

# Prognostic Impact of Multi-division Trigeminal Neuralgia on Long-Term Outcomes Following Microvascular Decompression

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## Introduction

Microvascular decompression (MVD) can relieve pain for patients with medically refractory trigeminal neuralgia (TN). Importantly, pain distribution in TN is heterogeneous, most frequently involving the maxillary (V2) and mandibular (V3) divisions. Many patients experience multi-divisional TN, with isolated single-division pain occurring less frequently. These data suggest that multi-divisional TN represents a substantial subset of patients and may carry distinct clinical implications. Despite this, the predictors that may determine success following MVD for multi-divisional pain remains unclear. The aim of this study is to evaluate the pre-operative factors that may predict MVD outcomes of multi-division compared with single-division involvement.

## Methods and Materials

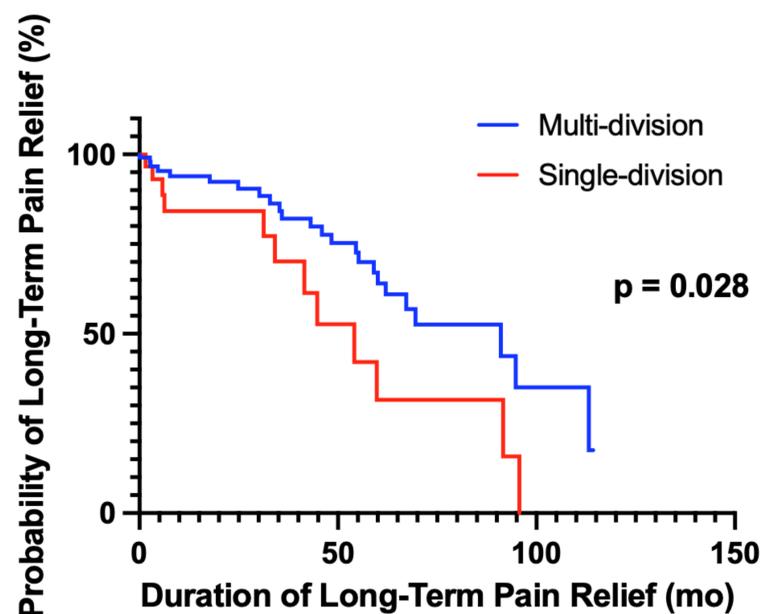
A retrospective analysis of MVD for patients with TN from 2010-2025 at a single institution was conducted. Demographics at presentation and operative data were collected as well as post-operative outcomes using the Barrow Neurological Institute pain intensity score. The primary outcomes were short-term (at first-follow-up) and long-term (at last follow-up) pain relief. The range of short-term follow up was 139 days, and the range for long-term follow up was 110.6 months. Univariate and multivariable Cox proportional hazards models and Kaplan-Meier survival analyses assessed whether multi-division pain was a prognostic factor for pain outcomes.

## Results

Among 152 patients undergoing 157 MVD procedures, all with confirmed neurovascular compression, 122 (77.7%) had multi-division TN and 35 (22.3%) had single-division TN. Short-term pain relief was achieved in 31 (88.6%) patients with single-division TN and 115 (94.3%) with multi-division TN. Long-term pain relief was achieved in 24 (66.7%) single-division and 98 (80.3%) multi-division patients.

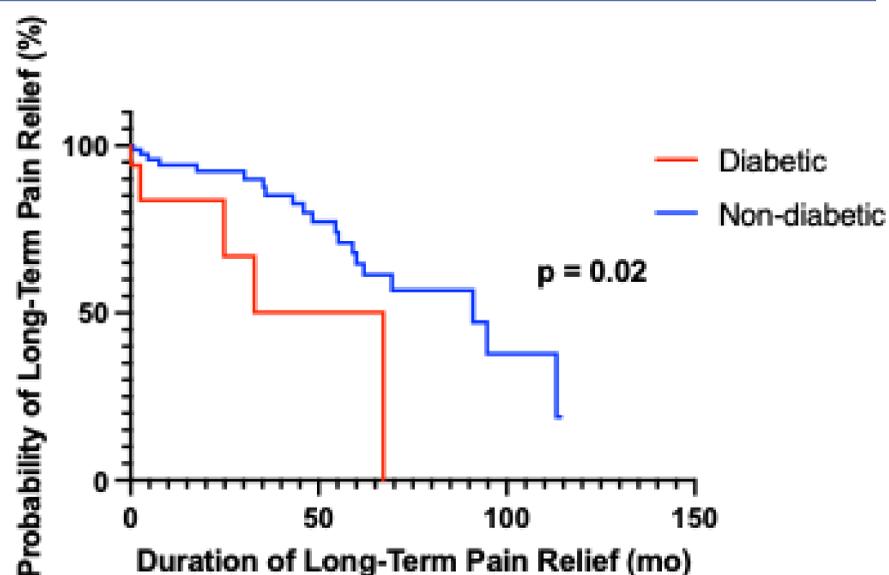
**Table 1.** Cox univariate proportional hazards regression analysis for risk of long-term pain recurrence

	Univariate			Multivariable		
	HR	95% CI	p-value	HR	95% CI	p-value
<b>Multi-divisional Long Term Pain Outcomes (n=122)</b>						
BMI>25	2.074	0.836-5.145	0.115	-	-	-
Diabetes Mellitus	3.375	1.215-9.377	0.02*	-	-	-
Hypertension	2.203	0.892-5.440	0.087	-	-	-
Pre-operative numbness	1.689	0.550-5.187	0.360	-	-	-
Pre-operative Trigger Point	2.790	0.373-20.866	0.318	-	-	-
<b>Single-divisional Long Term Pain Outcomes (n=35)</b>						
BMI>25	0.553	0.115 - 1.975	0.362	-	-	-
Diabetes Mellitus	0.045	0.000-4186	0.741	-	-	-
Hypertension	0.485	0.111-2.112	0.335	-	-	-
Pre-operative numbness	0.042	0.000-815.9	0.529	-	-	-
Pre-operative Trigger Point	4.305	0.532-34.84	0.171	-	-	-



**Figure 1.** Probability of Long-Term Pain Relief Following MVD in Patients with Single-division TN vs Multi-division TN (p=0.028)

The median duration of long-term pain relief was 91.07 months for multi-division TN patients and 54.1 months for single-division TN patients. On univariate analyses, multi-division TN was associated with improved long-term pain relief (HR: 0.453; 95% CI: 0.224-0.917; p=0.028).



**Figure 2.** Probability of Long-Term Pain Relief in Multi-division TN Following MVD in Patients With vs Without Diabetes Mellitus at presentation (p=0.02)

For multi-division TN patients, diabetes mellitus at presentation was associated with worse long-term pain relief (HR: 3.375; 95% CI: 1.215-5.145; p=0.02), with median duration of 67.2 months vs 91.07 months without diabetes.

## Discussion

This study demonstrates that multi-division trigeminal neuralgia is associated with **improved long-term pain relief following microvascular decompression compared to single-division involvement**. The extended median duration of pain relief (91.07 vs 54.1 months) suggests that multi-divisional pain may represent more severe neurovascular compression, potentially leading to better surgical outcomes. However, **diabetes mellitus emerged as a significant negative prognostic factor specifically in multi-division TN patients**, reducing median pain relief duration by approximately 24 months. These findings may help guide patient counseling and surgical decision-making, particularly regarding the expected durability of pain relief based on preoperative characteristics.

## Contact

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