves. If MRI is contraindicated, computed tomography (CT) of the brain/orbit can serve as a viable alternative [11].

Histopathological sampling is essential to determine the under-

lying cause of the disease, whether it is inflammatory, infectious, or malignant. Biopsy samples also allow for precise subtyping and grading of the tumor, which can potentially influence the choice of treatment modality.

Due to the rarity of primary SCC of the orbital apex, there are no established staging criteria for this condition. Existing staging criteria apply to secondary spread to the orbital apex. The 8th edition of the AJCC staging for tumors of the maxillary sinus and nasal cavity/ethmoid sinuses designates tumor involvement of the orbital apex as a local stage of 4b [12]. Prado-Ribeiro et al. suggested that orbital apex involvement in head and neck cancers is associated with a poor prognosis for patients [13].

There is no universally accepted standard of care for primary SCC of the orbital apex/orbit due to its extremely infrequent occurrence. Previously reported cases of orbital apex SCC have been managed in various ways. Saha et al. chose primary orbital radiotherapy followed by active surveillance [3]. Peckinpaugh et al. opted for orbital radiotherapy with adjuvant chemotherapy for two cases and primary orbital radiotherapy for another case [3]. Hromas et al. performed an orbital exenteration followed by adjuvant radiotherapy [4]. Saha et al. did not report the mortality outcome for their patient. Hromas reported that his patient remained disease-free 18 months after diagnosis. Peckinpaugh reported that one patient was alive 49 months after diagnosis, but two cases died at 19- and 12-months post-diagnosis, respectively.

Conclusions

Primary orbital apex/orbital squamous cell carcinoma (SCC) is an extremely rare condition with a poorly understood pathogenesis. The optimal management approach, whether it involves unimodal or multimodal therapy such as surgical resection, radiotherapy, and/or chemotherapy, remains uncertain. Based on the limited case series available for primary orbital apex SCCs, the outcomes appear to be unfavorable. Among the six reported cases, including this one, only 2 out of 6 patients survived beyond 19 months. Further research is needed to gain a deeper understanding of this enigmatic disease.

Key Takeaways

- Orbital apex syndrome can have various causes, including malignancy, infection, and inflammation. Thorough evaluation is crucial due to the diverse treatment approaches required for different etiologies.
- Orbital lymphoma is the most common primary orbital malignancy, while distant metastasis to the orbit usually originates from the breast, prostate, or lung.
- Orbital SCCs often occur because of secondary spread, including direct invasion from the nasopharynx, nasal cavity/paranasal sinuses, or hematogenous dissemination.
- Treatment options for orbital SCCs may involve single modality or multimodality approaches, such as chemotherapy, radiation, or surgical resection. Further research is needed to assess the overall survival and efficacy of each treatment modality.

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Authorship contribution

KL, the first author of the paper prepared the manuscript and expounded on the discussion with literature review. AT is the supervising consultant who gave guidance and assistance in preparing this case report.

Ethics approval

Not applicable.

Consent to participate

Written informed consent for publication of their clinical details and clinical images was obtained from the daughter of the patient. A copy of the consent form is available for review by the Editor of this journal..

Availability of data and materials

Not applicable.

Conflict of interest

The authors declare that they have no competing interests.

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