

Trigeminal Neuralgia Without Vascular Compression is Associated with a Smaller Posterior Fossa Volume:
An MRI Volumetric Study

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Introduction

-Trigeminal neuralgia (TN) occurs and recurs in the absence of neurovascular compression (NVC) in a substantial portion of TN patients.

-While the contribution of NVC to the pathophysiology of TN is still a subject of debate, the cause of TN when there is no NVC is completely unknown.

-Here we examine neuroanatomic differences between patient with TN with NVC and patients with TN without NVC.

Methods

-An IRB-approved volumetric study was performed on TN patients who had undergone surgical treatment.

-The following measurements were performed using T2 and reconstructed BFFE MRI images obtained pre-operatively: cerebellopontine angle (CPA) volume, posterior fossa volume, pons volume, length of cisternal portion of trigeminal nerve, and transverse distance between the two porus trigemini.

-Volume measurements were performed on OSIRIX.

-Student t-test was used to compare means between the two groups: TN with NVC and TN without NVC.

Results

We studied 143 patients with TN1 (117 with NVC, and 26 without NVC) and 25 patients with TN2 (24 with NVC and 1 without NVC).

Anatomic Feature	TN with NVC (mean ± SD)	TN without NVC (mean ± SD)	p value
Posterior fossa volume (cm ³)	144.5 ± 18.24	136.2 ± 18.23	0.028
CPA volume (cm ³)	1.41 ± 0.98	1.15 ± 0.65	0.154
Pons volume (cm ³)	2.49 ± 0.63	2.49 ± 0.18	0.98
Length of cisternal trigeminal nerve (mm)	8.38 ± 2.17	8.77 ± 1.39	0.38
Transverse distance between two porus trigemini (cm)	3.26 ± 0.23	3.29 ± 0.103	0.51

Anatomic measurements show that patients with TN without NVC have a smaller posterior fossa volume than TN patients with NVC.

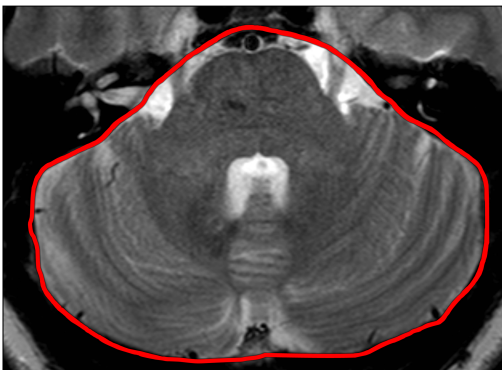


Figure 1: Demonstration of area measured around posterior fossa. Similar outlines were created on each T2 axial slice of the posterior fossa, and volumes calculated in Osirix.

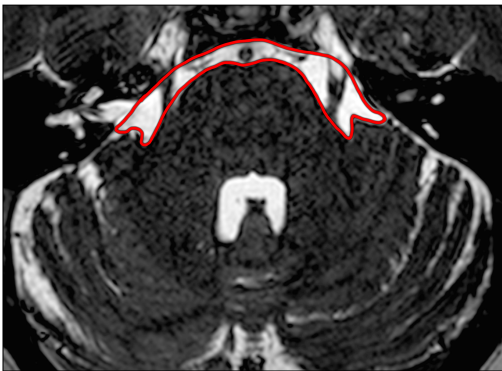


Figure 2: Demonstration of area measured around CPA. Similar outlines were created on each axial image encompassing the craniocaudal extent of the nerve, and volumes calculated in Osirix.

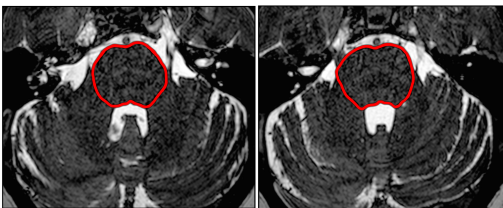


Figure 3: Demonstration of measurement of pons volume. Similar outlines were created on each axial image along the craniocaudal extent of the trigeminal nerve, and volumes calculated using Osirix.

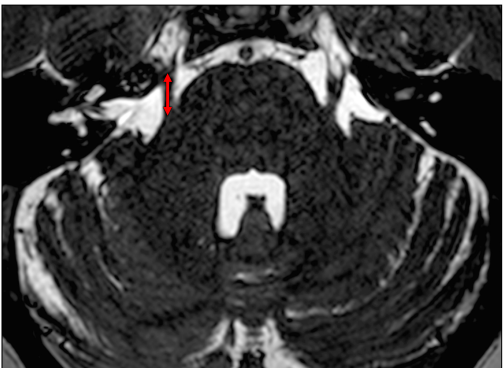


Figure 4: Demonstration of measurement of length of the cisternal portion of nerve. The right side was measured in this study.

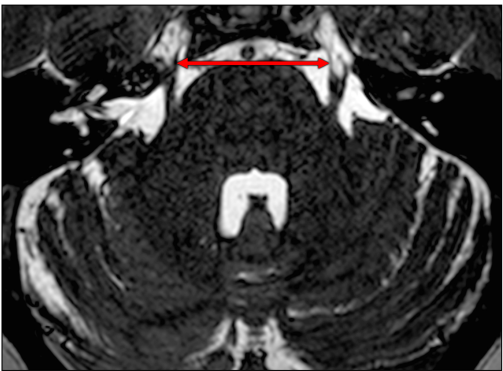


Figure 5: Demonstration of measurement of widest distance between two porous trigemini.

Conclusions

-Using MR imaging in TN patients, possible factors in disease pathogenesis have been identified: a smaller volume of the pontomesencephalic cistern of the affected side [1], small CPA cistern [2-4], atrophy of the trigeminal nerve [2,4], a sharp trigeminal-pontine angle on the affected side [2].

-Nonetheless, no study has compared anatomical differences between the TN patients with NVC and those without NVC.

-Mean posterior fossa volume in TN patients without NVC is 8.3 cm3 (5.79%) smaller than that in TN patients with NVC.

-Smaller posterior fossa volume could contribute to development of TN, especially in the absence of NVC.

-Larger studies are needed to confirm this finding and matched controlled comparisons to normative data is needed.

References

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5. Park SH, Hwang SK, Lee SH, Park J, Hamm IS (2009) Nerve Atrophy and a small cerebellopontine angle cistern in patients with trigeminal neuralgia. J Neurosurg 110:633-7