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.[12,13,19]. 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 spasm at last follow-up more than 1.5 years after operation were selected. 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.
MVD was performed with the patient in the later 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\(^\text{10}\). In case of HFS caused by tortuous vertebral artery, transposition of compressing artery was performed if decompression by interposition was inadequate.

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 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 sustained tonic muscle

| Table 1. Definition of types of symptom disappearance after microvascular decompression for hemifacial spasm |
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| Type of symptom disappearance after MVD | Description |
| Type 1 | Complete disappearance of spasm immediately after MVD* |
| Type 2 | Delayed disappearance of spasm after MVD* |
| 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 |
contraction. There is a tendency that the longer the spasm continues, the higher the frequency and the intensity become.

For the pathogenesis of HFS, two hypotheses are most recognized. The central hypothesis is 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.

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.

MVD is the treatment of choice since it was developed by Gardner and Jannetta. According to Jannetta in 1990, 89% of 336 patients with HFS had complete disappearance after MVD, 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. 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 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. 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% and 37.4%), 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% and lower than the 88%. The longest silent period in our study was 10 days, which was longer than the other reports (3 days and 4 days, 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 others6,13. 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 course6,9.

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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