# 62-year-old male with h/o SCC of tongue presents with facial and oral numbness

Keerthana Sharma Anand, MBBS

Abner Gershon, MD

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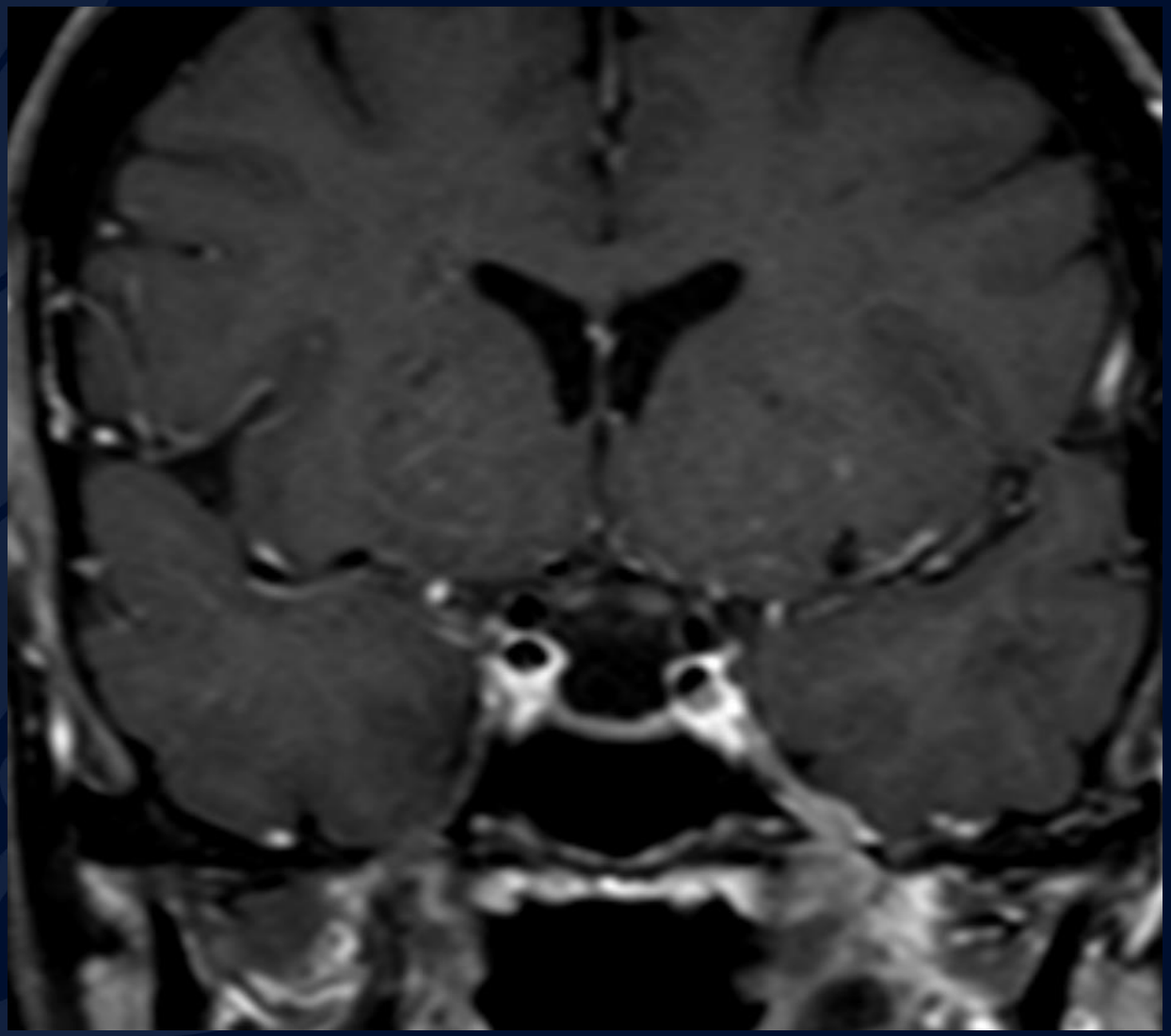

Coronal T1-Gd

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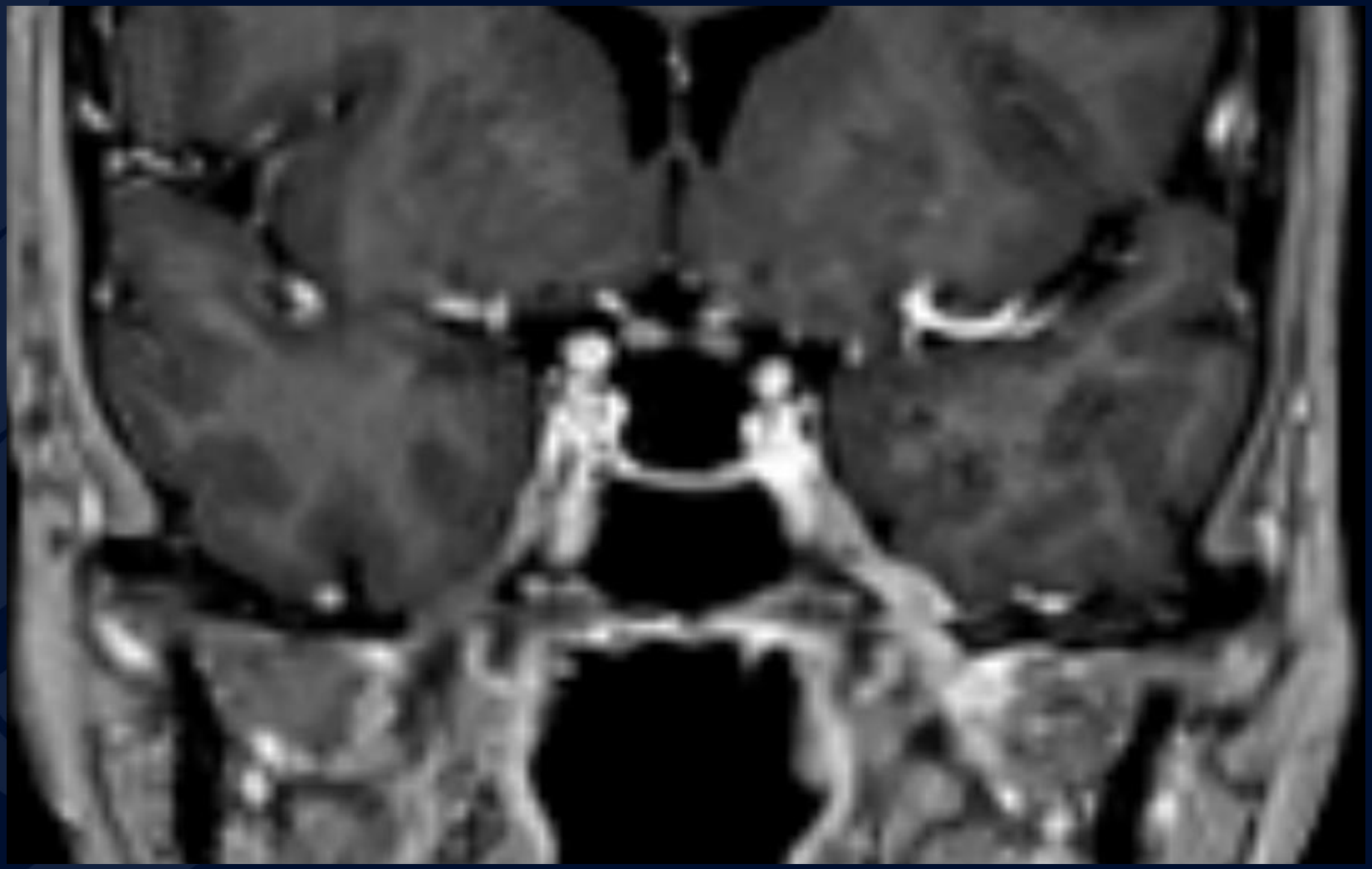

Coronal T1-Gd

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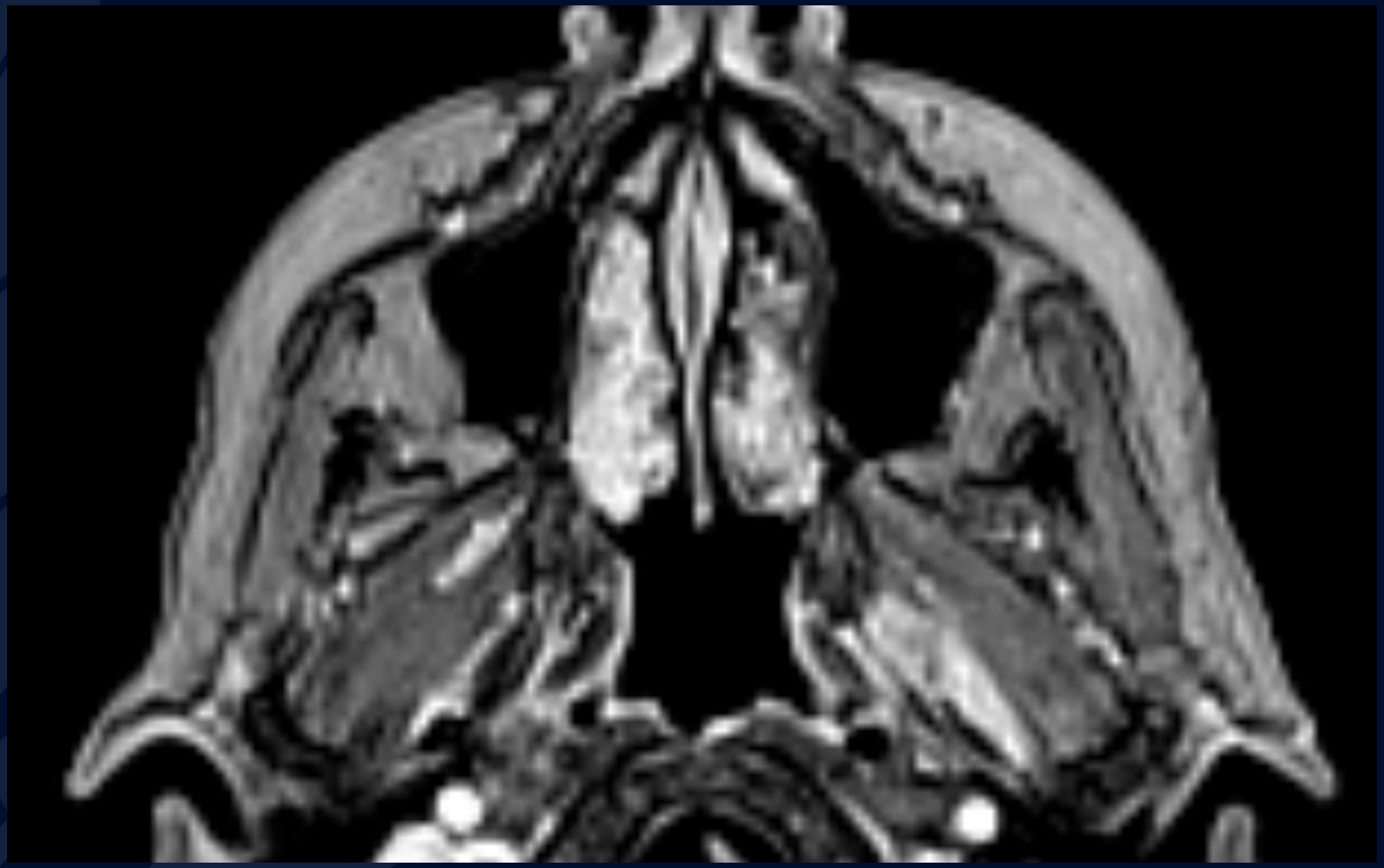

Axial T1-Gd

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# Perineural Tumor Spread

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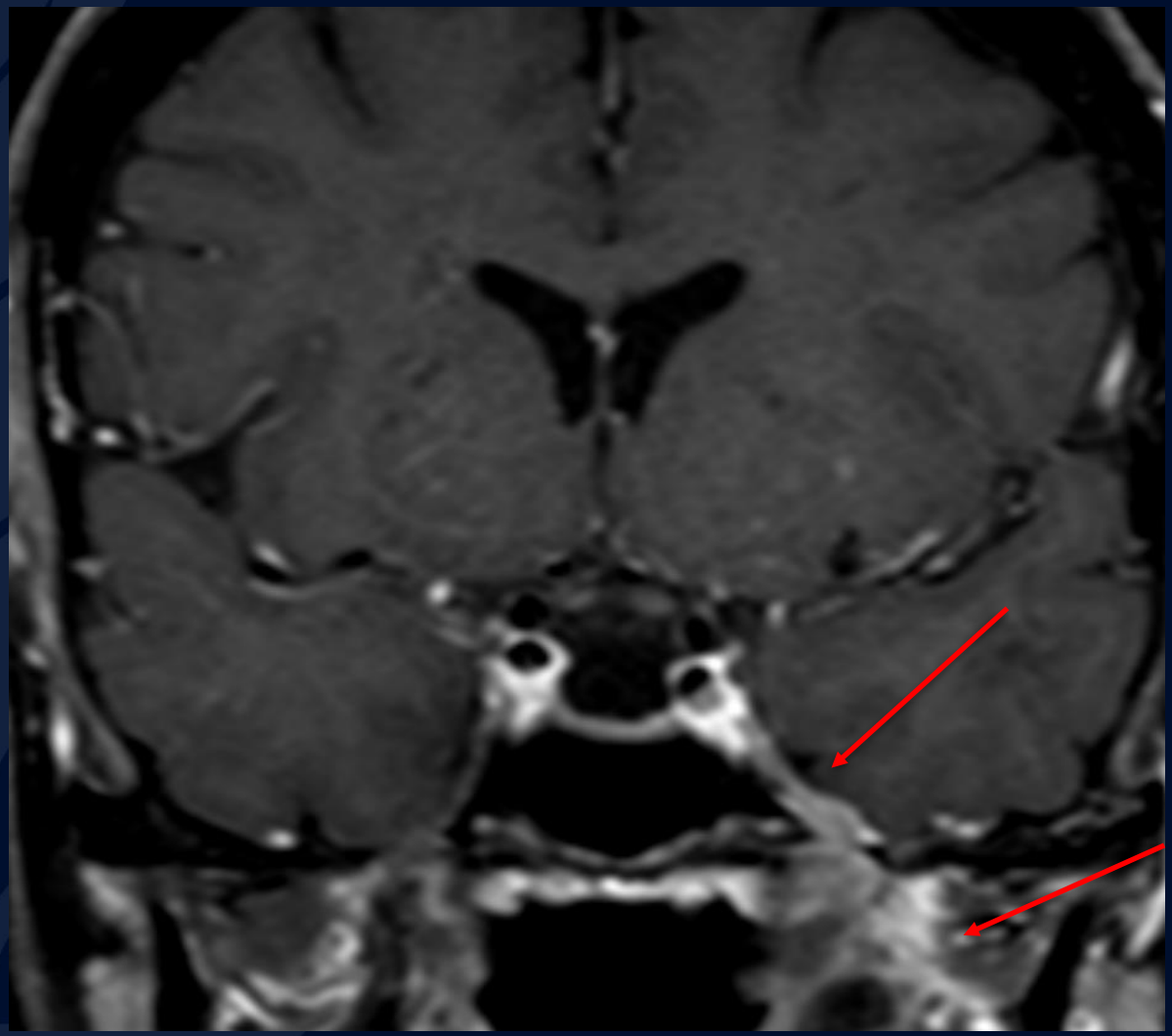
## Coronal T1-Gd



The left mandibular division of CN V is abnormally enlarged & shows enhancement extending from foramen ovale to the masticator space.

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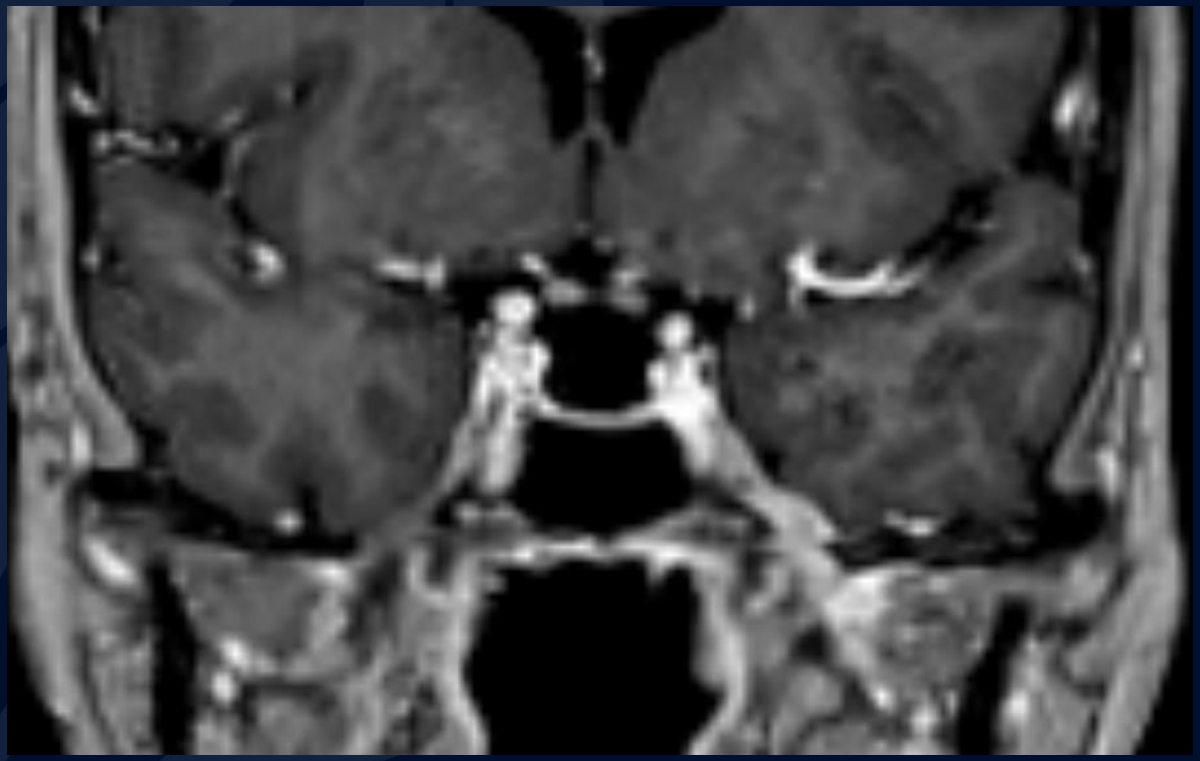
**Coronal T1-Gd**



Perineural tumor spread disrupts the blood nerve barrier and allows leakage of contrast.

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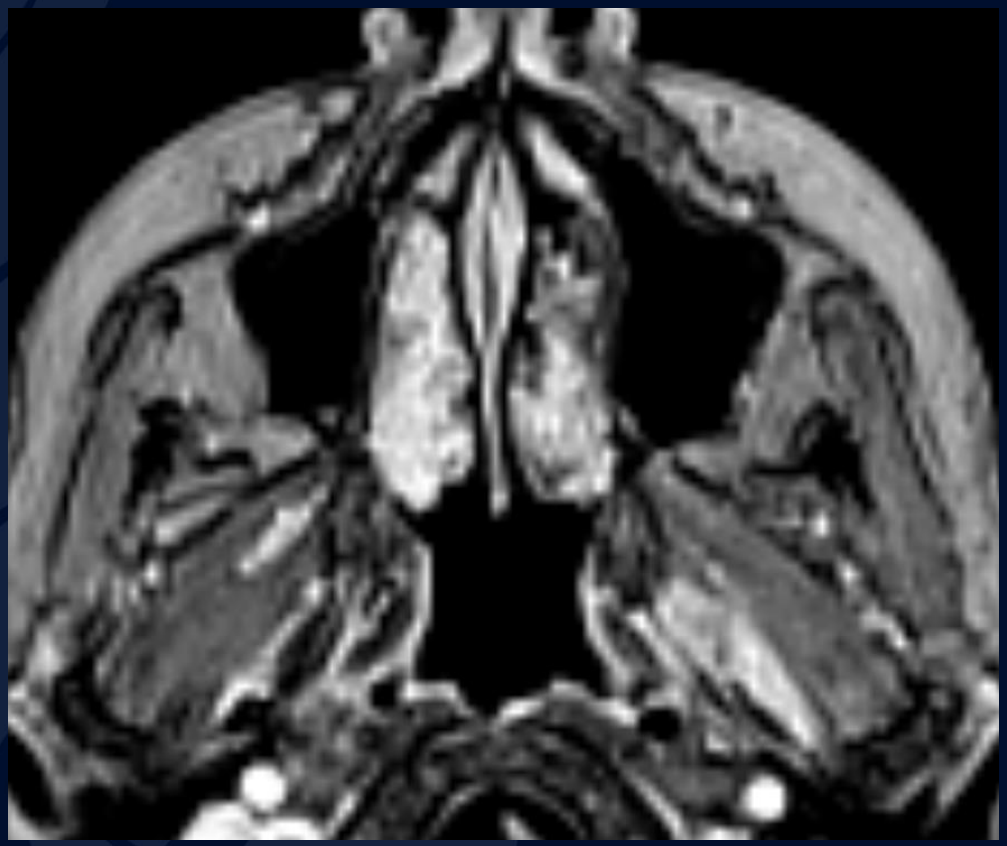

**Axial T1-Gd**

Contrast enhancement is seen along the medial aspect of lateral pterygoid muscle.

Enhancement can be seen in denervated muscles in the acute and subacute phases due to accumulation of contrast in the increased extracellular space surrounding the denervated muscle.

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# Perineural Tumor Spread

**Terminology**:
Perineural tumor spread refers to contiguous neoplastic extension from a primary tumor along the tissues of the nerve sheath.
This has to be distinguished from perineural invasion, which refers to tumor cell infiltration into the nerve, and is a histological finding.

Neutrotropism means that a tumor has an affinity for growth along nerves. Tumors that commonly show neurotropism include;
-Squamous cell carcinoma (oral/laryngeal/cutaneous): most common overall
-Adenoid cystic carcinoma: highest incidence per individual tumor
-Others: Melanoma, Lymphoma, Sarcoma, Meningioma (rare)

Most commonly involved nerves are the maxillary and mandibular divisions of CN V and the facial nerve. The ophthalmic division of CNV and hypoglossal nerve are less frequently involved.

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# Imaging Findings

**Location frequency**: CNV2 > CNV3 > CNV1.

**CT**: Bone CT may show smoothly widened foramina.

**MRI**: Modality of choice.

- T1WI shows enlarged nerve that replaces surrounding fat pads eg. PPF (CNV2), foramen ovale (CNV3), superomedial orbit (CNV1), stylomastoid foramen (CNVII)
- Post-contrast T1WI with fat-suppression shows enhancing tumor.
- T2WI: replacement of CSF filled Meckel's cave (CN V)
- Muscle denervation shows high T2 with enhancement in acute/subacute phases, which changes to high T1 without enhancement in chronic denervation.
- Radiographic skip lesions: Enlarged nerve may appear to be of normal size while traversing through foramina, not a true skip lesion.

**PET:** Usually not FDG avid due to small volume of tumor along nerve.

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# Clinical Features

- Nerve affected and associated symptoms;

  -CN V: Facial pain, numbness or paresthesia. Weakness of masticatory muscles if CN V3 involved.

  -CN VII: Facial weakness or paralysis

  -Auriculotemporal: pre-auricular pain/otalgia
- Perineural spread is a poor prognostic sign and is associated with increased local recurrence and decreased survival rates.
- Treatment: Surgery with post-op RT along entire nerve course.

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# Differential Diagnoses

- Schwannoma: T2 hyperintense, heterogeneously enhancing, larger in dimension
- Neurofibroma: T2 hyperintense with central target sign, associated with NF Type 1
- Sarcoidosis: May involve cranial nerves, diffuse/local dura-arachnoid thickening seen
- Invasive fungal sinusitis: Diffuse infiltration into surrounding tissues, not exclusively along nerves

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# References


- Ong, C K, and V F-H Chong. “Imaging of perineural spread in head and neck tumours.” *Cancer imaging : the official publication of the International Cancer Imaging Society* vol. 10 Spec no A,1A S92-8. 4 Oct. 2010, doi:10.1102/1470-7330.2010.9033

- Radiopaedia: Perineural spread of tumor. https://radiopaedia.org/articles/perineural-spread-of-tumour

- STATdx: Perineural Tumor Spread. Hilda E. Stambuk, MD.

- Perineural Tumor Spread. Sharma K, Gershon A. Radiology Online (2021)


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