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Clinical Article

Time Course of Symptom Disappearance after Microvascular Decompression for Hemifacial Spasm

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Objective : This study is to investigate time course of symptom disappearance in patients whose spasm relieved completely after microvascular decompression (MVD).
Methods : Of 115 patients with hemifacial spasm (HFS) who underwent MVD from April 2003 to December 2006, 89 patients who had no facial paralysis after operation and showed no spasm at last follow-up more than 1.5 years after operation were selected. Symptom disappearance with time after MVD was classified into type 1 (symptom disappearance right after operation), type 2 (delayed symptom disappearance) and type 3 (unusual symptom disappearance). Type 2 was classified into type 2a (with postoperative silent period) and type 2b (without silent period).
Results : Type 1, type 2a, type 2b and type 3 were 38.2%, 48.37%, 12.4% and 1.1%, respectively. Delayed disappearance group (type 2) was 60.7%. Post-operative symptom duration in all cases ranged from 0 to 900 days, average was 74.6 days and median was 14 days. In case of type 2, average post-operative symptom duration was 115.1 days and median was 42 days. Five and 3 patients required more than 1 year and 2 years, respectively, until complete disappearance of spasm. In type 2a, postoperative silent period ranged from 1 to 10 days, with an average of 2.4 days.
Conclusion : Surgeons should be aware that delayed symptom disappearance after MVD for HFS is more common than it has been reported, silent period can be as long as 10 days and time course of symptom disappearance is various as well as unpredictable.

KEY WORDS : Hemifacial spasm · Microvascular decompression · Delayed resolution.

INTRODUCTION

Hemifacial spasm (HFS) described first by Gowers in 1884 is characterized by the spontaneous contraction of muscles where unilateral facial nerve is distributed[21]. HFS occurs over the various ages, but it is known that it happens mostly in the fifth decade. Most of them happen unilaterally, but rarely on both sides. Most symptoms start from orbicularis oculi and extend to lower facial muscles. It is known that it happens a little more to women.

The most common cause of HFS is the compression of facial nerve by cerebral vessels and as a pathogenesis, two hypotheses, central hypothesis and peripheral hypothesis, are suggested[1,3,4,15,17].

It is well known that patients have various time courses of symptom disappearance after MVD. However, studies on that subject are limited[2,6,13,19]. The aim of our study is to investigate the time course of symptom disappearance after MVD for HFS and its clinical implication in the management of HFS.

MATERIALS AND METHODS

Among 115 patients with HFS who underwent MVD in this hospital from April 2003 to December 2006, 89 patients, who had no temporary facial paralysis after operation and showed no symptom at last follow-up observation more than 18 months after operation were selected. The patients who developed temporary facial paralysis after MVD were excluded since postoperative facial paralysis can have an influence on symptom disappearance course after MVD.

Of 89 patients, 29 were men and 60 were women. Forty-four patients had spasm on the right side and 45 patients on the left side. The age at operation ranged from 24 to 71 years, with an average of 46.9 years. Average preoperative symptom duration was 58.2 months and median was 48 months, ranging from 6 to 240 months. Mean duration of the follow-up period was 40 months, ranging from 19 to

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64 months.

MVD was performed with the patient in the lateral decubitus position under general anesthesia. After removing occipital bone of 3 cm in diameter at back of mastoid process and opening dura mater, Teflon felt (IMPRA, Inc., A Subsidiary of C. R. Bard, Inc., USA) was inserted between the facial nerve and compressing blood vessel under the surgical microscope[10]. In case of HFS caused by tortuous vertebral artery, transposition of compressing artery was performed if decompression by interposition was inadequate.

Table 1. Definition of types of symptom disappearance after microvascular decompression for hemifacial spasm

Type of symptom disappearance after MVD	Description
Type 1	Complete disappearance of spasm immediately after MVD*
Type 2	Delayed disappearance of spasm after MVD*
	With silent period (a)
	Without silent period (b)
Type 3	Unusual disappearance of spasm after MVD*

*MVD : microvascular decompression

Table 2. Types of symptom disappearance after microvascular decompression for hemifacial spasm

Type of symptom disappearance				Total
Type 1	Type 2a	Type 2b	Type 3	
34 (38.2%)	43 (48.3%)	11 (12.4%)	1 (1.1%)	89

Patients were observed postoperatively until symptoms disappear completely. Also, spasms that occurred again after temporary disappearance of spasm, the times when facial spasm happens again after operation and it disappears finally were observed with scrutiny.

After careful observation on the disappearance of spasm with time after MVD, symptom disappearance after operation were classified as follows : Type 1, disappearance of spasm right after operation; Type 2, delayed disappearance of spasm after operation; and Type 3, unusual course of symptom disappearance. Type 2 was classified into type 2a, the delayed disappearance with a silent period, and type 2b, the delayed disappearance without a silent period (Table 1). Silent period was defined as the duration from operation to temporary relapse of spasm. Postoperative symptom duration was defined as the duration until spasm disappears completely after operation.

RESULTS

Thirty-four patients (38.2%) showed Type 1 symptom disappearance, 43 (48.3%) showed Type 2a and 11 (12.4%) showed Type 2b. One showed Type 3. In this case, spasm disappeared immediately after operation and mild spasm appeared again for 3 months after 11 months after MVD, since then the symptom-free period had continued for 3.5 years. In other words, 38.2 % of cases showed immediate disappearance of spasm after operation and 60.7% showed delayed disappearance of spasm after operation. A majority of cases (79.6%) with delayed disappearance had silent period (Table 2).

In total of 89 patients, mean postoperative symptom duration was 74.6 days and median was 14 days (range 0 to 900 days). The number of patients whose symptoms disappeared completely after more than 1 year after the operation was 5 (5.6%). Their postoperative symptom durations were 425, 600, 730, 730 and 900 days, respectively.

Probability of symptom disappearance with time after MVD was analyzed by using Kaplan-Meier survival analysis (Fig. 1).

In 54 patients who showed delayed disappearance of symptom after operation (Type 2), average of the postoperative symptom duration was 115.1 days and median was 42 days (ranging from 5 to 900 days). In delayed disappearance group (Type 2), the percentage of patients whose residual spasm after MVD disappeared within 1 month, 2 months, 3 months, 4 months, 6 months and 1 year were 44%, 69%, 74%, 83%, 87% and 91%, respectively. In 43 cases belonging to Type 2a (delayed disappearance with silent period), average silent period was 2.4 days and median was 2 days (ranging from 1 to 10 days). Average of symptom duration after silent period was 102.2 days and median was 40 days (ranging from 2 to 899 days). In 11 cases classified as Type 2b (delayed disappearance without silent period), postoperative average symptom duration was 156.2 days and median was 90 days (ranging from 5 to 720 days).

DISCUSSION

The most common cause of HFS is the compression of facial nerve by normal cerebral vessels. In addition, brain tumors, arteriovenous malformation and Paget's disease can be the causes. The differential diagnosis includes blepharospasm, facial myokymia, habitual tic, tardive dyskinesia, etc. Typical HFS begins in the eyelids and spreads to the lower facial muscles. The intensity of symptom can vary from the intermittent mild spasm to sustainted tonic muscle

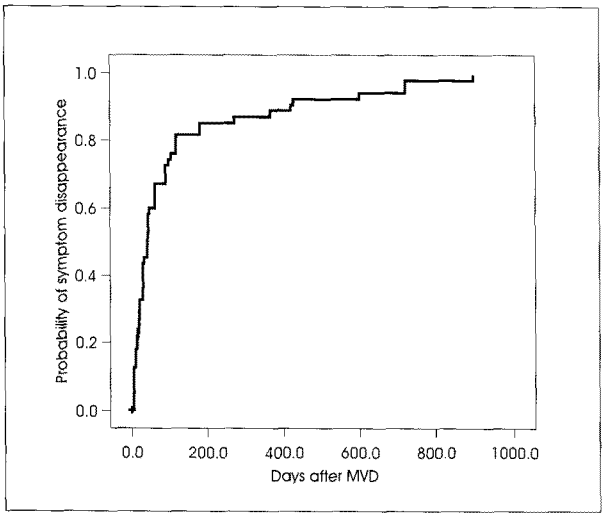

Fig. 1. Graph depicting probability of symptom disappearance with time after microvascular decompression for hemifacial spasm.

contraction. There is a tendency that the longer the spasm continues, the higher the frequency and the intensity become[11,16,18,20].

For the pathogenesis of HFS, two hypotheses are most recognized[1,3,4,15,17]. The central hypothesis is one that hyperexcitability in facial motor nucleus is generated as the facial nerve is stimulated by compressing blood vessels. Peripheral hypothesis is the other that ephaptic transmission between facial nerve fibers are generated as demyelination occurs at the compression site. The longer the compression of the facial nerves by blood vessel becomes, the more serious the pathophysiology in facial nerve and facial motor nucleus becomes[15]. According to the electrophysiological studies, both hypotheses are important for the explanation of development of HFS and resolution of spasm after MVD.

Regarding the mechanism of disappearance of symptom after MVD, it is thought that symptom disappears as facial nerve compression by vessel is removed and ephaptic transmission between facial nerve fibers and hyperexcitability in facial motor nucleus disappear[15,21].

MVD is the treatment of choice[5,7,9,12,14] since it was developed by Gardner and Jannetta[21]. According to Jannetta[9] in 1990, 89% of 336 patients with HFS had complete disappearance after MVD, 5% had partial disappearance and 6% had no response.

After MVD for HFS, symptom improvement course with time was reported to be various[6,8,13,19]. Jannetta[8] reported that 58% of 366 patients with HFS had complete response immediately after operation, 39% had partial response and 3% was failed. However, long term results among 344 patients followed for 12 to 189 months showed 89% had complete disappearance of spasm, 5% had partial disappearance and 6% had no response. His data reveals that the delayed disappearance of spasm after MVD is not infrequent.

Shin et al.[19] reported that the percentages of those with complete disappearance after MVD among 226 patients improved from 61.5% after 1 week to 74.8% after 3 months and to 82.7% at the final evaluation after at least 6 months of follow-up. In 187 patients who had complete improvement, the case that symptom disappeared right after operation was 62.6% and the case that symptom disappeared by delay was 37.4%. The average duration of symptom resolution was 73 days. Symptom resolution occurred within 1 month in 61.4%. The resolution time was statistically correlated with symptom duration.

Li[13] classified post-MVD course into 4 types. Type 1 is the case that spasm cured immediately. Type 2 is the case that spasm persisted with milder severity and faded away gradually from 7 days to as long as 2 years. Type 3 is the case that spasm ceased immediately but recurred in 3 days and ran the same course as in type 2. Type 4 is the failed case. Of 545 patients, 87.9% followed the type 1 course (immediate success group) and 11.7% experienced delayed disappearance of spasm (type 2 or 3). Cases with silent period (type 3) comprised 4.2% of total cases and 36% of delayed disappearance group. Of the delayed disappearance group, the percentage of patients whose residual spasm disappeared within 2 weeks, 3 months, 6 months and 1 year were 38%, 69%, 87% and 98.3%, respectively.

Ishikawa et al.[6] reported approximately 50% of 175 patients with HFS experienced more or less postoperative spasm (delayed group). Residual symptom disappeared within 1 month in 58% of delayed group, within 3 months in 70% and within 8 months in 93%, however 7% of delayed group had residual spasm for more than 1 year. A long duration of postoperative residual spasm was recognized in 2 patients (660 and 810 days). Eighty-eight percentage of delayed group had silent period which continued less than 4 days.

The percentage of the delayed disappearance group in our study (61.8%) was higher than other results (11.7%[13], 37.4%[19] and 50%[6], respectively). The percentage of cases with silent period in delayed disappearance group was 79.6% in our study, which was much higher than the 36%[13] and lower than the 88%[6]. The longest silent period in our study was 10 days, which was longer than the other reports (3 days[13] and 4 days[6], respectively). In our study, the average postoperative symptom duration of all patients and delayed disappearance group were 75 days and 115 days, respectively. The percentage of patients whose residual spasm after MVD disappeared within 1 month, 2 months,

3 months, 4 months, 6 months and 1 year were 44%, 69%, 74%, 83%, 87% and 91%, respectively, which was comparable to the percentage reported by others[6,13]. The number of patients that more than 1 year was required until symptom disappeared completely was 5 (5.6%). Their postoperative symptom durations were 425, 600, 730, 730 and 900 days, respectively. These demonstrated that some patients need more than 2 years for complete disappearance of HFS after MVD. Surgeons have to keep in mind this when they decide reoperation.

Variations regarding delayed disappearance and silent period may depend on the strictness of the observation, the definition of complete disappearance of spasm, the characteristics of patients in each study and the surgical procedure including the extent of completeness of decompression of facial nerve. Our policy in MVD for HFS is to mobilize compressing vessel and interpose Teflon as much as possible or to transpose tortuous and elongated artery if decompression by interposition is inadequate, which is not different from others.

Considering the variable and unpredictable course of symptom disappearance after MVD, both removal of compression by vessel on facial nerve and normalization of electrophysiological abnormality are important for the disappearance of spasm. The balance between central hyperexcitability and peripheral damage may determine the postoperative HFS course[6].

CONCLUSION

Surgeons should be aware that delayed symptom disappearance after MVD for HFS is common and time course of symptom disappearance is various as well as unpredictable.

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References

1. Adams CB : Microvascular compression : an alternative view and hypothesis. **J Neurosurg 57** : 1-12, 1989
2. Auger RG : Hemifacial spasm : clinical and electrophysiologic observations. **Neurology 29** : 1261-1272, 1979
3. Chang JW, Chang JH, Choi JY, Kim DI, Park YG, Chung SS : Role of postoperative magnetic resonance imaging after microvascular decompression of the facial nerve for the treatment of hemifacial spasm. **Neurosurgery 50** : 720-725; discussion 726, 2002
4. Gardner WJ : Concerning the mechanism of trigeminal neuralgia and hemifacial spasm. **J Neurosurg 19** : 947-958, 1962
5. Huang CI, Chen IH, Lee LS : Microvascular decompression for hemifacial spasm : analyses of operative findings and results in 310 patients. **Neurosurgery 30** : 53-56; discussion 56-57, 1992
6. Ishikawa M, Nakanish T, Takamiya Y, Namiki J : Delayed resolution of residual hemifacial spasm after microvascular decompression operations. **Neurosurgery 49** : 847-854; discussion 854-856, 2001
7. Iwakuma T, Matsumoto A, Nakamura N : Hemifacial spasm : comparison of three different operative procedures in 110 patients. **J Neruosurg 57** : 753-756, 1982
8. Jannetta PJ : Cranial rhizopathies. In : Youmans JR (ed). **Neurological surgery**. 3rd ed. Philadelphia : WB Saunders, 1990, pp4169-4182
9. Jannetta PJ : Microvascular decompression for hemifacial spasm. In : May M (ed). **Facial nerve**. New York : Thieme, 1986, pp499-508
10. 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 47** : 321-328, 1977
11. Kerber CW, Margolis MT, Newton TH : Tortuous vertebrobasilar system : a cause of cranial nerve signs. **Neuroradiology 4** : 74-77, 1972
12. Kondo A, Ishikawa J, Yamasaki Y, Konishi T : Microvascular decompression of cranial nerve, particularly of the 7th cranial nerve. **Neurol Med Chir (Tokyo) 20** : 739-751, 1980
13. Li CS : Varied patterns of postoperative course of disappearance of hemifacial spasm after microvascular decompression. **Acta Neurochir (Wien) 147** : 617-620; discussion 620, 2005
14. Liu KN, Wu JM, Fairholm D : Hemifacial spasm : Treatment by posterior fossa surgery. **J Formosan Med Assoc 80** : 1235-1239, 1981
15. Moller AR : The cranial nerve vascular compression syndrome : II. A review of pathophysiology. **Acta Neurochir (Wien) 113** : 24-30, 1991
16. Moller AR, Jannetta PJ : Physiologic abnormalities in hemifacial spasm studied during microvascular decompression operation. **Exp Neurol 93** : 584-600, 1986
17. Nielsen VK : Pathophysiology of hemifacial spasm : ephaptic transmission and ectopic excitation. **Neurology 34** : 418-426, 1984
18. Nielsen VK, Jannetta PJ : Pathophysilogic aspects of hemifacial spasm. Part III. Effect of facial nerve decompression. **Neurology 36** : 891-897, 1984
19. Shin JC, Chung UH, Kim YC, Park CI : Prospective study of microvascular decompression in hemifacial spasm. **Neurosurgery 40** : 730-734; discussion 734-735, 1997
20. Wartenberg R : **Hemifacial spasm, A Clinical and Pathophysiological study**. New York : Oxford University Press, 1952
21. Wilkin RH : Hemifacial spasm : a review. **Surg Neurol 36** : 251-277, 1991