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Reappearance of Cranial Nerve Dysfunction Symptoms Caused by New Artery Compression More than 20 Years after Initially Successful Microvascular Decompression: Report of Two Cases

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Abstract

Reappearance of symptoms of cranial nerve dysfunction is not uncommon after successful microvascular decompression (MVD). The purpose of this study was to report two quite unusual cases of recurrent and newly developed hemifacial spasm (HFS) caused by a new conflicting artery more than 20 years after the first successful surgery. In Case 1, the first MVD was performed for HFS caused by the posterior inferior cerebellar artery (PICA) when the patient was 38 years old. After 26 symptom-free years, HFS recurred on the same side of the face due to compression by the newly developed offending AICA. In Case 2, the patient was first operated on for trigeminal neuralgia by transposition of the AICA at 49 years old, but 20 symptom-free years after the first MVD, a new offending PICA compressed the facial nerve on the same side, causing HFS. These two patients underwent reoperation and gained satisfactory results postoperatively. Reappearance of symptoms related to compression of the root exit zone (REZ) by a new offending artery after such a long symptom-free interval since the first effective MVD is rare. Here, we describe two such unusual cases and discuss how to manage and prevent such reappearance of symptoms after a long time interval.

Key words: microvascular decompression, trigeminal neuralgia, hemifacial spasm, reappearance, new artery

Introduction

Microvascular decompression (MVD) has been established as an effective treatment for trigeminal neuralgia (TN) and hemifacial spasm (HFS). Although immediate postoperative cure is reportedly obtained in upto approximately 90% of cases after MVD, symptom recurrence developed at a rate of 6–30% in a 3-year follow-up study, with an annual rate of recurrence of 1–3.5%.[1–7] We have recently encountered and studied two unusual cases. In one case, HFS reappeared 26 symptom-free years after the first successful MVD for HFS and in the other case, HFS newly developed 20 years after the first MVD for TN. In these two patients, symptoms developed on the same side as the first MVD after an extended duration following initial MVD.

Although reappearance of TN and HFS after MVD is common, previous reports do not appear to have described reappearance of HFS caused by neurovascular conflict with a new artery a significant duration after the initial MVD. Here, we report two such unusual cases and discuss how to prevent redo-MVD by managing the arteries running close to the nearby cranial nerves.

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Case Reports

I. Case 1

A 64-year-old man had undergone surgery for left HFS at 38 years old. At the first MVD, the facial nerve was compressed by the posterior inferior cerebellar artery (PICA), which was transposed laterally to obtain complete cure of symptoms. After 26 symptom-free years since the first MVD, HFS recurred ipsilaterally, and redo MVD showed that the PICA that had compressed the REZ of the facial nerve on initial MVD remained transposed (Fig. 1A), but the nearby AICA had become redundant and thus compressed the root exit zone (REZ) of the facial nerve (Fig. 1B). This artery was successfully displaced from the REZ of the nerve (Fig. 1C), resulting in complete cure of symptoms.

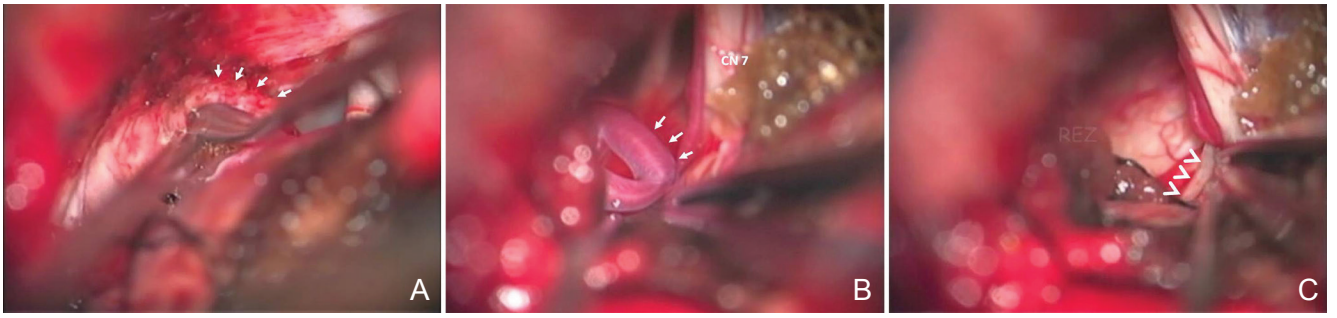

Fig. 1 A: At redo microvascular decompression, the posterior inferior cerebellar artery (*arrows*) that had compressed the root exit zone of the facial nerve at the first microvascular decompression remained transposed. B: The facial nerve (CN VII) was compressed by the nearby anterior inferior cerebellar artery (*arrows*), which had become redundant. C: The compressing artery was successfully transposed and the root exit zone (*arrowheads*) was decompressed.

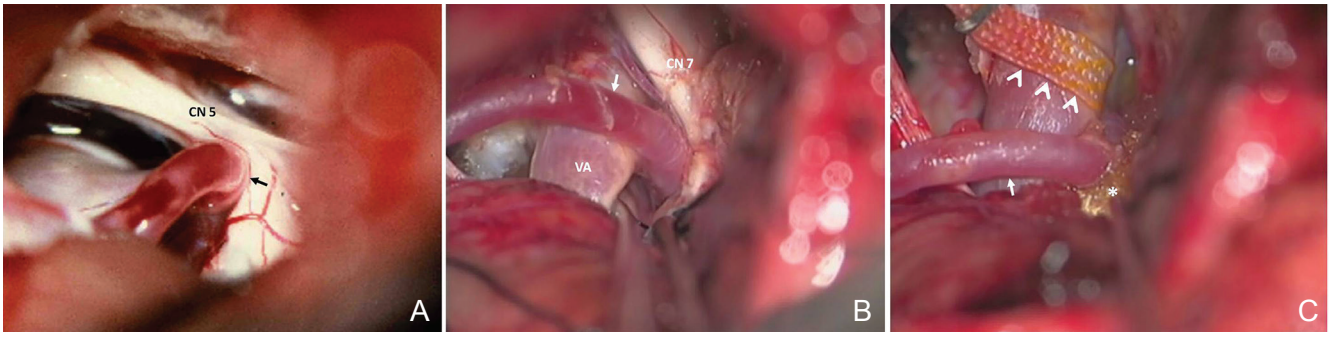

Fig. 2 A: At the first microvascular decompression for trigeminal neuralgia, the trigeminal nerve (CN V) was compressed by the anterior inferior cerebellar artery (*arrow*), which was successfully repositioned, resulting in cure of trigeminal neuralgia. B: Twenty years after the first microvascular decompression, hemifacial spasm developed on the same side of the face. At repeat microvascular decompression, the vertebral artery (VA), which had become more tortuous and redundant, started to displace the proximal part of the posterior inferior cerebellar artery (*arrow*) caudolaterally to impinge on the root exit zone of the facial nerve (CN VII). C: The vertebral artery was lifted by vascular tape (*arrowheads*) and fixed to the dura of the petrous bone, and the posterior inferior cerebellar artery (*arrow*) was repositioned by inserting prosthesis (*asterisk*) between the posterior inferior cerebellar artery and brainstem.

II. Case 2

A 69-year-old woman had undergone MVD for left TN at 49 years old. At the first MVD, the trigeminal nerve was compressed by the AICA (Fig. 2A), which was successfully repositioned to resolve the TN. Twenty years after the first MVD, she started to complain of HFS on the same side as the previous TN. At redo-MVD, the AICA that had previously compressed the TN remained transposed, but the nearby vertebral artery (VA), which had become tortuous and redundant, had started to displace the proximal part of the PICA to impinge on the REZ of the facial nerve (Fig. 2B). After transposing the VA by fixing it to the nearby petrous dura, the directly conflicting PICA that ran between the VA and the REZ was also displaced caudolaterally (Fig. 2C). Immediately after surgery, HFS was successfully cured without any sequelae.

Discussion

In experienced hands, MVD for TN and HFS offers the highest likelihood of long-term successful cure of cranial nerve dysfunction symptoms with low rates of morbidity and recurrence. To achieve satisfactory MVD and thus not only a good cure rate, but also minimization of surgical complications and recurrence, surgeons should have a thorough understanding of the various techniques available.

Although various reports have described and discussed postoperative recurrence of symptoms, the term "recurrence" has not been clearly defined and remains controversial. As a result, the terms "incomplete cure" and "recurrence" are often misused and may be misleading. We believe, based on our daily clinical experience, the most definitive measurement of surgical outcomes should be undertaken after a postoperative period of more than 12 months. This is because during MVD, nerves may be manipulated and the procedure might mask symptoms for some time postoperatively, even if the surgery was not appropriately performed. In such cases, patients may not complain for some time, possibly several months after MVD. We, therefore, believe that a postoperative period of at least 12 months should pass before recurrence is officially noted.

Although MVD is now recognized as the treatment of choice for TN and HFS in order to obtain complete and permanent relief from symptoms, recurrences may occur in some cases, even after careful MVD. Among patients with TN, Cho et al. reported that the rate of recurrence was 14% (53/376) for a mean follow-up period of 6.3 years, and Matsushima et al. described a 17.1% (14/82) rate of recurrence for a mean follow-up period of 5.4 years.[7,8] In a large MVD series by Barker et al., the recurrence rate was reported as high as 30% after a median follow-up of 6.2 years, with symptoms typically developing within the first 2 years after surgery, and later (at approximately 10 years) with an annual recurrence rate less than 1%.[1] Among patients with HFS, symptom recurrence rates have also been reported in the literature, at approximately 2.4–2.9%, and the duration of the interval between surgery and recurrent symptoms has also varied among institutes, from 5 years to 16 years.[9–11] Payner et al. reported results for 34 cases of HFS and reviewed the literature concerning the incidence and timing of recurrence. Although 10.3% of their patients in whom spasms initially showed complete cure developed recurrent spasm, no patients developed recurrence after a 24-month interval without spasm. According to their review of the literature, among more than 600 patients who underwent MVD for HFS, 86% of all recurrences occurred within 2 years of surgery, and the chance of symptom recurrence was only 1% after 2 years had elapsed.[12]

In our review of the literature concerning the timing of recurrence after MVD, the longest interval reported from first surgery to redo- MVD was approximately 10 years for TN and 16 years for HFS.[11,13]

Common causes of symptom recurrence include incomplete decompression, recompression of the REZ due to migration of an inserted prosthesis, and adhesion or fibrosis between an offending artery and the REZ due to an inappropriately inserted prosthesis.[3–8] According to a long-term follow-up study by Kondo, the recurrence rate after MVD decreased from 10.2% to 6.5% for TN and from 8.9% to 6.9% for HFS for an approximately 5- to 20-year follow-up period after adopting the transposition method.[4] Therefore, our tactics for preventing recurrence are as follows: (1) preferably transposing the offending artery and fixing it to the nearby dura mater; (2) trying to avoid insertion of a prosthesis between an offending artery and the REZ to avoid recompression of neural structures; and (3) in the case of TN with the nerve axis tilted by vascular compression, straightening the axis by completely incising the arachnoid membrane around the nerve.

The present report, however, describes unusual causes of recurrent symptoms. Some reports have examined the recurrence of TN and HFS caused by a newly developed second offending artery.

Cho et al. performed reoperations on 31 patients for recurrent TN after a pain-free period of 6–18 months, and 2 of the 7 patients with arterial recompression exhibited a new offending artery.[8] However, they did not describe precisely which artery was the new source of compression at the REZ. Ugochukwu et al. reoperated on 6 patients for recurrent TN in which the REZ had been compressed by the superior cerebellar artery (SCA) at the time of the previous MVD.[14] Among these, further compression by an additional loop of the AICA in two patients and by the basilar artery in one patient was noted upon reoperation after an average of 42 pain-free months.

Kureshi et al. reported eight re-exploration cases for recurrence of HFS after the first MVD, and described two cases of a new compressive arterial element. In the first case, symptoms recurred only 3 days after the initial MVD, and they commented that they had overlooked VA compression at the initial surgery. In the second case, recurrence developed 7.2 years after achieving partial recovery. They found that the branch of the PICA that had compressed the REZ at the first MVD was still in a good position, and the VA had newly compressed the REZ at the time of redo surgery.[5]

The interval between first surgery and redo surgery in these reports was relatively short, and not as long as the cases reported here.

We previously reported one patient whose TN recurred 20 years after the first MVD. SCA which compressed REZ of trigeminal nerve at the first MVD was found remained transpositioned at redo MVD, but AICA newly compressed REZ and caused TN again.[15] The present two cases and one case that we previously reported are very unusual in that the symptoms that reappeared were elicited by new conflicting arteries after the first MVD, and in all cases, the duration from initial surgery to reappearance of cranial nerve symptoms was longer than any previously reported.[1,7,8]

The pathological mechanisms causing a new artery to compress the REZ could be a result of patient's age, with arteries near the REZ gradually starting to change, becoming more arteriosclerotic, elongated, and redundant, and thus resulting in compression of the REZ. Since the reported patients who had been operated on previously had aged more than 20 years by the time of re-exploration, risks of surgery were likely increased at redo MVD. We question whether it would be beneficial to treat arteries close to, yet not compressing, the REZ at the first MVD in order to avoid future compression of the nerves. Our opinion is that the arteries found in closest proximity to the REZ at the first MVD should preferably be displaced from the REZ in advance. A second question is whether redo MVD is appropriate for older patients. Fortunately, all patients we encountered were healthy and in Class 1 condition according to the criteria of the American Society of Anesthesiologists (physical status classification

system: healthy person without any systemic disease) and no problems with general anesthesia were encountered.

Conclusion

Although various causal factors likely contribute to the reappearance of TN and HFS after MVD, recompression of the REZ by a new artery a long time after the first successful surgery is quite rare. We described and discuss 2 such cases in the present report with unusual patterns of symptom reappearance, with each progressing differently: HFS to HFS in Case 1; and TN to HFS in Case 2.

It should be acknowledged that the reappearance of TN or HFS may occur due to a new offending artery a long time after the first successful MVD. Our opinion is that early treatment of such arteries may be preferable if the arteries are close enough to the REZ, in order to avoid redoing MVD after such patients age significantly.

Conflicts of Interest Disclosure

The authors have no personal, financial, or institutional interests in any of the drugs, materials, or devices mentioned in this article. All authors who are members of the Japan Neurosurgical Society (JNS) have registered online Self-reported COI Disclosure Statement Forms through the website for JNS members.

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