

# Microvascular Decompression: Costs, Complications, and Re-operation Rates from National Level Data

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## Introduction

Microvascular decompression (MVD) is a well-accepted technique for the surgical management of various cranial neuropathies. While many studies have examined the outcomes of MVD in single-center trials, we sought to determine the re-operation rate in a large, independent cohort of patients undergoing MVD surgery.

## Methods

The Reuter's MarketScan database was utilized to perform a retrospective, population-based study. Patients who underwent MVD for trigeminal neuralgia, hemifacial spasm or glossopharyngeal neuralgia between 2000 and 2009. Of the 278 MVD procedures identified, all patients with less than 2 years of post-operative follow-up data were excluded. The records of the remaining 113 patients were analyzed using a logistic regression analysis examining long-term complication and re-operation rates, type of re-operation and outpatient healthcare resource utilization.

## Results

The study sample included 278 patients with a total of 113 patients with >2 year follow-up. The mean age was 56 years, 67% female, 68% Commercial insurance, 87% with low comorbidities (Charlson index= 0) and mean follow-up of 4 years. The 1, 2 and long-term re-operation rates were 2.7%, 3.5% and 4.4%, respectively. Post-operative complications totaled 8.0% at 90 days. Re-operation consisted of redo MVD (3.5%), balloon decompression (1.8%), and radiosurgery (0.88%). Average time to re-operation was 3.8 years and 2 year follow-up resulted in hospital charges totaling \$9018, outpatient services of \$9384, and medication charges of \$4906.

**Table 1.** Characteristics and demographics of the cohort

Variable	All patients (n= 278)	Patients w/ >=2 yrs post-op data (n= 113)
Age [mean (SD)]	54 (13)	56 (12)
Post-operative follow-up days [mean (SD)]	787 (727)	1486 (646)
Gender: females [n (%)]	182 (65.47)	67 (59.29)
Charlson index [n (%)]		
0	237 (85.25)	98 (86.73)
1	32 (11.51)	12 (10.62)
2	5 (1.80)	2 (1.77)
>=3	4 (1.44)	1 (0.88)
Type of insurance [n (%)]		
Commercial	202 (72.66)	77 (68.14)
Medicaid	30 (10.79)	16 (14.16)
Medicare	46 (16.55)	20 (17.70)

**Table 2.** Comparative results for patients who were re-operated with respect to type of first re-operation (n= 12)

Outcome variable	Total (n= 278)	
Re-operation [n (%)]	All-type	12 (4.32)
	Redo MVD	11 (3.96)
	Radiosurgery	2 (0.72)
	Radiofrequency	0 (0.00)
	Balloon compression	5 (1.80)
Time to re-operation [mean (SE)]	1359 (18)	
Post-operative complications [n (%)]	Immediate	16 (5.76)
	30-day	20 (7.19)
	90-day	22 (7.91)
Index hospitalization [mean (SD)]	Days	3 (3)
	Charges in 2009\$	25530 (17991)

**Table 3.** Descriptive statistics for patients with at least 2 years post-operative follow time (n= 113)

Outcome		Index hospitalization	1-year	2-year	>=2-year	
Re-operation [n (%)]	All type		3 (2.65)	4 (3.54)	5 (4.42)	
	Redo MVD		3 (2.65)	3 (2.65)	4 (3.54)	
	Radiosurgery		1 (0.88)	1 (0.88)	1 (0.88)	
	Radiofrequency		0 (0.00)	0 (0.00)	0 (0.00)	
	Balloon compression		1 (0.88)	1 (0.88)	2 (1.77)	
Time to re-operation [mean (SE)]			1373 (25)			
Healthcare resources use [mean (SD)]	Hospital days	3 (3)	2 (5)	2 (7)	6 (7)	
	Outpatient services		39 (43)	88 (136)	188 (235)	
	Outpatient ED		2 (7)	4 (11)	13 (33)	
	Medications		25 (28)	52 (59)	108 (123)	
	Healthcare resources charges in 2009\$ [mean (SD)]	Hospital pay	23407 (15947)	5240 (16939)	9018 (23757)	35850 (32953)
	Outpatient services		4684 (5812)	9384 (15767)	21011 (31698)	
	Outpatient ED		197 (517)	405 (943)	1200 (2942)	
	Medications		2296 (3812)	4906 (7998)	12316 (25352)	
Post-operative complications		Immediate	30-day	90-day		
			5 (4.42)	9 (7.96)	9 (7.96)	

## Conclusions

We report a smaller national reoperation rate (4.4%) than those found in several other large, single institution studies. In terms of post-operative healthcare resource utilization following MVD, our findings suggest that despite the very good efficacy of MVD reported in the literature, MVD patients continue to remain heavy users of healthcare resources following surgery. While redo MVD remains the first-line choice nationally for those that undergo a reoperation for a cranial neuralgia, the high level of long-term post-operative healthcare resource utilization suggests that MVD patients are still requiring significant long-term management and assistance.

## Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the incidence and epidemiology of patients undergoing redo operation after initial MVD 2) Be able to discuss the efficacy, costs, and complication rates associated with the various types of re-operations.

**Table 4.** Summary of Prior Studies Examining Reoperation Following MVD

Study	Condition Studied	Type of Repeat Operation	Reported Rate of Reoperation	Results of Reoperation
Barker (1996)	TN	MVD	132 of 1185 (11.1%)	42% had "excellent" results and another 5% had "good" results.
Cho (1994)	TN	MVD	31 of 400 (7.8%)	22 of 31 (71.0%) experienced complete resolution of symptoms
Amador (2008)	TN	PFE with option of MVD or PNS	30 of 186 (16.1%)	80% and 75% achieved an "excellent" outcome at 1-year and 3-year follow-up respectively.
Liao (1997)	TN	MVD	5 of 80 (6.3%)	4 of 5 (80.0%) had complete remission of symptoms, 1 of 5 (20.0%) had partial remission.
Yamak (1992)	TN and HFS	MVD	7 of 60 (11.7%) for TN, 3 of 64 (4.7%) for HFS.	2 of 7 (28.6%) of TN patients had complete remission. 3 of 3 (100%) of HFS patients had complete absence of spasms.
Rath (1996)	TN	PFE with option of MVD or neurolysis	(16 patients studied)	6 of 9 (67.7%) undergoing repeat MVD had no recurrence of symptoms. 5 of 7 (71.4%) undergoing careful neurolysis experienced no recurrences.
Kureshi (1998)	TN and HFS	PFE with partial trigeminal rhizotomy	23 of 308 (7.5%) for TN, 8 of 107 (7.5%) for HFS	15 of 23 (65.2%) of TN patients had complete relief of symptoms. HFS patients received varying treatments.
Ueuanvi (2010)	TN	MVD	6 of 149 (4.0%)	5 of 6 (83.3%) did not have recurrence of pain.
Barker (1995)	HFS	MVD	61 of 703 (8.7%)	91% of early reoperations (within 30 days) had "excellent results" compared with 61% of late reoperation.
Einh (2005)	HFS	MVD	(36 patients studied)	24 (70.6%) experienced complete spasm resolution. 100% of early reoperations (within 30 days) were successful compared to 70.8% of late reoperations.
Park (2006)	HFS	MVD	(13 patient studied)	11 of 13 (84.6%) had "excellent" outcomes, with 1 of 13 (7.7%) "good" outcome and 1 of 13 (7.7%) "fair" outcome.
Zhone (2010)	HFS	MVD	9 of 393 (2.3%)	"Excellent" outcomes in 100% of patients
Li (2010)	HFS	MVD	13 of 753 (1.7%)	"Excellent" spasm resolution in 10 of 13 (76.9%).
Huang (2010)	TN	GKS	(27 patients studied)	7 of 27 (25.9%) had complete resolution of pain, 22 of 27 (81.5%) had no new numbness.

PFE = Posterior Fossa Exploration, PNS = Partial Nerve Section, GKS = Gamma Knife Surgery