

## Technical Notes &amp; Surgical Techniques

# Transposition of posterior inferior cerebellar artery could have caused ischemic complication in microvascular decompression for hemifacial spasm<sup>☆</sup>

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## ABSTRACT

Ischemic complications are generally rare complications in microvascular decompression surgery for hemifacial spasm. We report a case of posterior inferior cerebellar artery (PICA) infarction post-microvascular decompression. A 68-year old woman with a 2-year history of right hemifacial spasm underwent microvascular decompression surgery. Preoperative magnetic resonance image (MRI) showed that her PICA ran through closely to the root exit zone of her facial nerve. We treated the PICA with a string of polytetra fluoroethylene. After surgery, the patient complained about vertigo, and her MRI revealed ischemic changes in the medulla. She was eventually discharged without any neurological deficit. We reviewed our intraoperative video and found that certain steps in the detachment of the vessel, and minor changes in vessel position could have induced vascular obstruction and ischemia. Herein, we also discuss the choice of decompression methods and emphasize that the transposition of vessels was too invasive in this case. An appropriate method of decompression should carefully be performed in such cases, and review of surgical videos is beneficial.

## 1. Introduction

Microvascular decompression (MVD) is a safe and effective treatment for hemifacial spasm [1]. Previous studies reported that the success rate of controlling hemifacial spasm is > 85%, while the complications related to operative maneuvers were < 6% [1]. According to two large-scale retrospective analyses (both studies having > 2000 cases), the incidence of vascular complications was < 0.05%, including hemorrhagic and ischemic events [2,3]. Few studies reported about vascular events related to decompression surgery and detailed information about these complications is scarce.

Recently, some surgeons emphasized various methods of decompression [4,5]. They insisted that the method of inserting a prosthesis between the offending arteries and the root exit zone (REZ) of the facial nerve is not enough to permanently secure decompression for hemifacial spasm. Surgeons should try to move the offending arteries far away from the REZ of facial nerve and fix there.

We encountered a case wherein the transposition of the Posterior inferior cerebellar artery (PICA) could have caused medullary infarction. Thus, it is important to consider that forcible transposition of the

PICA may cause severe complications.

## 2. Case presentation

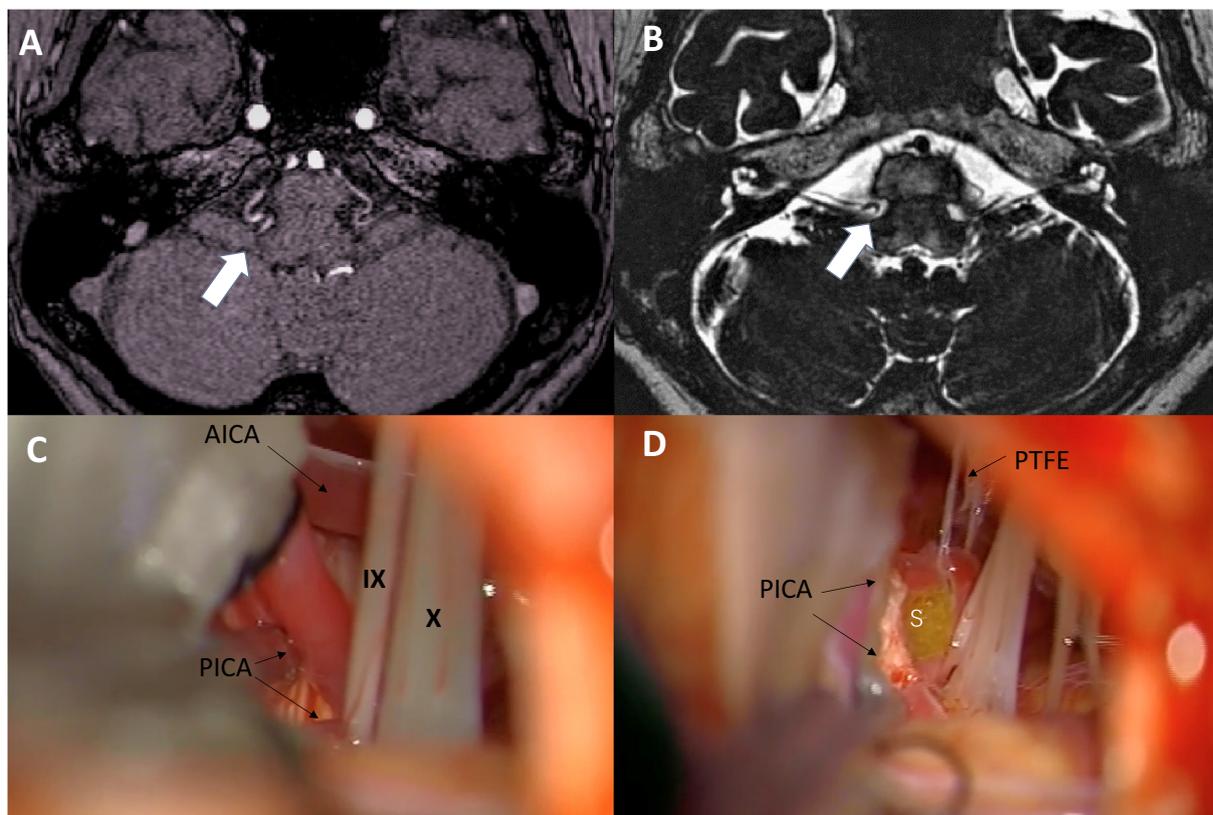
A 68-year-old woman was experiencing right hemifacial spasm for 2 years. Her spasm initiated in the right orbicularis oculi and spread to the orbicularis oris. Her magnetic resonance images (MRI) in the time of flight images and constructive interference in steady state (CISS) sequences showed that her PICA ran closely and touched the REZ of her facial nerve (Fig. 1A and B). She selected to undergo MVD and was referred to our department.

We performed suboccipital retrosigmoid craniotomy and exposed the REZ of her facial nerve. The PICA was present around the REZ of the facial nerve and offending the facial nerve (Fig. 1C). We dissected arachnoid membranes and trabeculae around the PICA and hooked it with a string of polytetra fluoroethylene (PTFE). Then, we moved the PICA close to the petrous bone. The PTFE was fixed with fibrin glue. We confirmed that there were no other arteries offending the REZ and put sponge covering the REZ to prevent the recurrence of hemifacial spasm (Fig. 1D).

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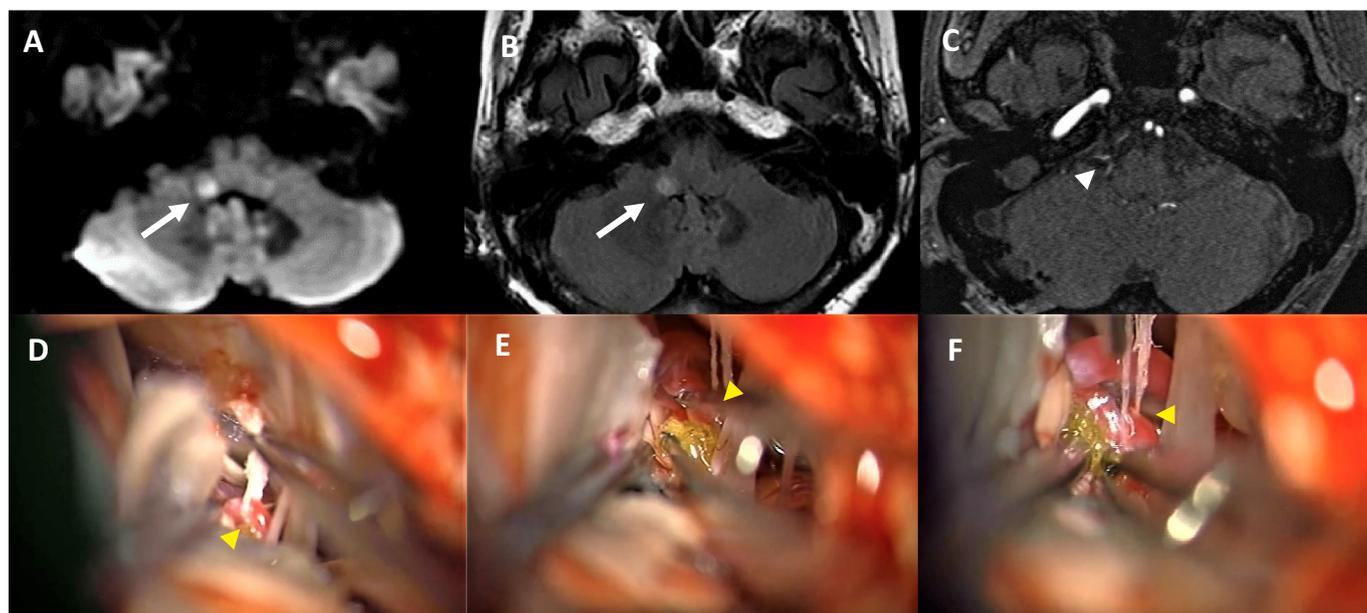
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**Fig. 1.** Pre-operative magnetic resonance images and intra-operative views.

A: Time of flight image, B: constructive interference in steady state image show the PICA compressing the REZ of facial nerve (white arrow), C: before the transposition of an offending artery, D: After the decompression.  
 Remarks: IX: glossopharyngeal nerve, X: vagus nerve, S: sponge.



**Fig. 2.** Post-operative magnetic resonance images and the instances of PICA kinking.

A: Ischemic lesion in diffusion weighted image (white arrow), B: ischemic lesion in fluid attenuated inversion recovery image (white arrow), C: time of flight image showed the PICA was preserved (white arrow head).  
 D: The withdraw of the PICA by PTFE, E and F: the instances of the insertion of sponge between PICA and REZ.

One day after the surgery, she complained of severe vertigo and was unable to walk by herself. She did not have any other neurological sign. Her emergency MRI revealed acute ischemic change in the right dorsal

side of the medulla (Fig. 2A and B), while the distal branch of the PICA was patent (Fig. 2C).

We administrated her edaravone for two weeks and provide a

physical rehabilitation program for her symptoms. We did not use any antiplatelet drugs and vasopressor medications, since we have confirmed the blood flow of the PICA was intact with MRI. She recovered from her symptoms completely and was discharged 21 days after the surgery without any neurological deficits.

### 3. Discussion

We reviewed the procedures conducted on this patient with our intraoperative video.

There were instances wherein our manipulations caused kinking of the PICA, which might have caused the decrease in blood flow of this vessel. Those were possibly inducing ischemic insult in peripheral territory of the PICA:

- i) Detachment of the PICA by PTFE to move away from REZ (Fig. 2D and video).
- ii) Insertion the prosthesis between the PICA and brainstem (Fig. 2E and video)
- iii) Placement of another prosthesis on the dorsal side (Fig. 2F and video).

We felt that our dissection of trabecular and separation of the PICA from surrounding tissue were enough to move the PICA; however, the video showed that the PICA appeared to be locked by trabecular. We also found that the material was too thin to withdraw the vessels without kinking them (Step i)).

In the process of inserting a prosthesis, the proximal side of the PICA was rotated, and it might have strained the peripheral branch, since the PICA was already fixed to the petrous bone and the flexibility of the PICA had been lost (Step ii) and iii)). We did not notice these stressors for the PICA during the operation, since the final view of the PICA indicated that the vessel kept the normal diameter and was pulsatile with good color.

Transposition is more effective for the treatment and lower recurrence rate in MVD [4]. Neurosurgeons try to move offending arteries as much as possible in MVD [5]. While, our review suggested that minor tension for vessels caused by manipulations and minor changes of vessel position could induce severe vascular obstructions and injuries. Even short time kinking of vessel may have a potential of hypo-perfusion and result in cerebral infarction. To prevent these complications, meticulous

and wide dissections are necessary, but those may be too invasive for hemifacial spasm. Since MVD is a functional surgery, safety should be a priority.

We reported a case of hemifacial spasm with an ischemic complication our intraoperative procedures may cause. We speculate that these complications occur because of the surgeons' strong preference for the movement of the offending arteries with materials such as strings. This case indicates that the transposition of the PICA is too invasive, depending on the condition of arteries and the space this procedure performed, as seen in this case.

### 4. Conclusion

We reported the rare complication in MVD. The choice of the decompression methods in each case should be carefully considered.

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### Declarations of interest

None.

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