External Validation of Established Pre-Operative Scoring Systems in Predicting Response to Microvascular Decompression for Trigeminal Neuralgia

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Abstract : Background: Trigeminal neuralgia (TN) is a heterogenous pain syndrome characterised by short paroxysms of lancinating facial pain in the distribution of the trigeminal nerve, often triggered by usually innocuous stimuli. TN has a low prevalence of less than 0.1%, of which 80% to 90% is caused by compression of the trigeminal nerve from an adjacent artery or vein. The root entry zone of the trigeminal nerve is most sensitive to neurovascular conflict (NVC), causing dysmyelination. Whilst microvascular decompression (MVD) is an effective treatment for TN with NVC, all patients do not achieve long-term pain relief. Pre-operative scoring systems by Panczykowski and Hardaway have been proposed but have not been externally validated. These pre-operative scoring systems are composite scores calculated according to a subtype of TN, presence and degree of neurovascular conflict, and response to medical treatments. There is discordance in the assessment of NVC identified on pre-operative magnetic resonance imaging (MRI) between neurosurgeons and radiologists. To our best knowledge, the prognostic impact for MVD of this difference of interpretation has not previously been investigated in the form of a composite scoring system such as those suggested by Panczykowski and Hardaway. Aims: This study aims to identify prognostic factors and externally validate the proposed scoring systems by Panczykowski and Hardaway for TN. A secondary aim is to investigate the prognostic difference between a neurosurgeon's interpretation of NVC on MRI compared with a radiologist's. Methods: This retrospective cohort study included 95 patients who underwent de novo MVD in a single neurosurgical unit in Melbourne. Data was recorded from patients' hospital records and neurosurgeon's correspondence from perioperative clinic reviews. Patient demographics, type of TN, distribution of TN, response to carbamazepine, neurosurgeon, and radiologist interpretation of NVC on MRI, were clearly described prospectively and preoperatively in the correspondence. Scoring systems published by Panczykowski et al. and Hardaway et al. were used to determine composite scores, which were compared with the recurrence of TN recorded during follow-up over 1-year. Categorical data analysed using Pearson chi-square testing. Independent numerical and nominal data analysed with logistical regression. Results: Logistical regression showed that a Panczykowski composite score of greater than 3 points was associated with a higher likelihood of pain-free outcome 1-year post-MVD with an OR 1.81 (95%CI 1.41-2.61, p=0.032). The composite score using neurosurgeon's impression of NVC had an OR 2.96 (95%CI 2.28-3.31, p=0.048). A Hardaway composite score of greater than 2 points was associated with a higher likelihood of pain-free outcome 1 year post-MVD with an OR 3.41 (95%CI 2.58-4.37, p=0.028). The composite score using neurosurgeon's impression of NVC had an OR 3.96 (95%CI 3.01-4.65, p=0.042). Conclusion: Composite scores developed by Panczykowski and Hardaway were validated for the prediction of response to MVD in TN. A composite score based on the neurosurgeon's interpretation of NVC on MRI, when compared with the radiologist's had a greater correlation with pain-free outcomes 1 year post-MVD.

Keywords : de novo microvascular decompression, neurovascular conflict, prognosis, trigeminal neuralgia

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