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Reply:

We thank Dr. Saravanan and colleagues for their comments concerning our article "Endovascular Treatment of Peripheral Aneurysms of the Posterior Inferior Cerebellar Artery."^{1,2} The authors also reported 2 illustrated cases of peripheral cerebellar artery aneurysms treated by parent artery occlusion (PAO) with Onyx-18 (ev3, Irvine, Calif).²

By now, it has been well documented that due to its physical properties, Onyx has advantages over glue in the embolization of brain or dural arteriovenous malformations.^{3,4} The use of Onyx-18 for endovascular treatment of peripheral infectious middle cerebral artery aneurysms in the pediatric population has recently been reported by Eddleman et al.⁵ We are unaware of any other reports regarding Onyx-18 in the treatment of peripheral aneurysms. Eddleman et al⁵ and Saravanan et al² demonstrated that Onyx might be a feasible alternative to glue in PAO. Unlike glue, Onyx is nonadhesive and basically provides a more controlled delivery. However, the polymerization properties of glue can be modified by altering the ratio of glue and iodized oil. We agree with Saravanan and colleagues that the risk of iatrogenic aneurysm rupture is reduced using liquid embolic material compared with coils. On the other hand, the major drawbacks of PAO using liquid embolic material are risks of inadvertent peripheral migration of the embolic agent and reflux into the feeding pedicle, potentially resulting in an increased size of the infarct. In our experience, PAO with glue is a relatively safe, simple, fast, and cheap procedure and will result in a durable occlusion. We are still unaware of the advantages of Onyx over glue regarding the risks of distal migration and reflux in the setting of PAO.

In this context, we illustrate 1 recent case (not included in our published series) of multiple ruptured peripheral posterior inferior cerebellar artery (PICA) aneurysms treated by PAO.

A 68-year-old man with a history of hypertension, hypercholesterolemia, and an abdominal aortic aneurysm, for which he underwent surgery 3 years earlier, presented with acute onset of headache. The patient became unconscious during transportation to the hospital. CT revealed massive intraventricular hemorrhage with extension to the basal cisterns. After emergency ventriculostomy, digital subtraction angiography was performed, revealing multiple fusiform/dissecting aneurysms located in the hemispheric branch of the cortical segment of right PICA (Fig 1A). The most proximal one had

ruptured to the fourth ventricle (Fig 1B, superselective PICA injection). In this case, the aim of the endovascular treatment was the following: 1) to occlude preferably not only the most proximal aneurysm but the whole dissected segment of the artery, and 2) to avoid any reflux to the vermian branch. PAO was performed with glue (Histoacryl; Braun, Melsungen, Germany) mixed with iodized oil (Lipiodol; Guerbet, Aulnay-sous-Bois, France) in a ratio of 1:2.

The angiographic result was optimal with preservation of the vermian branch and complete occlusion of the abnormal vessel segment (Fig 1C). Postprocedural CT showed only a small inferior right cerebellar infarct. The postoperative course was complicated by pneumonia, pulmonary embolism, and meningitis. Four weeks after the onset the patient was neurologically fully conscious, still needing some assistance in walking. In this case, PAO with Onyx could have been a good option as well.

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Fig 1. Right vertebral artery DSA (A) and superselective PICA injection (B) reveal multiple peripheral aneurysms in a 68-year-old man with acute intraventricular hemorrhage. Control angiogram after glue embolization shows complete occlusion of the cortical segment of PICA with preservation of the vermian branch (C).