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OLFACTORY NEUROBLASTOMA – 2 CASE REPORTS IN A TERTIARY CARE CENTRE IN SOUTH INDIA

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ABSTRACT

Olfactory neuroblastoma is a rare malignant tumor primarily affecting the nasal cavity and potentially extending to adjacent structures. We present two cases treated at a tertiary care hospital, detailing their clinical presentations and management. The first case involved a 55-year-old male with bilateral nasal obstruction, loss of vision, and significant nasal mass, confirmed through biopsy as olfactory neuroblastoma. The second case described a 68-year-old male with unilateral nasal blockage and headache, where imaging revealed an extensive nasal mass leading to surgical excision, again confirming the diagnosis. We highlight the clinical features, and staging systems. Imaging modalities such as CT and MRI play crucial roles in assessing tumor extension, while histopathological analysis informs prognosis and treatment planning. Surgical resection remains the cornerstone of treatment, with endoscopic techniques emerging as effective alternatives, particularly for advanced cases. Adjuvant radiation therapy is standard, although its necessity in early-stage cases continues to be debated. Chemotherapy may be beneficial for advanced disease and is tailored based on individual patient factors. Despite a generally favorable prognosis, the risk of local and regional recurrence underscores the importance of long-term follow-up. This article emphasizes the need for accurate diagnosis, comprehensive treatment planning, and ongoing patient monitoring to optimize outcomes in esthesioneuroblastoma management.

KEYWORDS

Esthesioneuroblastoma, Diagnosis, Olfactory neuroepithelium, Surgical management, Chemotherapy

INTRODUCTION

Esthesioneuroblastoma, synonymous with olfactory neuroblastoma, is a rare and unique type of malignant neoplasm that arises from the olfactory neuroepithelium. This malignant tumour was first described by Berger and Luc in 1924, as a neuroectodermal tumor primarily affecting the nasal cavity and occasionally extending to adjacent structures, including the orbit and the cranium. Its clinical manifestation often includes nasal obstruction, epistaxis, and anosmia. We describe 2 such cases who presented to a tertiary care hospital in south India.

Case Description 1:

A 55 year male complained of bilateral nasal block for three months and loss of vision in both eyes. History of foul-smelling, occasionally blood-stained nasal discharge was present with protrusion of left eye and loss of smell. Widening of dorsum of nose was noted and a pale mass was seen occupying both nasal cavities extending anteriorly upto the vestibule. The mass bled on probing. Her pupils were unreactive, pupillary reflex was absent and extra-ocular movements were restricted bilaterally.

Multiple punch biopsies were taken under general anesthesia and the histopathology report was that of olfactory neuroblastoma. The institution's multi-disciplinary tumour board advised 6 cycles of chemotherapy (Vincristine, Actinomycin D and Cyclophosphamide) followed by response assessment and radiotherapy.

Case Description 2:

A 68 year old male complained of left-side nasal block for 3 months associated with headache. On anterior rhinoscopy, a single soft cystic pale mass occupying the entire left nasal cavity was noted, extending anteriorly till the anterior end of the inferior turbinate.

Magnetic resonanace imaging showed a lesion in the posterior 2/3rd of the left nasal cavity measuring 5.5 x 2.5 x 5 cm extending into and nearly obliterating the nasopharynx.

The patient underwent endoscopic excision of the sinonasal mass under general anesthesia. Intraoperatively the mass was noted in the left nasal cavity extending superiorly upto the cribriform plate but having no involvement of the olfactory fossa, posteriorly till the choana, medially till the septum, laterally into the middle meatus. The mass was resected in toto. Histopathological report was that of olfactory neuroblastoma.

Immuno-histochemistry staining showed tumour cells strongly positive for CD 56 and synaptophysin, weakly positive for chromogranin and negative for Cd99.

After a discussion in the multi-disciplinary tumour board, it was decided to proceed with chemotherapy (Vincristine, Actinomycin D and Cyclophosphamide), followed by response assessment and radiotherapy.

DISCUSSION

Of neural crest origin, olfactory neuroblastoma arises from the basal cells of the olfactory neuroepithelium. Causal factors and hereditary patterns are yet to be described for this malignancy [1].

Olfactory neuroblastoma has a tendency to spread locally through the submucosal plane of paranasal sinuses and invade the anterior cranial base. Extension to brain and subarachnoid space follows [2]. Hematogenous and lymphatic spread occur. Lymphatic spread to cervical lymph nodes occurs in 30% of cases [3]. Distant spread to lung and bone may occur [2].

Staging

Kadish et al introduced a pretreatment staging system [4].

Table 1 Kadish staging of olfactory neuroblastoma

Stage A	Confined to the nasal cavity strictly
Stage B	Involving the nasal cavity and paranasal sinuses
Stage C	Extending beyond the nasal cavity and paranasal sinuses intracranially
Stage D	Having cervical nodes and distant metastasis (montal et al)

Stamm – Kennedy esthesioneuroblastoma staging system factors in whether the tumour involves the dura or extends intracranially [1].

Table 2 Stamm-Kennedy staging of olfactory neuroblastoma

Stage 1	Confined to the nasal cavity and paranasal sinuses
Stage 2	Having dural involvement
Stage 3	Having orbital involvement
Stage 4	Having intracranial involvement
Stage 5	Having regional or distant metastasis

Clinical features

This tumour usually presents as a unilateral nasal obstruction, recurrent epistaxis, anosmia and occasionally Eustachian tube block, unilateral middle ear effusion, diplopia, proptosis, vision loss. Also it may be associated occasionally with hormone excess syndromes viz. Cushing's or SIADH secretion.

The differential diagnoses for esthesioneuroblastoma include the following: sinonasal undifferentiated carcinoma, neuroendocrine tumour, melanoma, lymphoma, plasmacytoma, embryonal rhabdomyosarcoma, ewing sarcoma, peripheral primitive neuroectodermal tumour and vascular tumour such as hemangioma pericytoma [1].

Hyam's grading system based on histologic features.
Histopathology may be correlated with survival and prognosis [5]. A study has combined the grades as follows: grades 1 and 2 correspond to low grade and grades 3 and 4 correspond to high grade [6].

Imaging
A combination of CT and MRI is essential for a comprehensive assessment of tumor extension. Fine-cut CT (1.5 mm slice thickness) is recommended as the first imaging modality, providing detailed visualization of osseous involvement and identifying characteristics such as homogeneous soft tissue masses with moderate enhancement and potential calcification. It is particularly effective in evaluating bony erosion of structures like the cribriform plate [5].

Magnetic resonance imaging is considered the gold standard for imaging, offering superior detail in assessing soft tissue involvement, intracranial extension, and perineural invasion. Typically olfactory neuroblastoma appears hypointense on T1-weighted images and intermediate to hyperintense on T2-weighted images. MRI can distinguish tumor from surrounding tissues and identify signs of intracranial extension, although definitive diagnoses regarding dural and periorbital involvement are usually made during surgery [5], [7].

Surgical Treatment
Surgical management of olfactory neuroblastoma traditionally involves anterior craniofacial resection, which includes bifrontal craniotomy and transfacial lateral rhinotomy. This approach provides excellent tumor exposure and enables en bloc resection, along with effective reconstruction using vascularized pericranial flaps. Recently, endoscopic techniques have gained popularity, initially limited to early-stage tumors. Advances in endoscopic methods now allow these techniques to be employed even for advanced-stage tumors, reducing the need for facial incisions and minimizing frontal lobe retraction [8].

Pure endonasal endoscopic approaches can access various regions of the anterior skull base and allow for resection of dura, olfactory tracts, and involved brain tissue. However, extensive invasion of brain parenchyma remains a relative contraindication for these methods, often necessitating traditional craniofacial approaches. Contraindications for pure endoscopic methods also include significant involvement of the frontal sinus, nasolacrimal sac, carotid artery, and extensive intraorbital invasion [8].

Post-surgery, the reconstruction of the skull base is crucial to prevent cerebrospinal fluid (CSF) leaks, with multilayered watertight closure being essential. Although the nasoseptal flap is commonly used, alternatives may be necessary in cases of septal involvement or larger defects. The risk of CSF leaks is noted to be higher with endoscopic approaches, with reports indicating a 12.5–17% incidence, though recent studies show rates below 5% [9].

Regardless of the surgical approach, achieving gross total resection with negative margins is vital. While en bloc resection is often debated, it has not demonstrated superior oncological outcomes compared to piecemeal resection when adequate margins are maintained. The complexity of skull base anatomy poses challenges even for open craniofacial approaches, making complete en bloc resection difficult in many cases [7].

Role Of Radiation Therapy
The usual treatment protocol involves surgical resection followed by postoperative radiotherapy. This approach has been shown to enhance local disease control. However, the necessity of postoperative radiation in early-stage (Kadish A) olfactory neuroblastoma, where resection margins are negative, remains a topic of debate; in some cases, surgery alone may suffice. [10]

The radiation doses typically administered range from 55 to 65 Gy. Advancements in radiation technology, such as intensity-modulated radiotherapy (IMRT) and proton beam therapy, have improved treatment outcomes. These techniques provide better local control while minimizing toxicity and the risk of complications to surrounding critical structures. Overall, while surgical resection followed by radiotherapy is standard for managing ONB, careful consideration is needed for early-stage cases, and ongoing advancements in radiation techniques offer promising avenues for improved patient outcomes [7].

Role Of Chemotherapy
Some studies suggest that olfactory neuroblastoma may exhibit chemosensitivity due to its biological similarities to other neural crest tumors, such as high-grade neuroendocrine tumors.

Chemotherapy is generally considered for patients with advanced disease, characterized by high Hyams grades, extensive regional disease, distant metastases, positive surgical margins, unresectable tumors, or recurrences. While there is no established standard chemotherapy regimen, several combinations have been explored. Notably, some reports have documented the use of cyclophosphamide, vincristine, and doxorubicin, while others have favored cisplatin-based regimens. Among these, cisplatin combined with etoposide appears to be the most commonly used [11].

Adjuvant chemotherapy has shown potential in improving locoregional control and extending the median time to relapse. Neoadjuvant chemotherapy has also been investigated, particularly in advanced cases with extensive intracranial and intraorbital involvement, aiming to reduce tumor bulk for better surgical resection or to facilitate definitive chemoradiation treatment [11].

CONCLUSION
Olfactory neuroblastoma necessitates careful pathological and immunohistochemical evaluation to distinguish it from other neuroendocrine tumors before treatment initiation. The most accepted treatment protocol involves adequate surgical resection followed by adjuvant radiotherapy, with or without chemotherapy.

Endoscopic or endoscopic-assisted techniques may be employed as alternatives to traditional open craniofacial resection, achieving comparable oncological outcomes.

Long-term follow-up—extending beyond 10 years—is essential due to the significant risk of delayed local and regional recurrences. This highlights the need for ongoing monitoring and management strategies for affected patients.

REFERENCES:

[1] Stamm, A. C. (2019). Transnasal Endoscopic Skull Base and Brain Surgery. Thieme.
[2] Rod J. Oskouian, J. A. (2002). Esthesioneuroblastoma: clinical presentation, radiological, and pathological features, treatment, review of the literature, and the University of Virginia experience. Journal of Neurosurgery, 1-9.
[3] Alessandra Rinaldo, A. F. (2002). Esthesioneuroblastoma and Cervical Lymph Node Metastases: Clinical and Therapeutic Implications. Acta Oto-Laryngologica , 215-221 .
[4] Kadish S, G. M. (1976). Olfactory neuroblastoma. A clinical analysis of 17 cases. Cancer, 1571-1576.
[5] Pavel Dulguerov, M. S. (2001). Nasal and paranasal sinus carcinoma: Are we making progress? Cancer, 3012-3029.
[6] Constantinidis J, Steinhart H, Koch M, Buchfelder M, Schaenzer A, Weidenbecher M, Iro H. Olfactory neuroblastoma: the University of Erlangen-Nuremberg experience 1975–2000. Otolaryngology—Head and Neck Surgery. 2004 May;130(5):567-74.
[7] Abdelmeguid, A. S. (2018). Olfactory Neuroblastoma. Current Oncology Reports, 20(1). doi:10.1007/s11912-018-0661-6
[8] Gallia GL, Reh DD, Salmasi V, Blitz AM, Koch W, Ishii M. Endonasal endoscopic resection of esthesioneuroblastoma: the Johns Hopkins Hospital experience and review of the literature. Neurosurg Rev. 2011;34(4):465–75. https://doi.org/10.1007/s10143-011-0329-2.
[9] Su SY, Kupferman ME, DeMonte F, Levine NB, Raza SM, Hanna EY. Endoscopic resection of sinonasal cancers. Curr Oncol Rep. 2014;16(2):369. https://doi.org/10.1007/s11912-013-0369-6.
[10] Schwartz JS, Palmer JN, Adappa ND. Contemporary management of esthesioneurobl astoma. Curr Opin Otolaryngol Head Neck Surgery. 2016;24(1):63–9. https://doi.org/10.1097/MOO. 0000000000000220.
[11] Loy AH, Reibel JF, Read PW, Thomas CY, Newman SA, Jane JA, et al. Esthesioneuroblastoma: continued follow-up of a single institution's experience. Arch Otolaryngol Head Neck Surg. 2006;132(2):134–8. https://doi.org/10.1001/archotol.132.2.134.