

Letter to the Editor

Stroke welcomes Letters to the Editor and will publish them, if suitable, as space permits. Letters must reference a Stroke published-ahead-of-print article or an article printed within the past 4 weeks. The maximum length is 750 words including no more than 5 references and 3 authors. Please submit letters typed double-spaced. Letters may be shortened or edited.

Letter by Liu and Chen Regarding Article, “Unruptured Brain Arteriovenous Malformations: Primary ONYX Embolization in ARUBA (A Randomized Trial of Unruptured Brain Arteriovenous Malformations)-Eligible Patients”

To the Editor:

In their recent article, Singfer et al¹ investigated the outcomes of unruptured brain arteriovenous malformations (uBAVM) treated with primary embolization using ethylene vinyl alcohol (ONYX). The authors concluded that ONYX embolization alone or combined with stereotactic radiosurgery (SRS) achieved a high occlusion rate in uBAVM. Although we read this study with great interest, a series of questions arose.

First, the authors stated that 35 patients received therapy of endovascular embolization (EE) followed by SRS. However, there was no data concerning the exact time interval between EE and SRS in their article.¹ The authors should have given this information. If we knew the exact time, this might be meaningful as it will provide an important data on investigating the relationship between the time interval and treatment complications. We wonder whether early SRS after EE treatment was more likely to have neurological complications in uBAVM. This might influence therapeutic strategies and clinical decisions. In fact, the optimal time between EE and SRS did not know. Niranjana et al² pointed out waiting for several weeks was beneficial to reduce the likelihood of vascular ischemic complications or residual cerebral edema sometimes associated with embolization followed by early radiosurgery.

Second, the location of uBAVM was divided into 2 major subdivisions: noneloquent and eloquent.¹ However, the authors did not further subdivide the location of uBAVM. We wonder whether it was safe after therapy of EE in the different locations of uBAVM. So, we hope the authors can subdivide the location of uBAVM into cortical, deep, cerebellar, and brain stem. Viana et al³ investigated the safety and efficacy of EE in 12 patients with cortical AVMs. They found that EE of superficial intracranial AVMs appeared safe and effective. Furthermore, Mendes et al⁴ enrolled a total of 22 patients with deep AVMs, demonstrating that embolization therapy appeared to be safe and potentially curative for certain deep AVMs. However, Jin et al⁵ found that EE for brain stem AVM with ONYX was a technical challenge and the reflux of ONYX might cause severe complications.

Third, we noted that there were 25 cases presented with seizure and 19 cases with headaches.¹ However, detailed information about the symptomatic relief was unknown after EE treatment. We should not only focus on the high occlusion rate and low complication rate of EE treatment but also the rate of symptomatic remission. For example, if the patient presented with epilepsy and the angiography shown the uBAVM was occlusion after EE treatment, however, the symptoms did not disappear, was the EE treatment really appropriate for this situation?

Finally, we would like to reiterate our congratulations to the authors for their meaningful study. We are excited to see what further developments in the treatment of uBAVM in future.

Disclosures

None.

Fujun Liu, MD

Jing Chen, MD, PhD

Department of Neurosurgery

West China Hospital of Sichuan University

Chengdu, Sichuan Province, People's Republic of China

References

1. Singfer U, Hemelsoet D, Vanlangenove P, Martens F, Verbeke L, Van Roost D, et al. Unruptured brain arteriovenous malformations: primary ONYX embolization in ARUBA (A Randomized Trial of Unruptured Brain Arteriovenous Malformations)-eligible patients. *Stroke*. 2017;48:3393–3396. doi: 10.1161/STROKEAHA.117.018605.
2. Niranjana A, Lunsford LD. Stereotactic radiosurgery guideline for the management of patients with intracranial arteriovenous malformations. *Prog Neurol Surg*. 2013;27:130–140. doi: 10.1159/000341773.
3. Viana DC, de Castro-Afonso LH, Nakiri GS, Monsignore LM, Trivelato FP, Colli BO, et al. Extending the indications for transvenous approach embolization for superficial brain arteriovenous malformations. *J Neurointerv Surg*. 2017;9:1053–1059. doi: 10.1136/neurintsurg-2017-013113.
4. Mendes GA, Silveira EP, Caire F, Boncoeur Martel MP, Saleme S, Iosif C, et al. Endovascular management of deep arteriovenous malformations: single institution experience in 22 consecutive patients. *Neurosurgery*. 2016;78:34–41. doi: 10.1227/NEU.0000000000000982.
5. Jin H, Liu Z, Chang Q, Chen C, Ge H, Lv X, et al. A challenging entity of endovascular embolization with ONYX for brainstem arteriovenous malformation: experience from 13 cases. *Interv Neuroradiol*. 2017;23:497–503. doi: 10.1177/1591019917711679.

Letter by Liu and Chen Regarding Article, "Unruptured Brain Arteriovenous Malformations: Primary ONYX Embolization in ARUBA (A Randomized Trial of Unruptured Brain Arteriovenous Malformations)-Eligible Patients"

Fujun Liu and Jing Chen

Stroke. published online February 13, 2018;

Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Copyright © 2018 American Heart Association, Inc. All rights reserved.

Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://stroke.ahajournals.org/content/early/2018/02/12/STROKEAHA.117.020347.citation>

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in *Stroke* can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the [Permissions and Rights Question and Answer](#) document.

Reprints: Information about reprints can be found online at:
<http://www.lww.com/reprints>

Subscriptions: Information about subscribing to *Stroke* is online at:
<http://stroke.ahajournals.org/subscriptions/>