

In Reply: Superficial Temporal Artery: Distal Posterior Cerebral Artery Bypass Through the Subtemporal Approach: Technical Note and Pilot Surgical Cases

To the Editor:

We thank Verbraeken et al for their letter¹ regarding our publication.² The authors recommended the occipital artery (OA)-posterior cerebral artery (PCA) bypass via infratentorial lateral supracerebellar approach (ILSA) for surgical treatment of the P1/P2 aneurysms. There are some advantages and disadvantages in each approach and we would like to discuss on them. We would like to focus on (1) specifics of surgical approaches for reconstruction of the distal PCA, (2) manipulation of the aneurysm and adjacent parent vessel parts while placing a bypass via the same or different separate approaches, and (3) the properties of the required graft for treatment of complex P1/P2 aneurysms, ie, comparison between OA-PCA bypass via ILSA and superficial temporal artery (STA)-PCA bypass via subtemporal approach.

The distance of the surgical corridor to the PCA through the ILSA is longer than the subtemporal approach. The surgical field obtained through the ILSA to manipulate the bypass procedure is also narrower and limited. The PCA runs supratentorially, thus only the posterior part of the P2 or anterior part of the P3 segments can be exposed even if the tent is divided. On the other hand, the main disadvantage of the subtemporal approach is the risk of temporal lobe injury during retraction. However, the temporal lobe injury can be avoided by release of 50 to 100 mL cerebrospinal fluid by lumbar drainage, adequate exposure, and good neuroanesthetic management that also improve the angle of access.^{3,4}

For the treatment of complex P1/P2 aneurysms, the ILSA requires performing an additional procedure (endovascular technique or another craniotomy). The ILSA gives access to a very short segment of the PCA, and it is difficult to expose the proximal segment of the P2. Proximal control of the aneurysm, trapping, and/or thrombectomy cannot be achieved by the approach. Performing 2 separate craniotomies for the treatment of such aneurysms increases the risks of complications. Moreover, a bypass followed by an endovascular procedure carries higher risks of complications related to the contradicting management in endovascular and bypass procedures, and it is related to higher costs. As anticoagulation is used to minimize the risks of thromboembolic events during endovascular interventions, increasing the possibility to develop postoperative bleedings.⁵ Thrombosed aneurysms at the P1/P2 segment are one of the major indications for revascularization of the distal PCA segment as indicated in our publication.² Moreover, distal bypass without proximal control for the treatment of a ruptured aneurysm has serious risks of intraoperative rupture, even with intraoperative endovascular support. At the time of the distal PCA bypass placement via subtemporal

approach, the whole segment sequence from the P1 to the anterior part to of the P3 can be exposed, and that easily can include manipulation on the aneurysm in the same surgical field. This for us is the most important difference with the access provided by the ILSA.

To the moment our experience consists of more than 1100 extracranial-intracranial bypass operations, including more than 50 cases using with the OA graft. Our observations indicate that the OA as a donor vessel is inferior to the STA because of its individual variability of development and the complexity of harvesting due to its tortuosity, branching and tightness to the surrounding connective tissue. Therefore we can expect that the risk of donor vessel occlusion using the OA graft is higher than the STA graft.

If all the requirements for surgical technical management (proximal control, trapping, thrombectomy, and separate space for bypass) were obtained through the ILSA, the presented technique by Verbraeken et al¹ could be applicable. Therefore we suppose that there are non-negligible risks associated with their approach for surgical treatment of complex P1/P2 aneurysms. We believe that the STA-PCA bypass through the subtemporal approach has potentials advantages compared to the OA-PCA bypass through ILSA. After invoking the discussion on this complex and controversial subject, we are grateful to Verbraeken et al¹ for their suggestion and expect the mentioned approach to find well defined indications in the future in this complex pathology.

Disclosure

The authors have no personal, financial, or institutional interest in any of the drugs, materials, or devices described in this article.

Akitsugu Kawashima, MD, PhD*

Hugo Andrade-Barazarte, MD, PhD‡

Behnam Rezaei Jahromi, MD‡

Takakazu Kawamata, MD, PhD§

Juha A. Hernesniemi, MD, PhD¶

**Department of Neurosurgery*

Yachiyo Medical Center

Tokyo Women's Medical University

Chiba, Japan

‡Department of Neurosurgery

University of Helsinki and Helsinki University Hospital

Helsinki, Finland

§Department of Neurosurgery

Tokyo Women's Medical University

Tokyo, Japan

¶Juha Hernesniemi International Center for Neurosurgery

Henan Provincial People's Hospital

Zhengzhou, China

REFERENCES

1. Verbraeken B, Aboukais R, Lejeune JP, Lukes A, Menovsky T. Letter: Superficial temporal artery: Distal posterior cerebral artery bypass through the subtemporal approach: Technical note and pilot surgical cases. *Oper Neurosurg*. 2018;15(4):E47.
2. Kawashima A, Andrade-Barazarte H, Jahromi BR, et al. Superficial temporal artery: Distal posterior cerebral artery bypass through the subtemporal approach: Technical note and pilot surgical cases. *Oper Neurosurg*. 2017;13(3):309-316.
3. Drake CG PS, Hernesniemi JA. *Surgery of Vertebrobasilar Aneurysms*. London, Ontario, *Experience on 1767 Patients*. Wien: Springer Verlag; 1996.
4. Hernesniemi J, Ishii K, Niemela M, Kivipelto L, Fujiki M, Shen H. Subtemporal approach to basilar bifurcation aneurysms: advanced technique and clinical experience. *Acta Neurochi Suppl*. 2005;94(suppl):31-38.
5. Chang SW, Abla AA, Kakarla UK, et al. Treatment of distal posterior cerebral artery aneurysms. *Neurosurgery*. 2010;67(1):16-26.

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