*Neuroradiology Nuggets - 04*

# Smaller the contact, bigger the conflicts: Facial pain

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**Abstract**

**Background**

Trigeminal neuralgia (TN) is a debilitating neuropathic pain condition characterized by sudden, severe, electric shock-like facial pain. The most common etiology is a neurovascular conflict at the trigeminal nerve root entry zone, where an aberrant blood vessel compresses the nerve. This case report highlights a patient with classic TN symptoms caused by a seemingly minor focal compression, illustrating the disproportionate relationship between the anatomical impingement and the clinical severity of the pain.

**Key words:** Trigeminal Neuralgiaisoning; FLAIR; MRA and MRV fusion images

## 1. Case Presentation

An 80-year-old female presented to the OPD with pain in the left lower jaw tooth, initially sharp, paroxysmal with constant pain in between s/o Left Trigeminal Neuralgia.

MRI trigeminal neuralgia protocol was done following baseline screening sequences - Diffusion weighted imaging (DWI), Fluid attenuated inversion recovery (FLAIR), SWI, heavily T2 weighted drive, MR angiogram (TOF-MRA) of brain and MR Venogram.

Neurovascular contact is noted along the root entry zone of the left trigeminal nerve, with adjacent flow void likely venous without significant displacement. However, thinning is noted with asymmetrical signal changes along intraparenchymal course of the nerve within the brainstem.

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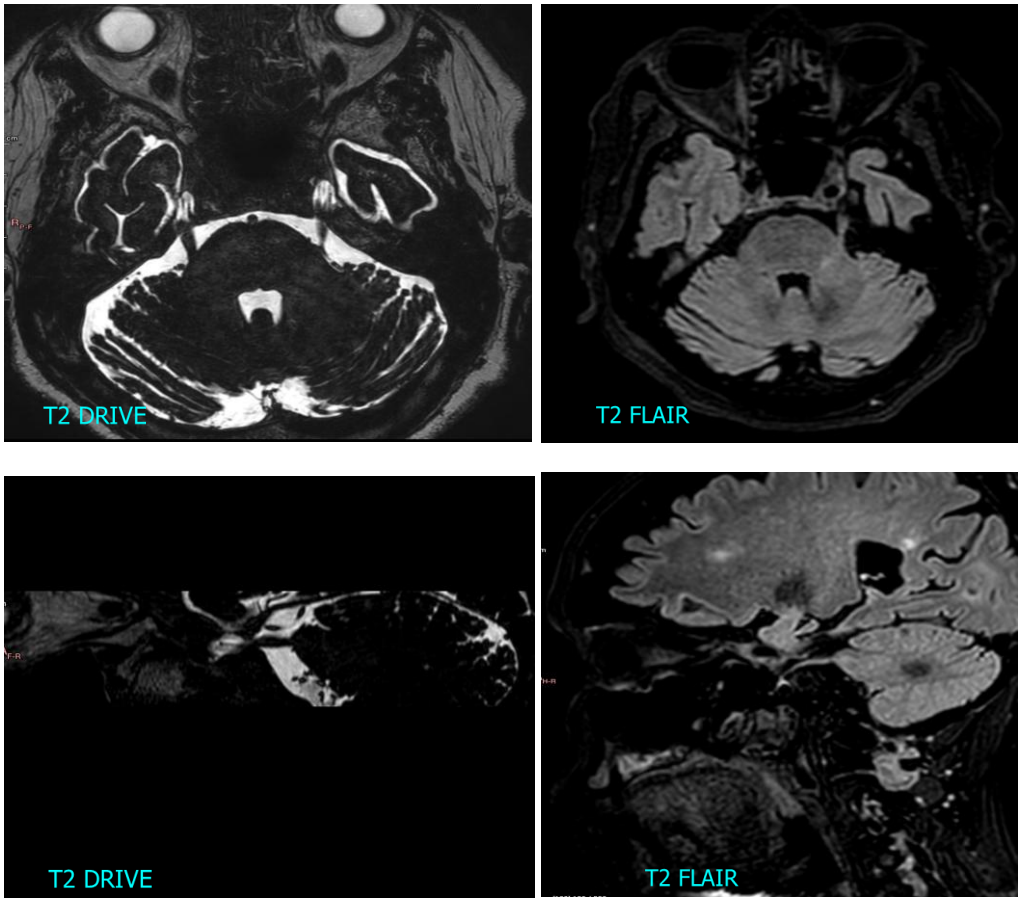


**Figure Legends**:

Sagittal T2 drive images show flow void along the inferior aspect of the root entry zone of the left trigeminal nerve.

T2 FLAIR shows signal changes along intraparenchymal course of the nerve within the brainstem

### 1.1. MRA and MRV Fusion Images

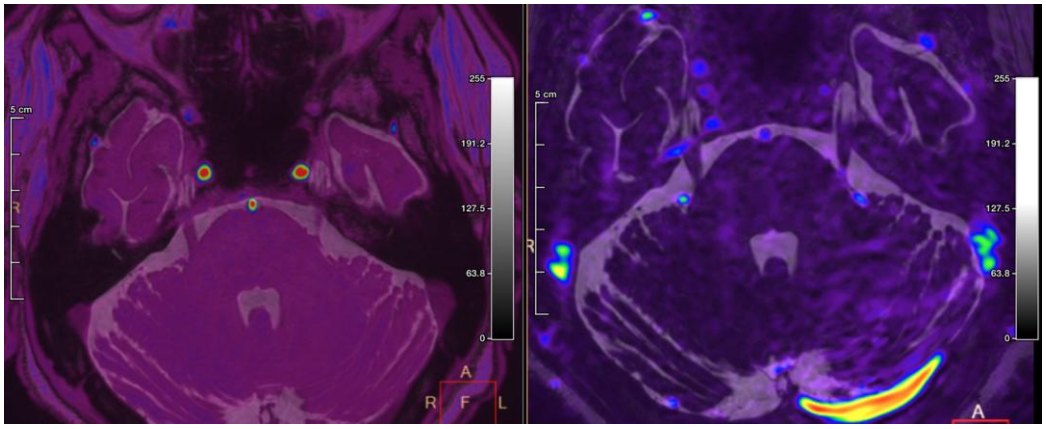

**Figure**: MRA and MRV fusion images showing no arterial contact and venous flow signal along the root entry zone of the left trigeminal nerve

## 2. Discussion

Trigeminal neuralgia can be caused by secondary causes such as demyelination, stroke etc. However, intraparenchymal brain stem changes can also occur secondarily to the neurovascular contact as long standing sequelae.

Role of MRI is to exclude these causes and additionally look for neurovascular contact between the trigeminal nerve and adjacent vessels.

Most commonly arterial contact happens with the superior cerebellar artery.

Venous contacts are more likely to be clinically refractory and can occur close to the root entry zone (REZ) of the trigeminal nerve with brainstem as well as proximal to the Meckel's cave regions.

Appropriate imaging protocols include heavily T2 weighted images and MRA with MRV to identify such neurovascular contacts.

### 2.1. Neuro-radiological - Learning Points

- MRI helps in ruling out secondary causes including demyelination and neoplastic etiologies
- Protocol includes High resolution thin section heavily T2 weighted 3D sequences and Correlation with MRA and MRV
- Clinico radiological correlation is essential and classification of the likely causative vessel is needed (Main Vessel, Branch Vessel, Venous or Multifactorial)
- Neurovascular contact can also be present in some asymptomatic individuals
- Focal distortion in course of nerve and signal changes along the REZ with displacement of the fibers are signs of higher degree of neurovascular contact
- Thinning of nerve and parenchymal changes can occur if symptoms are long standing.

### 2.2. Pathophysiology of Trigeminal Neuralgia

Numerous theories have been put forward to explain the pathophysiology of trigeminal neuralgia.

Anatomical/hemodynamic/ neural variability

Nucleus hyperexcitability

Ion channel disturbances

Grey and white matter alterations

Inflammation/demyelination

Altered biochemical parameters

The most likely chain of events leading to NVC symptoms is vascular compression in transition zone → demyelination → nucleus hyperexcitability → symptoms.

**(Szmyd, B et al. Frontiers in Molecular Neuroscience, 15, 923089)*

**3. Summary**

Classical facial pain syndromes most commonly include trigeminal neuralgia which can be diagnosed clinically. Role of MRI is to rule out secondary causes like stroke and demyelination, more importantly also look for neurovascular contacts. Trigeminal neuralgia MRI protocol must include thin section heavily T2 weighted sequences with vascular imaging (MRA and MRV).

Both arterial and venous contact along the root entry zone and cisternal course of the nerves must be documented radiologically. Clinico-radiological correlation helps in final localization of the cause. Medically refractory patients respond well to surgical microvascular decompression.

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2. Dr. Sridhar K, Department of Neurosurgery

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