Can the neurovascular compression volume of the trigeminal nerve on magnetic resonance cisternography predict the success of local anesthetic block after initial treatment by the carbamazepine?

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Objectives. Whether NVC volume on magnetic resonance (MR) cisternography might be related to the success of local anesthetic block by tetracaine (TNB) as an additional treatment after carbamazepine (CBZ) treatments in patients with trigeminal neuralgia (TN) was evaluated.
Study Design. Detectable NVC volumes were measured from MR cisternography in 65 patients with TN treated by TNB after CBZ treatments. The correlation between the success of TNB and the NVC volume or the improvement in pain by CBZ was evaluated retrospectively.
Results. A significant difference was found between the improvement in pain by CBZ and the success of TNB, but not between NVC volume on MR cisternography and the success of TNB.
Conclusions. The present results suggest that the success of CBZ as initial treatment, but not NVC volume on MR cisternography, may be a significant predictor of the success of TNB as additional therapy in patients with TN. (Oral Surg Oral Med Oral Pathol Oral Radiol 2014;117:e15-e21)

Trigeminal neuralgia (TN) is an important disease characterized by severe lancinating pain in the oral and maxillofacial regions. One of the most common causes of TN is neurovascular compression (NVC) in the root entry zone (REZ) of the trigeminal nerve in the cerebellopontine angle cistern.[1-3] As one of the tools to visualize NVC in the REZ, 3-dimensional (3D) magnetic resonance (MR) cisternography has recently been used in patients with TN. In our previous report, 3D-MR cisternography could predict the success of carbamazepine (CBZ) therapy as one of the initial treatments for patients with TN.[4] If patients with TN were less likely to have a good result with CBZ, they could be immediately treated with additional therapies, such as local anesthetic block by tetracaine (TNB).[5,6] In our dental hospital, patients who have benefited less from CBZ have been also treated with TNB; however, the precise factors for predicting the success of TNB remain obscure, and TNB is currently used at the physician's discretion.

Whether the degree of NVC of the trigeminal nerve is related to the success of TNB was evaluated in patients with TN after CBZ therapy as an initial treatment. At the same time, the relationship between the improvement in pain by CBZ therapy and the success of TNB was also evaluated.

MATERIAL AND METHODS

A total of 65 patients (22 men, 43 women; mean age, 63.4 years; age range, 42-93 years) who were treated with TNB for TN after CBZ therapy as an initial treatment at the Kyushu Dental College Hospital between July 1999 and April 2009 and who were examined by MR imaging were investigated.

The flow chart of treatments for TN at Kyushu Dental College is shown in Figure 1. Of the 246 patients

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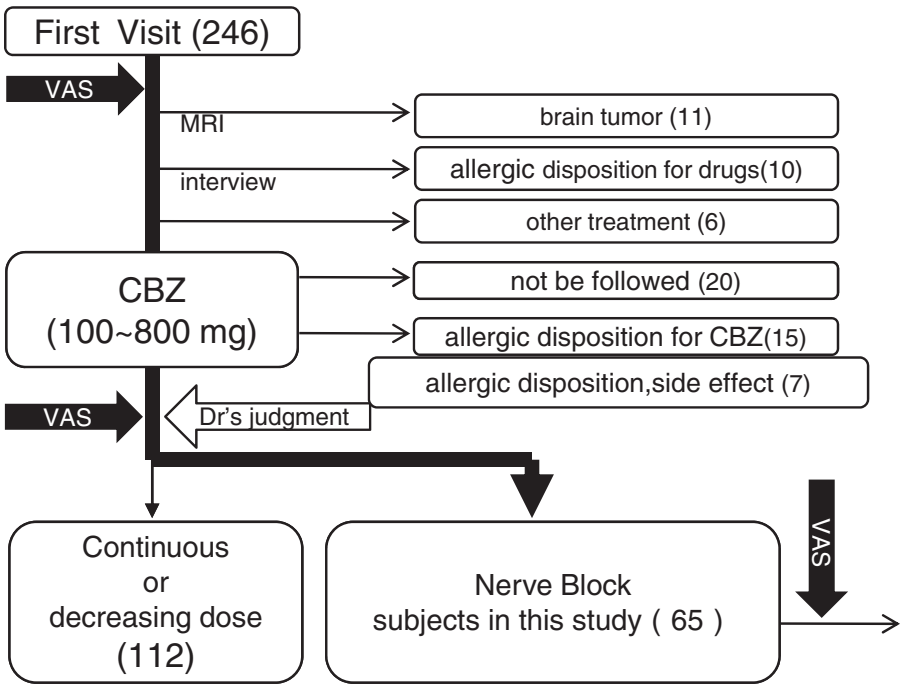

Fig. 1. Flow chart of treatments for patients with TN in the present study.

with TN at our dental hospital, 11 had a brain tumor that invaded the REZ of the trigeminal nerve, and 6 underwent microvascular decompression surgery or gamma knife treatment at another hospital. CBZ could not be given to 10 of these 229 patients because of a history of allergy. Next, CBZ was given at 100 mg/d for 2 weeks to 219 patients as the initial treatment; however, 15 of these 219 patients had side effects after CBZ at 100 mg/d, and 20 of the 219 patients could not be followed-up completely. Thus, 184 patients with TN were followed-up during CBZ therapy. After CBZ was given at 100 mg/d for 2 weeks as the initial treatment, further treatment with CBZ was at the doctor's discretion based on patients' symptoms. The package insert for CBZ indicated that the maximum permissible dose is 800 mg/d when used for TN. This was followed when prescribing CBZ for these patients. Thereafter, it was determined whether additional treatments were needed at each physician's discretion. The degree of pain in TN was measured using a visual analogue scale (VAS) from 0 to 100 according to Tanaka et al.[4] In making the judgment as to whether additional treatment was needed, 2 criteria had to be fulfilled: the VAS pain score did not decrease after CBZ to less than 30% of the value before CBZ and/or it was not possible for the patient to engage in daily activities, such as eating, conversation, face washing, and teeth brushing without severe pain, and the patient indicated the need for additional treatment.[7] Using these criteria, 112 of the 184 patients with TN were considered to have been cured with CBZ treatment, whereas 72 patients required TNB; however, TNB could not be done in 5 of these 72 patients because of a history of allergy. In addition, 2 of these 67 patients had side effects after TNB and could not be followed-up after TNB. Thus, 65 patients with TN were followed-up in the present study. After treatment with trigeminal nerve block by 0.4 mL tetracaine at a 5% concentration, further treatment was done for 65 patients. The VAS was again used to measure pain relief after TNB according to Tanaka et al.[4] The degree of pain with TN was measured using the VAS from 0 to 100 at the first examination, after CBZ, and after TNB. The extent of the improvement in pain by CBZ was evaluated as VAS after CBZ/VAS before CBZ. Success was defined as a ratio of less than 30%. Failure was defined as a ratio greater than 30% and the patients felt the need for additional treatments if the ratio was less than 30% at the time of TNB treatment completion; the maximum number of TNB treatments was 5.

All images were acquired using a 1.5-T full-body MR system (VISART; Toshiba, Tokyo, Japan) equipped with a circularly polarized head coil. T1-weighted images, T2-weighted images, and MR cisternography images with 3D-fast asymmetric spin-echo sequences (FASE) were acquired at the MR examination, and they were studied to determine whether local causes of TN could be clearly identified. In particular, the T1- and T2-weighted images were obtained to rule out space-occupying lesions, such as brain tumors and