

Clinical Article

The Efficacy and Safety of Microvascular Decompression for Hemifacial Spasm in Elderly Patients

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Objective : The purpose of this study was to examine the efficacy and safety of microvascular decompression (MVD) for hemifacial spasm (HFS) in elderly patients.

Methods : Between 1997 and June 2008, 1,174 patients had undergone MVD for HFS at our institute. Among these, 53 patients were older than 65 years. We retrospectively reviewed and compared the complication and the cure rates of these patients with those of younger patients.

Results : There were 38 females and 15 males. The mean duration of symptoms of HFS of these patients was 94.6 months (range, 12-360 months), compared with 67.2 months (range, 3-360 months) in the younger group. The overall cure rate in elderly patients who underwent MVD for HFS during this period was 96.2%. Permanent cranial nerve dysfunctions, such as hearing loss and facial palsy, were seen in 2 patients (3.8%, 2/53) in the elderly group and 19 patients (1.7%, 19/1121) in the younger group. The difference in permanent cranial nerve dysfunction between the two groups was not statistically significant. There was no operative mortality in either group.

Conclusion : Microvascular decompression is the most effective surgical modality available for the treatment of HFS. Results of this study indicate that such technique can be performed in the elderly without higher rates of morbidity or mortality. Any patient with HFS, whose general health is acceptable for undergoing general anesthesia, should be considered as a candidate for MVD.

KEY WORDS : Microvascular decompression · Hemifacial spasm · Elderly patients.

INTRODUCTION

Hemifacial spasm (HFS) is characterized by unilateral, intermittent contractions of the muscles responsible for facial expression. This spasm typically begins in the *orbicularis oculi* and spreads to the other muscles of expression over the course of several years³⁾. There is now considerable evidence that primary HFS is, in almost all cases related to a vascular compression of the facial nerve at its Root Exit Zone (REZ) from the brainstem^{9,12)}. Microvascular decompression (MVD) constitutes a curative treatment and is currently the only etiologic-based therapy with the best associated outcomes. Although MVD is widely offered to younger patients, some neurosurgeons are reluctant to offer this to more elderly

patients, primarily due to fear of complications and concerns over fitness for surgery^{15,19)}. The purpose of this study was to analyze our elderly population of patients to determine whether microvascular decompression treatment of hemifacial spasm in the elderly is safe and efficacious. The response to treatment and morbidity and mortality data were then compared with those of a general population to verify the possible impact of age.

MATERIALS AND METHODS

Patient population

Between 1997 and June 2008, a total of 1,174 patients were diagnosed with HFS and treated with MVD. We retrospectively reviewed the medical records of patients who underwent surgery at our center during this period. The diagnosis of HFS was made based on each patient's clinical history, physical examination, and radiologic findings. All patients had undergone computed tomography (CT) and magnetic resonance imaging (MRI), thereby excluding tumors or any other causes of HFS. Microvascular decom-

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pression was the treatment of choice in all patients with primary HFS unless their physical status was worse than American Society of Anesthesiologists class 2. The patients were divided into two groups : those patients older than 65 years and those younger than 64 years. A total of 53 patients over the age of 65 years were included in the elderly group.

The medical records of all patients were reviewed, and data were gathered on the demographics, duration of HFS before MVD, previous treatment history, intraoperative findings, outcome of surgery (including associated complications and the cure rate), and length of hospital stay. The main outcome measures were symptom relief and complications, especially regarding facial and vestibular nerve function. The data were then compared between the two groups. For follow-up, the patients completed serial questionnaires during their postoperative clinic visits, and follow-up telephone interviews were also conducted, with a minimum of one year of follow-up.

Outcome data, including long-term outcomes, were assessed. The incidence of complications, including wound infections, CSF leaks, cranial nerve palsies, stroke, and death, was also examined.

Surgical technique

All procedures were performed via a lateral retrosigmoid suboccipital approach. A small craniotomy was performed, exposing the edges of the sigmoid and transverse sinus. The dura was opened, and cerebrospinal fluid was allowed to empty. After careful dissection of the arachnoid membrane and gentle retraction of the flocculus, the Root Exit Zone (REZ) of the facial nerve was observed. Any compressing vessel was dissected away from the facial nerve. Several pieces of Teflon sponge were interpositioned between the compressing vessel and the REZ. During manipulation of the seventh and eighth nerves, brainstem auditory evoked potentials were closely monitored to assess for hearing loss, and facial electromyography to assess the lateral spread response phenomenon thereby achieving complete decompression¹⁷⁾. The dura was closed, with several muscle pieces interposed between the interrupted sutures to prevent cerebrospinal fluid leakage¹⁶⁾.

Statistical analysis

Fisher's exact test was used to analyze the outcome between the two groups of patients. The confidence level for statistical significance was set as a probability value of less than 0.05.

Table 1. Demographic data of the elderly and younger group

Characteristics	Elderly group	Younger group
No. of patients	53	1,121
Female : Male (ratio)	38 : 15 (2.5 : 1)	797 : 324 (2.5 : 1)
Mean age (yrs)	67.5 (65-75)	48.5 (19-64)
Mean duration of symptoms (months)	94.6 (12-360)	67.2 (3-360)
Left : Right (ratio)	32 : 21 (1.52 : 1)	557 : 564 (0.99 : 1)
Mean follow up period (months)	14.7 (12-55)	17.3 (12-99)
Hospital stay (days)	10.4 (6-180)	8.2 (6-42)

RESULTS

Demographic data obtained for the two groups are given in Table 1. The mean age of patients in the elderly group was 67.5 years (range : 65-75 years) with a female-to-male ratio of 2.5 to 1, compared with 48.5 years (range : 19-64 years) and a ratio of 2.5 to 1 in the younger group. The mean duration of HFS symptoms in the elderly patients was 94.6 months (range : 12-360 months), compared with 67.2 months (range : 3-360 months) in the younger group. The left side was affected in 32 patients (60.4%) and the right side in 21 patients (39.6%) in the elderly group. The mean follow-up period was 14.7 months (range : 12-55 months) and 17.3 months (range : 12-99 months) for the elderly and younger groups, respectively. The mean length of hospital stay was 10.4 days (range : 6-180 days) for the elderly patients, compared with 8.2 days (range : 6-42 days) for the younger group. The hospital stay for almost every elderly patient was 10 days or less. A patient in elderly group had complications from underlying heart disease which extended the length of the hospital stay, ultimately causing a difference in the length of hospital stay between the two groups.

The compressing vessel in the elderly group was found to be the anterior inferior cerebellar artery (AICA) in 50.9% (27/53), the posterior inferior cerebellar artery (PICA) in 32.1% (17/53), and a vertebral artery (VA) in 1.9% (1/53) of cases. The compressive vascular structures included the AICA and VA together in 3.8% (2/53), the PICA and VA together in 3.8% (2/53), and the AICA and PICA together in 7.5% (4/53) of cases. The causes of neural compression were similar in both groups (Table 2).

Outcome : symptom relief and complications

Among 53 patients in the elderly group, 51 patients (96.2%) experienced complete relief of their spasms, and 2 patients still had symptoms one year postoperatively. In the younger group, 1,054 patients (94.0%) experienced complete relief of preoperative symptoms, while 67 patients in the younger group had ongoing spasms (Fig. 1). Operative complications are presented in Table 3 and include deafness in 2 cases (3.8%) in the elderly group and 11 cases (1.0%) in the

Table 2. Vessels identified at operation as compressing the facial nerve

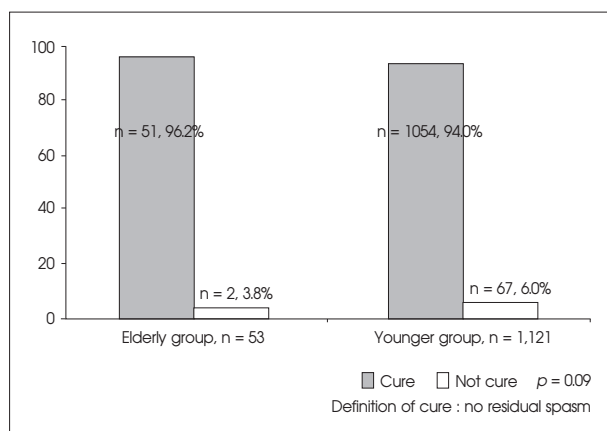
Vessel	Elderly group, n = 53 (%)	Younger group, n = 1,121 (%)
AICA	27 (50.9)	610 (54.3)
PICA	17 (32.1)	336 (30.0)
VA	1 (1.9)	11 (1.0)
AICA + PICA	4 (7.5)	65 (5.8)
AICA + VA	2 (3.8)	64 (5.7)
PICA + VA	2 (3.8)	19 (1.7)
AICA + PICA + VA	0 (0)	9 (0.8)
Artery + Vein	0 (0)	3 (0.3)
Vein	0 (0)	2 (0.2)
Not identified	0 (0)	2 (0.2)

AICA : anterior inferior cerebellar artery, PICA : posterior inferior cerebellar artery, VA : vertebral artery

Table 3. Complications of microvascular decompression

Complications	The elderly patients, n = 53	Control group, n = 1,121	p value
Transient hearing loss	3	18	0.26
Permanent hearing loss	2	11	0.19
Permanent facial palsy	0	8	0.01
CSF leakage	0	3	0.51
Wound infection or meningitis	0	3	0.51
Cerebral infarction	1	1	0.00
Cerebral hemorrhage	0	1	0.42

CSF : cerebrospinal fluid

**Fig. 1.** Overall cure rate between the elderly and younger group.

younger group. Transient hearing loss occurred in 3 cases (5.6%) in the elderly group and 18 cases (1.6%) in the younger group. The incidence of permanent hearing loss was higher in the elderly group, but not statistically significant ($p = 0.19$). No patients in the elderly group developed permanent facial palsy; however, eight patients (0.7%) developed permanent facial palsy in the younger group. Several patients developed transient or delayed facial palsy, but these findings resolved with time. Permanent cranial nerve dysfunction, including hearing loss and facial palsy, was seen in 2 patients (3.9%, 2/51) and 19 patients (1.7%, 19/1121), in the elderly and younger groups, respectively. The difference in permanent cranial nerve dysfunction rates between the

two groups was not statistically significant. The incidences of meningitis and CSF leak were 0% (0/53) and 0.6% (6/1121), in the elderly and younger groups, respectively. Cerebrovascular accidents, such as infarction and hemorrhage, occurred in 1 case (1.9%) in the elderly group and 2 cases (0.2%) in the younger group. There was no mortality in either group. The complication rates in the current series were similar in both groups.

DISCUSSION

Neurovascular compression has been accepted as the etiology of HFS^{7,13)}. HFS has been considered as a cranial neuropathy derived from facial nerve compression. Jannetta¹¹⁾ popularized the concept of microvascular decompression (MVD) as an effective form of treatment, and MVD is currently

the mainstay of treatment for HFS. MVD differs from other surgical options in that it is a non-destructive procedure that aims to promote myelin recovery following long periods of vascular cross compression⁸⁾.

Alternative treatments have been proposed for the management of elderly patients with HFS due to the assumed risk of open surgery, coupled with an overall shorter life expectancy^{1,6)}. Radiosurgery is the least invasive option available. Radiosurgery has the advantages of short procedure duration and the need for only local anesthesia. However, it is associated with inferior long-term outcomes and a higher incidence of recurrence than MVD¹⁰⁾. In the relevant literature, the efficacy of MVD is consistently superior to other surgical modalities. In the current series, there was no mortality or any life-threatening morbidity in either the elderly or younger group. There was no observed difference in cure rate between the two groups. Complete symptom relief was found in 96.2% and 94.0% of patients in the elderly and younger group, respectively. There was also no difference in terms of length of hospital stay between the two groups. These results agree with the few reports that appear in the literature^{14,18)}. The most frequently reported complications of MVD include hearing loss, diplopia, facial palsy, brainstem or cerebellar infarct, hematoma, ataxia, CSF leak, meningitis, and hydrocephalus^{4,15)}. Such risks can be minimized by careful surgical technique, minimal retraction, absolute hemostasis, attention to air cells, and immaculate wound

closure. These complications have been greatly reduced in recent years as seen in the current series.

There is no evidence in the literature to suggest increased major complication rates following MVD that are associated with increasing age. Previous studies have analyzed the results of MVD in elderly patients and demonstrated that the outcomes and morbidity rates are not related to age^{2,5)}. Broggi et al.⁵⁾, along with other physicians, consider MVD in the elderly to be easier and less time-consuming to accomplish than in younger patients, primarily due to brain atrophy and larger cisterns in the former, minimizing retraction-related complications. The routine application of neurophysiological monitoring, including brainstem auditory evoked potential and facial electromyography, also helps to control the retraction.

However, it is important to draw a distinction between the chronological age and the physical status of patients. We believe that the crucial factor influencing surgical outcomes is the patient's health status and not the chronological age. Therefore, the similarity of results between the elderly and younger groups, in our opinion, mirrors the comparable fitness status of these groups of patients.

CONCLUSION

Microvascular decompression is the most effective surgical modality available for the treatment of HFS, including in the elderly. This technique can be performed in the elderly without higher rates of morbidity or mortality. Any patient with HFS, whose general health is acceptable for general anesthesia, should be considered a candidate for MVD. Furthermore, MVD should be considered as the first-line procedure for HFS treatment in the elderly, as it is in younger patients.

References

1. Apfelbaum R : Neurovascular decompression : The procedure of choice? in Grady S (ed) : *Clinical Neurosurgery*. Baltimore : Lippincott, Williams & Wilkins, 1998, Vol, pp473-498
2. Ashkan K, Marsh H : Microvascular decompression for trigeminal neuralgia in the elderly : a review of the safety and efficacy. *Neurosurgery* 55 : 840-848; discussion 848-850, 2004
3. Barker FG 2nd, Jannetta PJ, Bissonette DJ, Shields PT, Larkins MV, Jho HD : Microvascular decompression for hemifacial spasm. *J Neurosurg* 82 : 201-210, 1995
4. Bederson JB, Wilson CB : Evaluation of microvascular decompression and partial sensory rhizotomy in 252 cases of trigeminal neuralgia. *J Neurosurg* 71 : 359-367, 1989
5. Broggi G, Ferroli P, Franzini A, Servello D, Dones I : Microvascular decompression for trigeminal neuralgia : comments on a series of 250 cases, including 10 patients with multiple sclerosis. *J Neurol Neurosurg Psychiatry* 68 : 59-64, 2000
6. Dellaretti M, Reyns N, Touzet G, Sarrazin T, Dubois F, Lartigau E, et al. : Clinical outcomes after Gamma Knife surgery for idiopathic trigeminal neuralgia : review of 76 consecutive cases. *J Neurosurg* 109 Suppl : 173-178, 2008
7. Digre K, Corbett JJ : Hemifacial spasm : differential diagnosis, mechanism, and treatment. *Adv Neurol* 49 : 151-176, 1988
8. Ferroli P, Acerbi F, Tomei M, Tringali G, Franzini A, Broggi G : Advanced age as a contraindication to microvascular decompression for drug-resistant trigeminal neuralgia : evidence of prejudice? *Neurol Sci* 31 : 23-28, 2010
9. Gardner JW, Sava GA : Hemifacial spasm : A reversible pathophysiological state. *J Neurosurg* 19 : 240-247, 1962
10. Goss BW, Frighetto L, DeSalles AA, Smith Z, Solberg T, Selch M : Linear accelerator radiosurgery using 90 gray for essential trigeminal neuralgia : results and dose volume histogram analysis. *Neurosurgery* 53 : 823-828; discussion 828-830, 2003
11. Jannetta PJ : Neurovascular compression in cranial nerve and systemic disease. *Ann Surg* 192 : 518-525, 1980
12. Jannetta PJ : Observations on the etiology of trigeminal neuralgia, hemifacial spasm, acoustic nerve dysfunction and glossopharyngeal neuralgia. Definitive microsurgical treatment and results in 117 patients. *Neurochirurgia (Stuttg)* 20 : 145-154, 1977
13. Jannetta PJ, Resnick D : Cranial rhizopathies, in Youmans JR (ed) : *Neurological Surgery : A Comprehensive Guide to the Diagnosis and Management of Neurosurgical Problems*, ed 4th. Saunders : Philadelphia, 1996, Vol, pp3563-3574
14. Javadpour M, Eldridge PR, Varma TR, Miles JB, Nurmikko TJ : Microvascular decompression for trigeminal neuralgia in patients over 70 years of age. *Neurology* 60 : 520, 2003
15. Kolluri S, Heros RC : Microvascular decompression for trigeminal neuralgia. A five-year follow-up study. *Surg Neurol* 22 : 235-240, 1984
16. Kong DS, Park K : Hemifacial spasm : a neurosurgical perspective. *J Korean Neurosurg Soc* 42 : 355-362, 2007
17. Kong DS, Park K, Shin BG, Lee JA, Eum DO : Prognostic value of the lateral spread response for intraoperative electromyography monitoring of the facial musculature during microvascular decompression for hemifacial spasm. *J Neurosurg* 106 : 384-387, 2007
18. Sekula RF, Marchan EM, Fletcher LH, Casey KF, Jannetta PJ : Microvascular decompression for trigeminal neuralgia in elderly patients. *J Neurosurg* 108 : 689-691, 2008
19. Trigeminal neuralgia. *Surg Neurol* 45 : 406-408, 1996