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## Olfactory Neuroblastoma

This 57 year-old woman presented with a seizure. She had a history of attending the ENT and neurosurgical departments for more than a decade. At the time of her initial presentation many years prior, her main complaint was of nasal congestion. A nasopharyngeal biopsy confirmed an olfactory neuroblastoma. (Figure 1)



Figure 1. Coronal CT Brain (non-contrast)

Olfactory neuroblastoma is an uncommon slow growing tumour of the nasal cavity with no established etiological basis. With a neuroectodermal origin, it arises from the olfactory epithelium of the upper nasal cavity.<sup>1</sup> Most cases arise from the cribriform plate, upper third of the nasal septum, superior turbinates or anterior ethmoidal air cells. However, it typically presents late when multiple structures are involved, which may include the orbits and intracranial compartments.<sup>2</sup>

Accounting for approximately 2% of sinonasal tumors, although often late to present, ironically only a minority of patients experience anosmia.<sup>3</sup> The commonest complaint at initial presentation is nasal blockage accounting for nearly a quarter of cases, with headache and epistaxis the next most frequent symptoms.<sup>1</sup>

Multi-modality imaging is essential in that the most recognized management of this infrequent tumor is a combination of craniofacial surgery and radiotherapy. The imaging pathway in this case was typical, with CT and MRI complementing each other in maximizing tumor delineation. Computed Tomography has superior definition in reviewing bony involvement which is a typical finding, whereas MRI has superiority in evaluating the extent of soft tissue invasion and establishing tumor boundaries against post obstruction fluid in the paranasal sinuses.<sup>3</sup> In this case the CT illustrates the gross destruction of the skull base, orbital and sinus margins. (Figure 2-5) The MRI outlines the extension of disease involving the pituitary fossa, brainstem and frontal sinus invasion. (Figures 6 and 7)

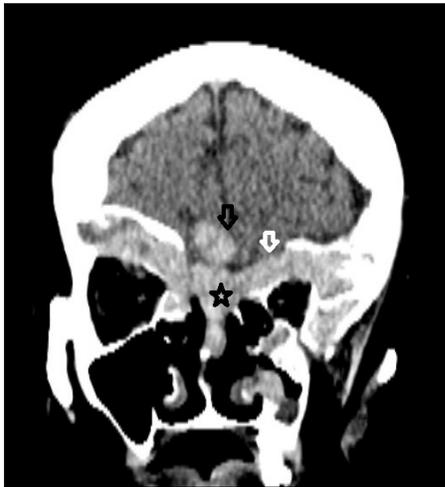
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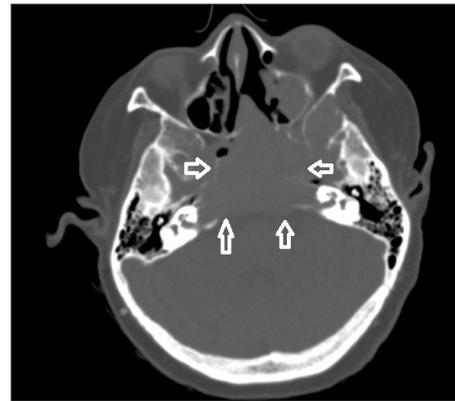
**Figure 2.** Coronal CT Brain (non-contrast): Tumor in the midline involving the nasal septum (\*), with destruction of the cribriform plate (black arrow) and destruction of both superior orbital margins (white arrow).



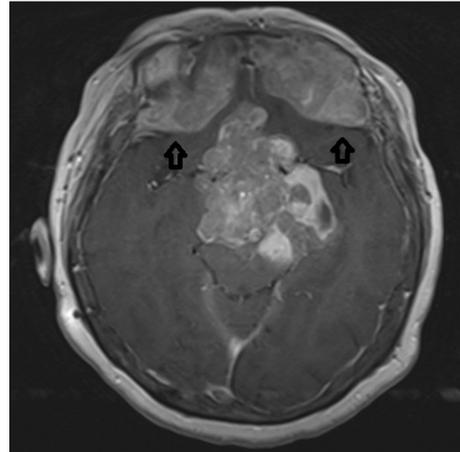
**Figure 3.** Sagittal CT Brain (non-contrast): The tumor has replaced the sphenoid sinus and sella (\*), with destruction of the floor of the anterior cranial fossa and frontal sinus invasion (black arrow).



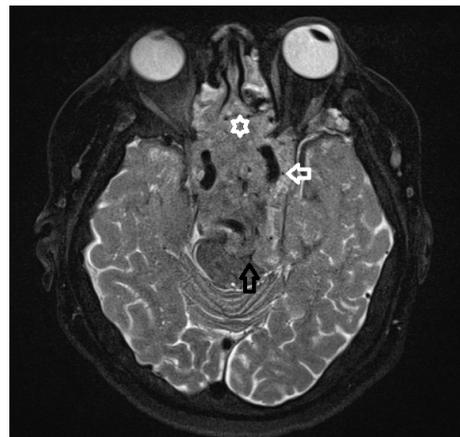
**Figure 4.** Axial CT Brain (non-contrast): Tumor contiguous with the ethmoid and sphenoid sinuses (black arrow) and extension into the pre-pontine space (\*) with bilateral proptosis due to mass effect.



**Figure 5.** Axial CT Brain (bone windows): Extensive bony destruction of the base of skull: involving the walls of the sphenoid sinus, (white arrows), carotid canals and petrous ridge.



**Figure 6.** Axial MRI Brain (post contrast): Enhancing soft tissue in both frontal sinuses indicating this is complete tumor invasion (\*) without obstructed secretions.



**Figure 7.** Axial T2 FS Brain: The huge tumor involves the ethmoid sinuses (\*), cavernous sinus (white arrow) and compresses the pons (black arrow).

REFERENCES

1. Diaz EM, Johnigan RH, Pero C, El-Naggar AK, Roberts DB, Barker JL, DeMonte F. Olfactory neuroblastoma: the 22-year experience at one comprehensive cancer center. *Head Neck*. 2005 Feb;27(2):138-49.
2. Li C, Yousem DM, Hayden RE, Doty RL. Olfactory Neuroblastoma: MR Evaluation. *ANJR*. 1993 Sept/Oct;14:1167-1171.
3. Thompson, LDR. Olfactory Neuroblastoma. *Head Neck Pathol*. 2009 Sep;3(3): 252-259.