Neurosurg Rev (2012) 35:137–140
DOI 10.1007/s10143-011-0366-x

LETTER TO THE EDITOR

An ideal microvascular decompression technique should be simple and safe

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Received: 21 July 2011 / Accepted: 8 October 2011 / Published online: 19 November 2011

I have read with great interest the recent paper of Masuoka et al. about a novel technique for microvascular decompression published in *Neurosurgical Review* 2011 [6]. The author provided a sling technique to transpose the culprit by means of stitching the offending artery to the tentorium or petrous dura. Regardless that several authors have reported the analogous retraction technique [4, 8], this paper focused on the stitching point anatomically. Although it is an alternative to separate the neurovascular confliction, this technique is not good enough to be propagated for it has numerous drawbacks.

First of all, this stitched sling retraction technique complicates the operation. It is not easy to complete those procedures of passing the thread around the artery and then stitching and knotting in such a small surgical field, which evidently adds extra operative time and the chance of complications. Meanwhile it might be a question if this thread-stitched fixation of the artery could maintain permanently without escape. Moreover, this thin sling thread may knife and harm the adventitia with pulsation or even occlude the artery. On the other hand, this technique is not suitable for multiple offending vessels including veins and arterioles, which is commonly encountered during the microvascular decompression (MVD) surgery [3, 14].

Secondly, this technique has some potential risks. It is not all visible while an angled needle go through the vessels. A blind manipulation means dangerous. Despite an appropriate spot has been localized by the author, it needs special skill to stitch on. A burst might be inevitable at the moment when the needle was penetrating the tentorium or the petrous dura, which is harmful to the meticulous microsurgery. Besides, when the surgeon concentrates on knotting or clipping, those surrounding delicate structures, especially petrosal veins as well as facial and vestibulocochlear nerves, are actually in jeopardy. In addition, the spatula has been seen in each figure of the paper. Nowadays, it has been the common view that a successful MVD can be achieved without a retractor [7]. However, to finish these extra procedures, it still has to be employed in order to obtain an additional

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operative room. It added risk coefficient compared with the non-retractor technique.

I agree with the author that the "transposition" is better than "interposition". Anyway, it would not cause a new compression to the nerve as long as the offending vessel is thoroughly freed before a soft wadding of teflon was placed. As a matter of fact, the offending vessel is separated from the nerve by an ample opening of the surrounding arachnoids rather than merely squeezing in the teflon between them [5, 11–13]. The teflon actually plays a role of preventing the vessel from rebounding rather than in isolation. Therefore, the teflon has not necessarily to be placed at the conflict site—it could be put anywhere which it cause minimal pressure to the nerve.

With the experience of more than 2,000 cases of MVDs in our center, we have realized that a satisfactory manipulative space could be established without spatula retraction. The suffered nerve could be successfully decompressed without retraction of the offending vessel [1–3, 5, 9–13]. Here are some knacks:

1. The head of the patient should be turned back slightly to the ipsilateral side in the lateral decubitus position, which allows the cerebellum to droop under its own gravity without using the spatula.
2. The craniectomy should be lateral enough and as close as possible to the sigmoid sinus, which offers a maximal visual angle.
3. The surgical field is established by sufficient opening of the arachnoids rather than solely retracting the cerebellum.
4. A proper approach facilitates the operation.
   (a) For glossopharyngeal cases, it should be approached infracerebellarly.
   (b) For hemifacial cases, it should be approached infraflocculary. The dissection should be medial enough to expose the pontomedullary fissure, where is usually haunted by the neurovascular conflict.
   (c) For trigeminal cases, the laterocerebellar (Fig. 1) rather than infratentorial approach is recommended, which avoids those blocking petrosal veins [10].
5. The decompression should be completed by fully releasing the offending vessel instead of stuffing teflon.
6. A soft teflon wadding should be adapted, which could be placed outside the conflict site.
7. The intraoperative electrophysiological monitoring is helpful to identify the offending vessel for hemifacial spasm cases (Fig. 2).

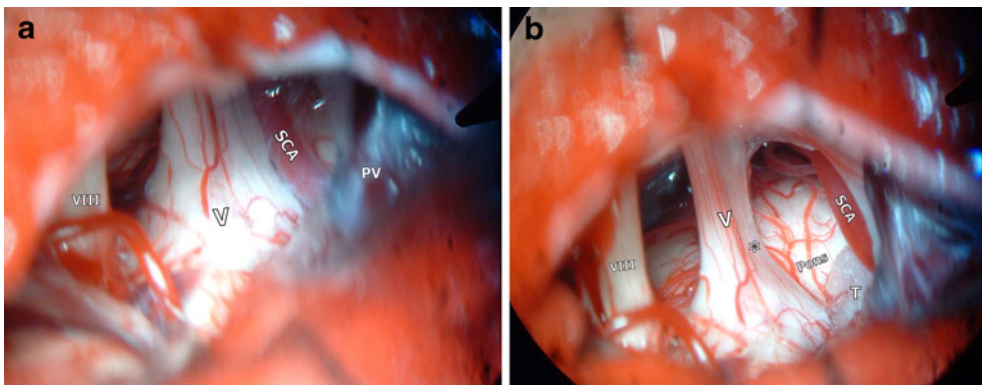

Fig. 1 **a** This was a left trigeminal neuralgia case. Instead of the superior cerebellar approach, the lateral cerebellar approach was chosen, which avoid those petrosal veins (*PV*). The superior cerebellar artery (*SCA*) was identified as the culprit, which adhered to trigeminal nerve (*V*) rostrally. **b**. With the surrounding arachnoids being sharply opened, the offending artery (*SCA*) was freed thoroughly. A soft wadding of teflon (*T*) was placed between the pons and the artery, which withdrew the offending vessel far away from the nerve (*V*) and no teflon was needed at the conflict site (*asterisk*)

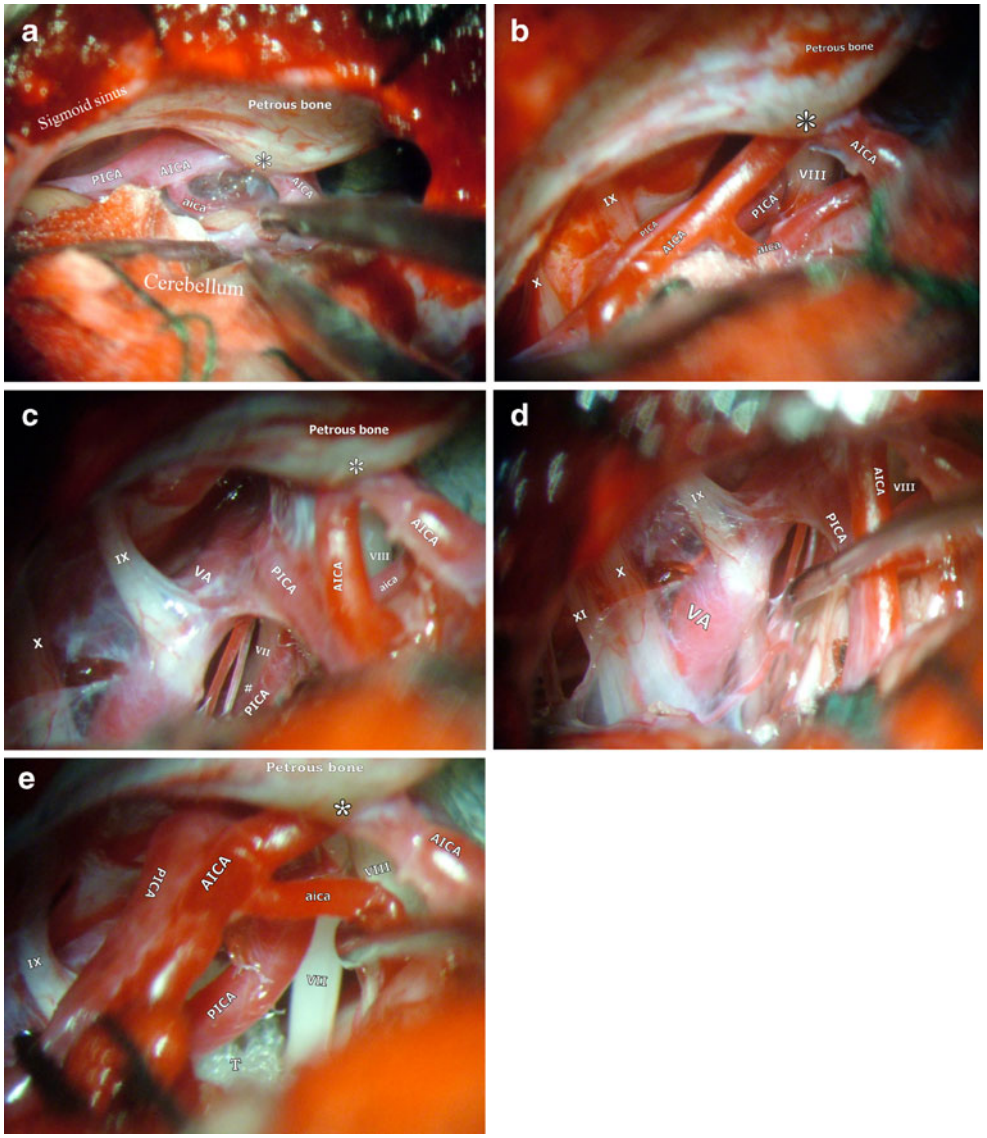

Fig. 2 **a** This was a left hemifacial spasm case. After the dura was opened, the anterior infracerebellar artery (*AICA*) was found to adhere to the petrous bone tightly (*asterisk*), which hindered the exposure. **b** With arachnoid opening, the lateral segment of vestibulocochlear nerve (*VIII*) was revealed, which seemed to contact with the posterior infracerebellar artery (*PICA*) caudally. But the real time electromyography did not monitor any change in the abnormal muscle response (AMR) wave after the PICA was transposed. Actually, the facial nerve was not visualized by then. **c** The microscopic view was moved caudally. With the arachnoids between the PICA and the caudal cranial nerves (*XI*, *X*) being opened sharply, the cerebellum was raised furthermore and the medial segment of facial nerve (*VII*) was visible. The nerve was discovered to be compressed by the proximal PICA at the site (*number sign*) where it originated from the brainstem. As soon as the artery was dissected free from the nerve, the AMR vanished. A tortuous vertebral artery (*VA*) was also observed ventrally to the caudal nerves, which pushed the PICA towards the facial nerve. **d** To effectively decompress the facial nerve, the VA was mobilized caudolaterally before manipulation of the direct offending artery (*PICA*). **e** With the VA being removed, the interposition of soft teflon waddings (*T*) was started from the level of those caudal nerves and gradually extended towards the facial nerve (*VII*). In this way, a satisfactory decompression was achieved without pulling the offending artery by a sticked sling, which was impossible for this case since the operative space was too limited because of the attached *AICA*

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Comments

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MVD is now one of the standard surgeries. But, there are still some problems which should be solved. One of them is recurrence after the MVD especially for trigeminal neuralgia. For this reason, many neurosurgeons in Japan have changed the decompression method from the interposition technique to the transposition one. The transposition technique with glue is generally utilized. However, unreliability of the fixation by the glue seems to be still one of the causes of the recurrence. Therefore, we started to try the transposition of offending arteries with the stitched sling retraction technique several years ago and reported it as one of the optional methods based on the knowledge of the anatomy this year.

The writer of this letter asked us several questions, and we are going to state our opinions answering his questions.

1. As he points out, it is difficult to perform this technique in a small surgical field. Many neurosurgeons that perform MVD prefer a small surgical field, but we perform this method in not-so small craniotomy and not-so small surgical field. In order to perform a reliable and safe surgery, we do not care much about the size of the craniotomy.

2. This method is not so complicated for surgeons who are familiar with cerebellopontine angle (CPA) surgeries. When the anatomy is well understood, we do not think complications increase. However, the operation time becomes longer by 30–60 min.

3. The offending arteries transposed by a sling are neither injured nor occluded because we do not tie silk sutures around the arteries. For further fixation, we sometimes use teflon felt and glue to fix the sutures of the sling to the tentorium.

4. We do not perform any blind operations. We perform this method in a sufficient surgical field watching the surrounding structures such as nerves, arteries, and veins.

5. This method is not a novel one for the surgeons who use the micro needle holder in the cranium. A few special long surgical instruments such as a micro needle holder are necessary especially in the MVD for trigeminal neuralgia.

6. In the surgeries of the upper portion of the CPA, the petrosal veins are very important, and we should know the anatomy of the complicated veins. After sufficient preoperative examinations of the veins by 3D CT, we first perform the dissection of the arachnoid membrane around the petrosal veins in order to be able to move the veins safely.

7. Many neurosurgeons that perform MVD make an effort not to use retractors in order to avoid compression of the cerebellum. We also agree that the MVD without any spatulas is safer. However, when this stitched sling retraction technique is performed, a wide operative field should be obtained even with retractors. We make an effort to reduce the time of use of the retractor short. Whether a retractor had better be used or not should be carefully determined based on its merits and demerits in each surgery.

8. In the cases with analogous retraction technique, a surgeon has to pay attention to the strength of the fixation for the transposition. When sufficient transposition is obtained by analogous retraction technique, the stitched sling retraction technique is not necessary.

9. Their surgery shown in Fig. 1 does not have a proper surgical field for the technique, and the petrosal vein has not been dissected. They are using only the petrosal cerebellar surface. In such a surgical field, it is very difficult and dangerous to perform the stitched sling retraction technique. We use not only the petrosal cerebellar surface but also the tentorial cerebellar surface after dissecting the arachnoid membrane around the petrosal veins.

Since the MVD was developed by Janetta PJ about 40 years ago, it has been gradually changed and improved. The MVD for trigeminal neuralgia, hemifacial spasm, and glossopharyngeal neuralgia was used to be performed in the same craniotomy and approach. However, now each MVD is performed through a little different craniotomy and approach as we proposed. The decompression methods and techniques have also been changed. In order to minimize complications and obtain good surgical results, we think it is important to improve our surgical procedures.