# A Novel Approach to Microvascular Decompression for Hemifacial Spasm: Method Description and Associated Outcomes

**Shinji Nagahiro, MD, PhD**
**Yoshifumi Mizobuchi, MD, PhD**
**Kohei Nakajima, MD, PhD**
**Yasushi Takagi, MD, PhD**

Department of Neurosurgery, Graduate School of Biomedical Sciences, Tokushima University, Tokushima, Japan

**Correspondence:**
Yoshifumi Mizobuchi, MD, PhD,
Department of Neurosurgery,
Graduate School of Biomedical Sciences,
Tokushima University,
3-18-15, Kuramoto-cho,
Tokushima 770-8503, Japan.
Email: y.mizobuchi1203@gmail.com

**Received,** November 11, 2021.
**Accepted,** January 27, 2022.
**Published Online,** April 29, 2022.



**BACKGROUND:** Microvascular decompression (MVD) is the only potential cure for hemifacial spasm (HFS). However, traditional techniques such as the interposition method may have limited effect in some cases. Alternative techniques have been proposed; however, they can be more complex or difficult to perform than the standard approach.
**OBJECTIVE:** To describe a safe decompression technique—the "shelter method"—which involves creating a shelter-like space around the facial nerve root exit zone and present associated outcomes.
**METHODS:** Medical records and intraoperative findings of 92 patients with HFS who underwent MVD using the shelter method between April 1997 and March 2017 were retrospectively reviewed. As a historical control group, we included 53 patients who had undergone MVD by the traditional interposition method before March 1989. The patients were divided into 3 subgroups according to the arteries involved and degree or direction of arterial compression to the seventh nerve. Patient outcomes were assessed as excellent, good, fair, and poor according to the MVD scoring system of the Japan Society for MVD Surgery.
**RESULTS:** In the shelter method group, complete disappearance of HFS was achieved in 87 patients (94.6%). The curative rate of the shelter method group was significantly higher than that of the interposition method group. The overall complication rates were significantly lower in the shelter method group than in the interposition method group.
**CONCLUSION:** Our findings indicate high curative and low complication rates of the shelter method, suggesting that it helps treat HFS caused by various types of arterial compression.

**KEY WORDS:** Hemifacial spasm, Microvascular decompression, Shelter method

*Operative Neurosurgery 00:1–7, 2022* https://doi.org/10.1227/ons.0000000000000223

Hemifacial spasm (HFS) may result from the compression of a facial nerve, most likely at the nerve root exit zone (REZ).[1] Microvascular decompression (MVD) is an effective treatment method for HFS.[2] Since Jannetta's original description,[3] there have been several developments in the techniques for keeping the offending vessel away from the nerve. In many cases, 2 different MVD techniques for displacing the offending vessels have been used, specifically, the interposition and transposition methods. Recent advances in microsurgical techniques have resulted in further improvements in patient outcomes, reducing the associated morbidity and mortality rates.[4] However, some traditional techniques such as the interposition method have been reported to have limited effects in some cases. Therefore, several techniques involving the transposition method have been introduced for MVD; these procedures are often more complicated and time-consuming than the interposition method.[5-13] Herein, we aimed to describe our simple and safe transposition technique known as the "shelter method" and to report the associated patient outcomes in the treatment of HFS.

**ABBREVIATIONS: HFS,** hemifacial spasm; **MVD,** microvascular decompression; **PICA,** posterior inferior cerebellar artery; **REZ,** root exit zone; **VA,** vertebral artery.

## METHODS

Between April 1997 and March 2017, 104 patients with HFS underwent MVD at our institution. This

retrospective analysis included 96 consecutive patients who were followed up for more than 1 year. Four patients were excluded because of the presence of short branches of the perforating arteries around the REZ, precluding them from undergoing MVD using the shelter method. MVD using the shelter method was used in 92 patients (95.8%) with the mean age of 55.6 years (range, 22-78). In total, 33 men and 59 women were included in the shelter method group. As a historical control group, we included 53 consecutive patients who had undergone MVD using the interposition method for HFS, performed by the same surgeons, before March 1989, and who were followed up for at least 1 year after surgery. Before March 1989, HFS was performed using the interposition method in all patients who underwent MVD at our institution.

This study included 18 men and 35 women. The mean age of the patients at the time of surgery was 53 years (range, 26-74). Data from medical records, details of surgical techniques, complication rates, and surgical outcomes were retrospectively reviewed.

All the patients in the shelter and interposition method groups were divided into 3 subgroups based on the arteries involved and the degree or direction of the arterial compression to the seventh nerve upon intraoperative observation. In group A, most common, simple type of compression is seen at the REZ caused by the anterior inferior cerebellar artery (AICA) or posterior inferior cerebellar artery (PICA), from the anterior caudal direction (Figure 1A1). In this type of compression, a nerve indentation is usually observed at the compressed REZ. In group B, tortuous redundant vertebral artery (VA) can be observed causing compression of the facial nerve directly or indirectly, and there is an interposed AICA or PICA between the VA and nerve (Figure 1B1). Compression of the seventh nerve was more severe in this group than in group A. In group C, the AICA coursed between the seventh and eighth cranial nerves and caused compression of the dorsal aspect of the seventh nerve. The proximal portion of the AICA or PICA compressed the ventral or caudal part of the seventh nerve (Figure 1C1). Patient outcomes were assessed according to the MVD scoring system of the Japan Society for MVD Surgery.[14] Based on this system, the efficacy (E) of the surgery is designated as E0 when the surgical outcome is complete disappearance of spasm, E1 when the outcome is an occasional slight spasm, E2 when the outcome is an occasional moderate spasm or apparently persisting spasm, and E3 when the surgical outcome is not cured. The complication score was C0 when no complications were observed after surgery; C1 when slight cranial nerve or cerebellar dysfunction, not affecting daily life, was present; and C2 if both subjective and objective cranial nerves or cerebellar dysfunction problematic for daily life were observed. Follow-up data on the postoperative grade of involuntary movement and complications were determined based on the patient's self-report through a direct interview during an outpatient visit, by a double postal card, or by telephone contact. The effectiveness of MVD using the interposition method or shelter method was compared among different offending vessels. This study was approved by the ethics committee of our hospital (details redacted for peer review). Because of the retrospective nature of the study, patient consent was not required.

## Surgical Procedures of the Shelter Method

The shelter method for HFS was performed as follows: With the patient in the park bench position with an auditory brainstem response and abnormal muscle response and with the help of an evoked potential system, abnormal muscle response recordings were obtained. Electrical stimulation of the temporal branch of the facial nerve generated mentalis muscle recordings and that of the marginal mandibular branch generated recordings from orbicularis oculi muscles. A suboccipital craniectomy was performed, approximately 3.5 × 3.5 cm in size (Figure 2). The supracondylar area was removed to minimize retraction and to approach the REZ of the facial nerve directly from the caudal direction. After dural incision, the arachnoid membrane of the cisterna magna was incised, and the cerebrospinal fluid was sufficiently drained to provide adequate cerebellar relaxation. The REZ of the facial nerve and offending arteries was easily observed with slight elevation of the flocculus and choroid plexus away from the ninth cranial nerve, without any tension on the eighth cranial nerve.

### *Type A*

To decompress the offending vessels, we created a space around the REZ with no artery within it, which was moved using a prosthesis, such as a polyurethane sponge or Teflon felt, placed between the artery and the brainstem around the REZ. To create space around the REZ, we created shelter with a polyurethane sponge for the offending artery to surround the REZ. During the surgery, the space between the offending vessels and REZ may look adequate; however, the postoperative changes in the brain position may bring the vessel up against the REZ again. The "shelter" technique is more likely to ensure that the vessel does not compress the facial nerve owing to the space created in comparison with the transposition technique (Figure 1A3) (Video 1).

### *Type B*

Decompression involved 2 processes. First, we transposed the VA on the pons. The VA was safely lifted from the brainstem and transposed caudally using a few Teflon pledges or by attaching the VA to the dura mater of the petrous bone by fibrin glue placed medial to the facial nerve. Second, transposition of the directly offending artery was performed. The directly offending artery was carefully lifted, and shelter was created with a polyurethane sponge for the offending artery to surround the REZ (Figure 1B3) (Video 2).

### *Type C*

The AICA coursed between the seventh and eighth cranial nerves and caused compression of the dorsal aspect of the seventh nerve. The proximal portion of the AICA or PICA compressed the ventral or caudal part of the seventh nerve. This double compression made transposition from the ventral region of the facial nerve REZ likely to be unsuccessful. Consequently, we first decompressed the normal typical pressure part of the REZ. The offending artery from the ventral side was carefully lifted, and a polyurethane sponge was inserted between the offending artery and brainstem, allowing us to observe the meatal branch of the AICA pressing the ventral side of the REZ between the facial and cochlear nerves, making decompression straightforward. Next, we separated the meatal branch between the facial and cochlear nerves from the REZ and moved toward the internal auditory canal. The meatal branch was then transposed to the petrous bone and attached by fibrin glue. At this stage, it was important to prevent pulling on the perforator because this branch penetrates the nerve and brainstem in the internal acoustic meatus (Figure 1C3) (Video 3).

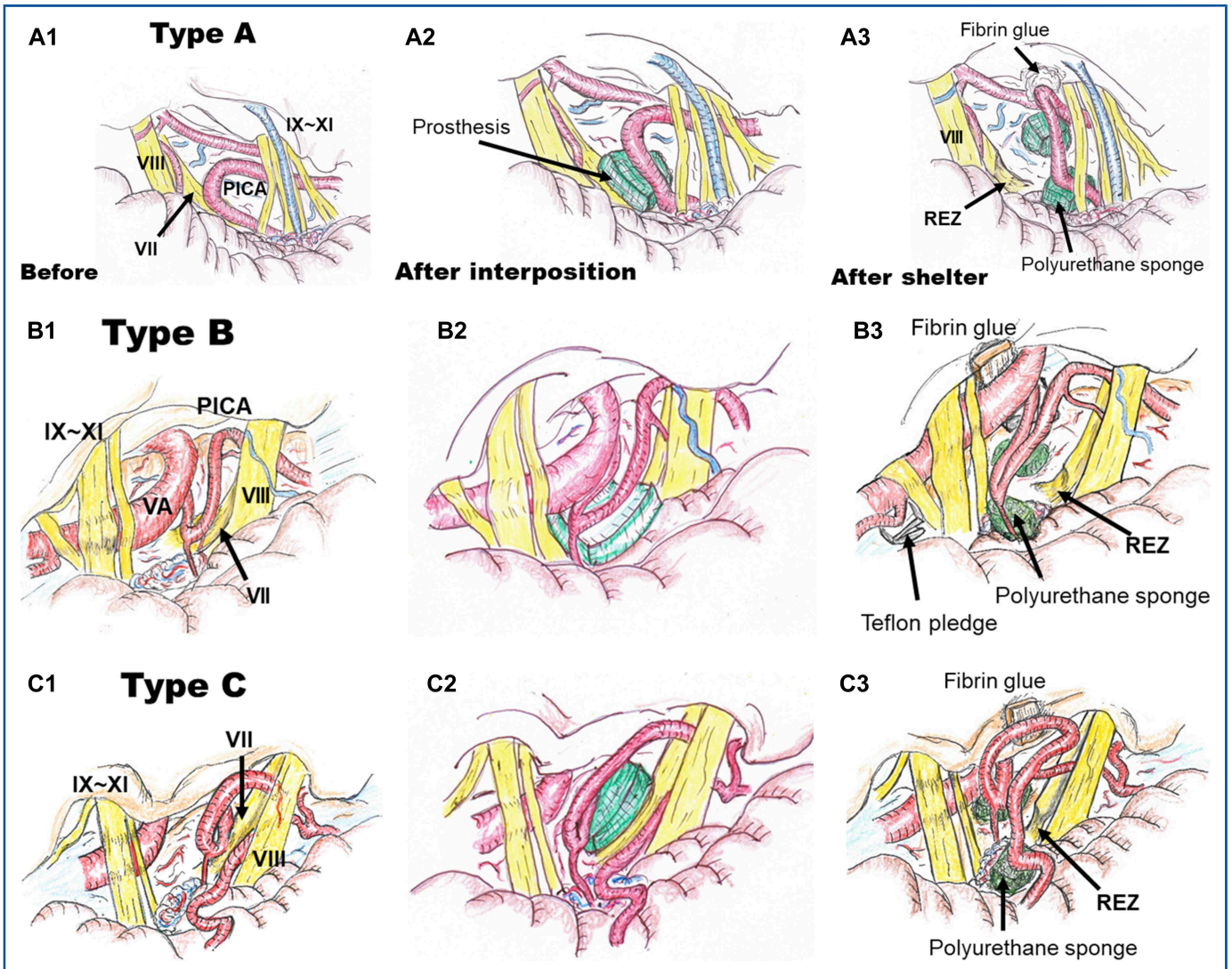


**FIGURE 1.** **A1**, *Most common, simple type of compression is seen at the REZ caused by the AICA or PICA, from the anterior caudal direction.* **A2**, *The pressure on the REZ is not relieved sufficiently by the interposition method.* **A3**, *To decompress the offending vessels, the artery is moved by polyurethane sponges or a Teflon felt, placed between the artery and the brainstem around the REZ.* **B1**, *Tortuous redundant VA can be observed causing compression of the facial nerve directly or indirectly, and there is an interposed AICA or PICA between the vertebral artery and nerve.* **B2**, *The pressure on the REZ by a VA cannot be effectively treated by direct decompression using a prosthesis.* **B3**, *To decompress, we first transposed the vertebral artery onto the pons. The vertebral artery was lifted from the brainstem and transposed caudally with a few Teflon pledges or by attaching the vertebral artery to the dura matter of the petrous bone by fibrin glue placed medial to the facial nerve. Subsequently, the offending artery was transposed, lifted, and sheltered with a polyurethane sponge to surround the REZ. The AICA coursed between the seventh and eighth cranial nerves and caused compression of the dorsal aspect of the seventh nerve.* **C1**, *The proximal portion of the AICA or PICA compressed the ventral or caudal part of the seventh nerve.* **C2**, *In patients with type C hemifacial spasm, the pressure on the REZ is not relieved by the interposition method.* **C3**, *We decompressed a typical pressure part of the REZ. The AICA or PICA offending arteries on the ventral side were carefully lifted from the brainstem and a polyurethane sponge was inserted between the offending artery and the brainstem, allowing visualization of the meatal branch of the AICA pressing the ventral side of REZ between the facial and cochlear nerves, ensuring straightforward decompression. We separated the meatal branch between the facial and cochlear nerves from the REZ and moved toward the internal auditory canal. The meatal branch was transposed onto the petrous bone and attached with fibrin glue. AICA, anterior inferior cerebellar artery; PICA, posterior inferior cerebellar artery; REZ, root exit zone; VA, vertebral artery.*

### Statistical Analysis

SPSS software (version 17.0 SPSS Inc.) was used for analyses. The Fisher exact test was used to compare categorical data. *P*-values of <.05 indicated statistical significance.

## RESULTS

The patients' demographic characteristics are summarized in Table 1.

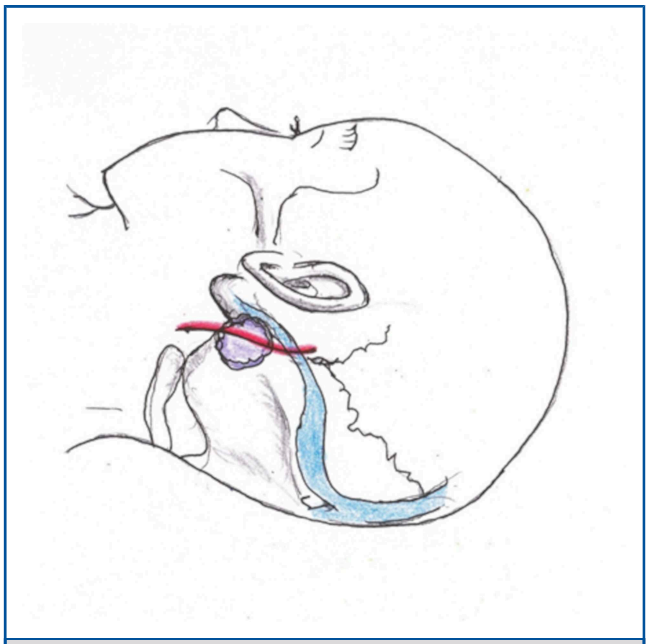

**FIGURE 2.** *With the patient in the park bench position, a suboccipital craniectomy was performed, approximately 3.5 × 3.5 cm in size. The supracondylar area was removed to minimize retraction and to approach the root exit zone of the facial nerve directly from the caudal direction.*

### Long-Term Outcomes

In the interposition method group, complete disappearance of spasm (E0) was achieved in 39 patients (73.6%). For types A and B, E0 was achieved in 30 of 32 (93.8%) and 9 of 14 patients (64.3%), respectively; no patient (0 of 7) achieved E0 in type C. By contrast, in the shelter method group, E0 was achieved in 87 (94.6%) patients of which 40 (95.2%), 36 (94.7%), and 11 (91.7%) patients, respectively, were classified under types A, B, and C. The overall complete cure rate in the shelter method group was higher than that in the interposition method group ($P = .0005$); the corresponding values for type A cases were comparable between the groups. In types B and C, complete cure rates in the shelter method group were significantly higher than those in the interposition method group ($P = .0114$ and $P = .0001$, respectively) (Table 2).

### Complications

No deaths were recorded in either group. Various complications were experienced by 18.9% of the patients with the interposition method and by 5.4% of the patients with the shelter method at discharge. Complication rates at discharge were significantly lower when using the shelter method than when using the interposition method ($P = .02$) (Table 3). Six patients in the interposition method group and 1 in the shelter method group experienced long-term hearing disturbance. The overall complication rates were significantly lower when using the shelter method than when using the interposition method ($P = .0098$). Meanwhile, in type B, fewer complications were observed with the shelter method than with the interposition method ($P = .0037$) (Table 4).

## DISCUSSION

MVD is an interposition technique with pad placement that was first described by Gardner[15] and largely popularized by Jannetta et al.[1] MVD has become the treatment of choice for patients with HFS because of its high success rate and low operative morbidity.[16] However, the curative effect of MVD decreases depending on the type of offending vessels while neurovascular compression by a large vessel such as a VA-rerated cannot be effectively treated with direct decompression by prosthesis (Figure 1B2).[6,17,18] Sindou et al[19-21] suggested that MVD performed when an implant is not in contact with the nerve root has a significantly better long-term outcome than MVD with pad placement. The transposition technique, rather than the interposition technique with pad placement, has become the technique of choice. In this study, long-term outcomes of the interposition method were satisfactory, and the complication rate was low in patients with AICA or PICA involvement (Figure 1A2). By contrast, the outcomes were poorer in VA-associated cases than in non–VA-associated cases. Decompression of the facial nerve by the insertion of some material between the REZ of the facial nerve and VA may be effective only in the short term, as this material may gradually harden because of adhesion or granulation, losing its shock absorbency.[22,23] The interposition technique does not provide adequate decompression of the neural structure in VA-associated cases. Several

**TABLE 1. Demographic and Clinical Characteristics of Patients Who Underwent Microvascular Decompression Using the Shelter and Traditional Methods**

| Characteristic | No. of patients | Sex (M/F) | Age (y) | Compressive pattern | Follow-up (y) |
|---|---|---|---|---|---|
| Shelter method | 92 | 1:1.8 | 22-78 (mean, 55.6) | Type A 42<br>Type B 38<br>Type C 12 | 1.0-14.4 (mean, 6.1) |
| Interposition method | 53 | 1:1.9 | 26-74 (mean, 53.0) | Type A 32<br>Type B 14<br>Type C 7 | 1.0-5.3 (mean, 3.0) |

**TABLE 2. Long-Term Effect of Patients Who Underwent Microvascular Decompression Using Interposition and Shelter Methods**

| | | Long-term effect | | Complete effect *E0/E0 + E1 + E2 + E3* | | |
|---|---|---|---|---|---|---|
| **Compressive pattern** | **Effect** | **Interposition** | **Shelter** | **Interposition (%)** | **Shelter (%)** | ***P*-value** |
| Type A | E0 | 30 (93.8%) | 40 (95.2%) | 93.8 | 95.2 | 1.0000 |
| | E1 | 2 (6.2%) | 1 (2.4%) | | | |
| | E2 | 0 | 0 | | | |
| | E3 | 0 | 1 (2.4%) | | | |
| Type B | E0 | 9 (64.3%) | 36 (94.7%) | 64.3 | 94.7 | **.0114** |
| | E1 | 3 (21.4%) | 2 (5.3%) | | | |
| | E2 | 2 (14.3%) | 0 | | | |
| | E3 | 0 | 0 | | | |
| Type C | E0 | 0 | 11 (91.7%) | 0 | 91.7 | **.0001** |
| | E1 | 2 (28.6%) | 0 | | | |
| | E2 | 5 (71.4%) | 0 | | | |
| | E3 | 0 | 1 (8.3%) | | | |
| Total | E0 | 39 (73.6%) | 87 (94.6%) | 73.6 | 94.6 | **.0005** |
| | E1 | 7 (13.2%) | 3 (3.3%) | | | |
| | E2 | 7 (13.2%) | 0 | | | |
| | E3 | 0 | 2 (2.1%) | | | |

E0, complete disappearance of spasm; E1, occasional slight spasm; E2, occasional moderate spasm or apparently persistent spasm; E3, recurrence to a degree equivalent to the condition before surgery; *P*-values were calculated using the Fisher exact test. Bold indicates statistical significance.

alternative surgical techniques have been introduced, and various materials have been reported to achieve successful transposition in VA-associated cases.[5-13] Some of them involve complicated manipulations, which require significant time and skill to be successfully and safely achieved within such a small space. Our shelter method requires neither surgical needle nor clips; thus, it is less complex and less hazardous and may be quicker than previously reported techniques. In addition, the efficacy of MVD in the shelter method group was significantly better than that in the interposition method group of VA-associated HFS. A favorable surgical outcome in the VA-associated cases required creating space by permanent and complete transposition of the offending vessels.

In patients with type C HFS, the pressure on the REZ is not relieved by the interposition method (Figure 1C2) because the pressure comes from both the ventral and dorsal directions. With the shelter method, the pressure from the dorsal side is relieved by moving the compressing artery that is fixed between the facial and auditory nerves more distally and thereafter deflecting it dorsally.

In this study, spasms disappeared completely in 94.6% of the patients. The efficacy of MVD in treating HFS in this study was superior to that reported in other studies.[4] Moreover, the overall complication rate was lower with the shelter method group (1.1%) than with the interposition method group (11.3%). In type B cases, the incidence of complications was significantly lower in the shelter method group (0.0%) than in the interposition method group (28.6%). Masuoka et al[24] reported the incidence of lower cranial nerve palsy to be higher in VA-associated HFS than in non–VA-associated HFS cases. In the shelter method, the risk of neural tissue injury was decreased by a thoughtful and deliberate manipulation. The shelter method may help reduce the risk of complications associated with MVD.

## Limitations

This study has several limitations. First, this was a retrospective study, and a historical cohort was used for comparisons. Second, the shelter method may not be suitable for all cases because its success may depend on the type of perforating branches involved. The involvement of many short perforating arteries may preclude obtaining space

**TABLE 3. Postoperative Immediate Complications of Patients Who Underwent Microvascular Decompression for Hemifacial Spasm**

| **Complication** | **Interposition method, No. (%)** | **Shelter method, No. (%)** | ***P*-value** |
|---|---|---|---|
| Facial paresis | 4 (7.5) | 2 (2.1) | .191 |
| Hearing disturbance | 5 (9.4) | 3 (3.3) | .142 |
| Lower cranial nerve palsy | 1 (1.9) | 0 | .366 |
| Total | 10 (18.9) | 5 (5.4) | .020 |

**TABLE 4. Permanent Complication of Patients Who Underwent Microvascular Decompression Using Interposition and Shelter Methods**

| | | Complication | | Total complication rate C1 + C2/C0 + C1 + C2 | | |
|---|---|---|---|---|---|---|
| Compressive pattern | Complication | Interposition | Shelter | Interposition (%) | Shelter (%) | *P*-value |
| Type A | C0 | 30 (93.8%) | 42 (100%) | 6.2 | 3.8 | .1840 |
| | C1 | 2 (6.2%) | 0 | | | |
| | C2 | 0 | 0 | | | |
| Type B | C0 | 10 (71.4%) | 38 (100.0%) | 28.6 | 0 | **.0037** |
| | C1 | 4 (28.6%) | 0 | | | |
| | C2 | 0 | 0 | | | |
| Type C | C0 | 7 (100%) | 11 (91.7%) | 0 | 0 | 1.0000 |
| | C1 | 0 | 1 (8.3%) | | | |
| | C2 | 0 | 0 | | | |
| Total | C0 | 47 (88.7%) | 91 (98.9%) | 11.3 | 1.5 | **.0098** |
| | C1 | 6 (11.3%) | 1 (1.1%) | | | |
| | C2 | 0 | 0 | | | |

C0, no complications; C1, slight cranial nerve or cerebellar dysfunction, not bothersome for daily life; C2, both subjective and objective cranial nerve or cerebellar dysfunction problematic for daily life; *P*-values were calculated using the Fisher exact test. Bold indicates statistical significance.

around the REZ by the shelter method. Finally, patients undergoing MVD using the interposition technique were encountered in a period when the operator was in the learning curve, and the microscopic surgical instruments and techniques were in the process of development; therefore, there is a possibility of a selection bias. However, the shelter method was used owing to the poor results in the early period, resulting in good outcomes and a low rate of complications.

## CONCLUSION

Herein, we described a novel decompression technique that creates free shelter-like space around the REZ. Our single-center retrospective study indicated that the rate of long-term curative effect in MVD with the shelter method was higher than that with the interposition method. MVD with the shelter method may help treat HFS caused by various types of arterial compression.

### Funding

This study did not receive any funding or financial support.

### Disclosures

The authors have no personal, financial, or institutional interest in any of the drugs, materials, or devices described in this article.

## REFERENCES

1. Jannetta PJ, Abbasy M, Maroon JC, Ramos FM, Albin MS. Etiology and definitive microsurgical treatment of hemifacial spasm. Operative techniques and results in 47 patients. *J Neurosurg.* 1977;47(3):321-328.
2. Rosenstengel C, Matthes M, Baldauf J, Fleck S, Schroeder H. Hemifacial spasm: conservative and surgical treatment options. *Dtsch Arztebl Int.* 2012;109(41):667-673.
3. Jannetta PJ. The cause of hemifacial spasm: definitive microsurgical treatment at the brainstem in 31 patients. *Trans Sect Otolaryngol Am Acad Ophthalmol Otolaryngol.* 1975;80(3 pt 1):319-322.
4. Sindou M, Mercier P. Microvascular decompression for hemifacial spasm: outcome on spasm and complications. A review. *Neurochirurgie.* 2018;64(2):106-116.
5. Bejjani GK, Sekhar LN. Repositioning of the vertebral artery as treatment for neurovascular compression syndromes. *J Neurosurg.* 1997;86(4):728-732.
6. Kyoshima K, Watanabe A, Toba Y, Nitta J, Muraoka S, Kobayashi S. Anchoring method for hemifacial spasm associated with vertebral artery: technical note. *Neurosurgery.* 1999;45(6):1487-1491.
7. Ogawa A, Suzuki M, Shirane R, Yoshimoto T. Repositioning of the tortuous vertebrobasilar artery for trigeminal neuralgia: a technical note. *Surg Neurol.* 1992;38(3):232-235.
8. Shigeno T, Kumai J, Endo M, Oya S, Hotta S. Snare technique of vascular transposition for microvascular decompression—technical note. *Neurol Med Chir (Tokyo).* 2002;42(4):184-190.
9. Suzuki S, Tsuchita H, Kurokawa Y, Kitami K, Sohma T, Takeda T. New method of MVD using a vascular tape for neurovascular compression involving the vertebrobasilar artery—report of two cases. *Neurol Med Chir (Tokyo).* 1990;30(13):1020-1023.
10. Tanaka Y, Uchida M, Onodera H, Hiramoto J, Yoshida Y. Simple transposition technique for microvascular decompression using an expanded polytetrafluoroethylene "belt": technical note. *Neurol Med Chir.* 2014;54(6):483-485.
11. Lee SH, Park JS, Ahn YH. Bioglue-coated Teflon sling technique in microvascular decompression for hemifacial spasm involving the vertebral artery. *J Korean Neurosurg Soc.* 2016;59(5):505-511.
12. Khoo HM, Yoshimine T, Taki T. A "sling swing transposition" technique with pedicled dural flap for microvascular decompression in hemifacial spasm. *Neurosurgery.* 2012;71(1 suppl operative):25-31.
13. Masuoka J, Matsushima T, Kawashima M, Nakahara Y, Funaki T, Mineta T. Stitched sling retraction technique for microvascular decompression: procedures and techniques based on an anatomical viewpoint. *Neurosurg Rev.* 2011;34(3):373-380.
14. Kondo A, Date I, Endo S, et al. A proposal for standardized analysis of the results of microvascular decompression for trigeminal neuralgia and hemifacial spasm. *Acta Neurochir (Wien).* 2012;154(5):773-778.
15. Gardner WJ. Concerning the mechanism of trigeminal neuralgia and hemifacial spasm. *J Neurosurg.* 1962;19(1):947-958.
16. Mizobuchi Y, Nagahiro S, Kondo A, et al. Prospective, multicenter clinical study of microvascular decompression for hemifacial spasm. *Neurosurgery.* 2021;88(4):846-854.
17. Nagahiro S, Takada A, Matsukado Y, Ushio Y. Microvascular decompression for hemifacial spasm. Patterns of vascular compression in unsuccessfully operated patients. *J Neurosurg.* 1991;75(3):388-392.

18. Ferreira M, Walcott BP, Nahed BV, Sekhar LN. Vertebral artery pexy for microvascular decompression of the facial nerve in the treatment of hemifacial spasm. *J Neurosurg.* 2011;114(6):1800-1804.
19. Sindou M, Amrani F, Mertens P. Does microsurgical vascular decompression for trigeminal neuralgia work through a neo-compressive mechanism? Anatomical-surgical evidence for a decompressive effect. *Acta Neurochir Suppl (Wien).* 1991;52:127-129.
20. Sindou M, Leston J, Decullier E, Chapuis F. Microvascular decompression for primary trigeminal neuralgia: long-term effectiveness and prognostic factors in a series of 362 consecutive patients with clear-cut neurovascular conflicts who underwent pure decompression. *J Neurosurg.* 2007;107(6):1144-1153.
21. Sindou M, Leston JM, Decullier E, Chapuis F. Microvascular decompression for trigeminal neuralgia: the importance of a noncompressive technique—Kaplan–Meier analysis in a consecutive series of 330 patients. *Neurosurgery.* 2008;63(4 suppl 2):341-351.
22. Oda K, Higuchi T, Murai Y, Yamaguchi F, Morita A. Teflon granuloma after microvascular decompression for hemifacial spasm: a case report and literature review. *Neurosurg Rev.* 2017;40(3):513-516.
23. Dou NN, Zhong J, Liu MX, et al. Teflon might be a factor accounting for a failed microvascular decompression in hemifacial spasm: a technical note. *Stereotact Funct Neurosurg.* 2016;94(3):154-158.
24. Masuoka J, Matsushima T, Nakahara Y, et al. Outcome of microvascular decompression for hemifacial spasm associated with the vertebral artery. *Neurosurg Rev.* 2017;40(2):267-273.

## COMMENT

I congratulate the authors on this addition to the literature on MVD for hemifacial spasm. The paper addresses the issue of how to correct a vascular compression of a cranial nerve: interposition or transposition. Placing padding between the vessel and nerve (interposition) was popularized by Janetta and taught to his students who have promulgated this technique. Moving the vessel away from the nerve (transposition) has been championed by Sindou (and some of the reviewers of this paper). The authors describe the "shelter method" which is essentially another method of transposition. Those of us who have successfully re-operated on patients and removed whatever padding someone has placed against the nerve have long since learned the rule "leave nothing touching the nerve." The authors' work supports this concept with large numbers from excellent surgeons.

**Chris Honey**
*Vancouver, BC, CANADA*

**VIDEO 1.** Shelter method for type A.
**VIDEO 2.** Shelter method for type B.
**VIDEO 3.** Shelter method for type C.