



## Case of Nasopharyngeal Neoplastic Lesion with Associated Perineural Spread

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### Abstract

Perineural spread of disease in head and neck tumors is a well described phenomenon in surgical and imaging literature. Branches of trigeminal and facial nerve serve as the most common conduit for the process to occur. However features of nerve involvement are not unique to tumor spread alone. Opportunistic infections, inflammatory disorders and primary nerve tumors also exhibit similar imaging feature.

### Introduction

Perineural tumor spread refers to spread of tumor to a distant location from its primary site using the nerve as a conduit. It is different from perineural nerve involvement which refers to nerve involvement at the site of disease [1]. Commonly vehicles for this process to occur are branches of facial and trigeminal nerve, however involvement of other cranial nerves have also been reported in past literature [2,3]. MRI is the modality of choice to identify features of nerve involvement, which include nerve enlargement, enhancement, destruction of the foramina through which it spreads and secondary features, which occur as a result of muscle denervation. These features are however not unique to tumor spread alone. Pathologies such as opportunistic infections, inflammatory disorders and primary nerve tumors also exhibit similar findings [4]. Perineural spread of disease is associated with poor prognosis and high rates of recurrence in malignancies and refers to aggressive version of infection [5]. A prior study revealed that in a series of 38 patients with perineural spread only 13% of radiology reports had mention of perineural spread [6]. Mention of perineural spread can impact management in head and neck pathologies especially in cases of malignancies, where treatment would change from surgery alone to include wide field radiation, surgical resection and neoadjuvant chemotherapy [7]. Here we present a case of histopathologically proven squamous cell carcinoma involving the buccal mucosa who presented to our department for staging workup.

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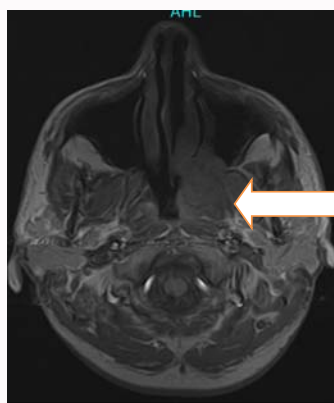
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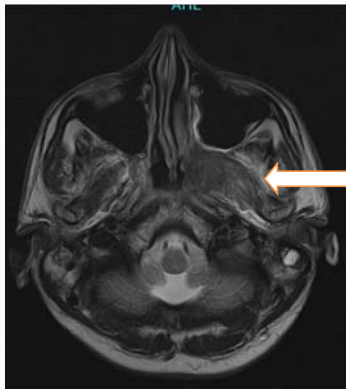
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### Case Presentation

A 39 years old male with no past significant history, no known co-morbid, presented to ENT O.P.D with complaints of nasal blockage, ear ache and numbness in facial region from 2 months. On scope examination, he was found to have a mass in nasopharyngeal region, which on biopsy turned out to be squamous cell carcinoma. He was further referred to department of radiology for MRI and PET CT scan as part of staging workup.



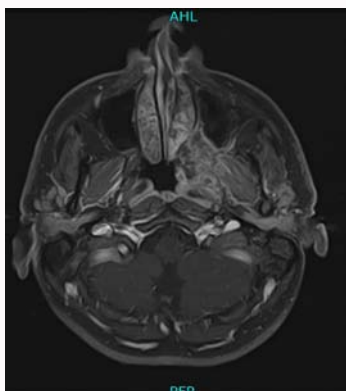
**Figure 1:** Axial T1 weighted images axial Section, showing abnormal hypointense Lesion (arrow) involving the left nasopharyngeal soft Tissue protruding into the nasopharyngeal Airway and the nasal cavity anteriorly.



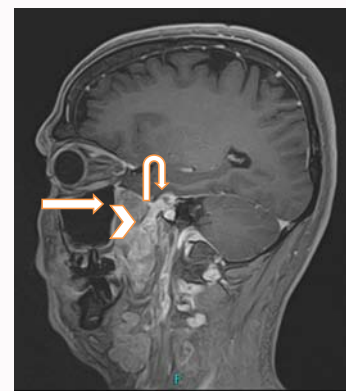
**Figure 2:** T2 weighted image through base of Skull hyper intense signals in the abnormal Lesion involving left nasopharyngeal soft Tissues (arrow).



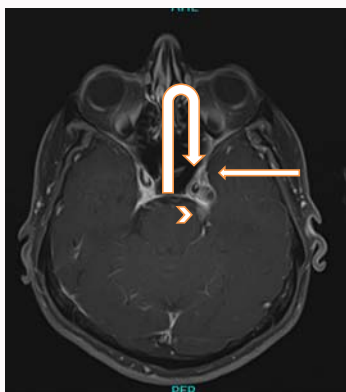
**Figure 5:** T1 weighted image sagittal section, shows nerve thickening along the course of mandibular division (arrow) of trigeminal nerve.



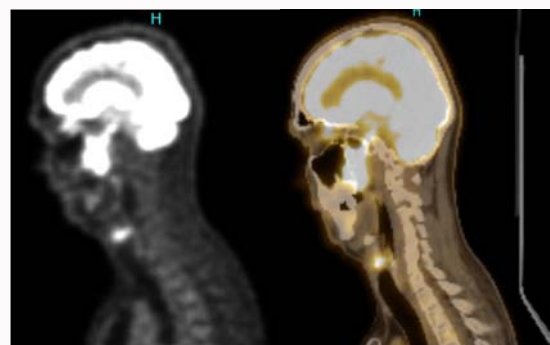
**Figure 3:** T1 post contrast image axial section shows heterogeneous enhancement within this lesion.



**Figure 6:** T1 post contrast sagittal image reveals, abnormal thickening and enhancement along the course of maxillary (arrow) and mandibular (arrow head) divisions of trigeminal nerve with extension up to the Meckels cave (curved arrow).



**Figure 4:** T1 post contrast image axial section, reveals enhancement extending along the branches of trigeminal nerve (arrow) up to the region of cavernous sinus (curved arrow) , involving the dura (arrow head) , without intra axial extent.



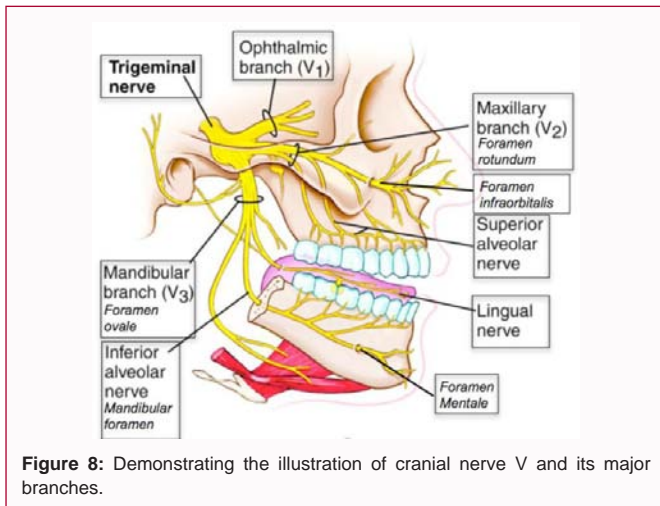
**Figure 7:** MIP and 8 fused images reveal abnormal FDG uptake in the lesion in nasopharyngeal soft tissues along with extension of the uptake along the branches of trigeminal nerve with intracranial extent.

**Imaging findings**

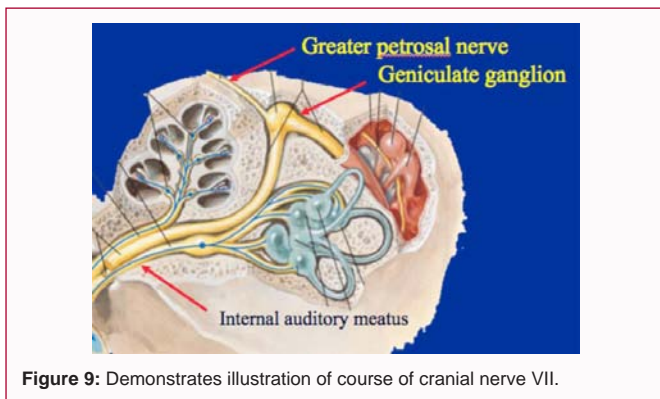
**MRI brain with contrast examination findings:** Axial T1 (Figure 1) image reveals a hypointense abnormal signal intensity lesion involving the left nasopharyngeal soft tissues which appears heterogeneously hyperintense on T2 weighted axial image (Figure 2). The lesion shows heterogeneous post contrast enhancement on T1 post contrast axial image (Figure 3). There is extension of the enhancement along the dura along the course of branches of trigeminal nerve up to the region of cavernous sinus (Figure 4).

Coronal T1 pre and post contrast images reveal abnormal thickening and enhancement involving the maxillary and mandibular divisions of left trigeminal nerve. The lesion is extending anteroinferiorly to involve the hard palate (Figure 5). Over all findings are consistent with a neoplastic lesion involving the left nasopharyngeal soft tissues with perineural spread along branches of V<sup>th</sup> nerve with intra dural extent, however no intra axial involvement.

**PET-CT scan findings:** Coronal maximum intensity projection (Figure 6) and coronal fused images (Figure 7) show abnormal FDG uptake in the lesion involving the nasopharyngeal soft tissue with



**Figure 8:** Demonstrating the illustration of cranial nerve V and its major branches.



**Figure 9:** Demonstrates illustration of course of cranial nerve VII.

abnormal uptake along the course of maxillary and mandibular divisions of trigeminal nerve up to the region of Meckel's cave.

## Discussion

Perineural spread is a well recognized entity in surgical and imaging literature. Since squamous cell carcinoma is the most common head and neck tumor, it results in highest number of cases with perineural spread [2].

Typical imaging features of perineural tumor spread are nerve enhancement and thickening which are well recognized on MR imaging along with abnormal uptake on FDG pet scan however these features are not unique to tumor spread alone and can be seen in infective, inflammatory and primary nerve pathologies as well [5]. Most commonly involved conduits are the trigeminal (Figure 8) and facial nerves (Figure 9) and hence the knowledge of anatomy and courses of these two structures is paramount to identification of the pathology [8].

According to eighth edition of the TNM staging for head and neck tumors, perineural spread is an independent staging criteria irrespective of nodal status; hence it is important to recognize perineural spread as the entity comes with a worse prognosis compared to localized disease [9].

It also has therapeutic implications as tumors with perineural tumor spread would include wide would require wide field radiation, neoadjuvant chemotherapy along with surgical resection rather than resection alone for localized disease [1].

## Conclusion

It is important to screen and mention features of nerve involvement in head and neck tumors, as this has therapeutic and staging implications.

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