Author’s response to reviews

Title: Association Between Basilar Artery Configuration and Vessel Wall Features: A Prospective High-resolution Magnetic Resonance Imaging Study

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Reviewer comments to the Authors:

Ronald Benveniste (Reviewer 1):
The authors present a descriptive series of patients with posterior circulation stroke or TIA, and documented basilar artery stenosis. Findings on DSA and high resolution MRI of the basilar artery were carefully documented. The authors report statistically significant associations between morphology of the posterior circulation and specific MR findings of the vascular wall, in this patient population. Specifically, intraplaque hemorrhage was more likely in patients with incomplete proximal posterior circulation (i.e. absent VA) and plaque enhancement was more likely in patients with incomplete distal posterior circulation. The authors present a well organized discussion that suggests mechanisms by which morphology of the posterior circulation could affect development of these vascular lesions.

This study is scientifically interesting and could help guide future studies of risk stratification or even therapeutics in patients with symptomatic BA stenosis. I recommend two minor revisions.

First, the paper is well written in general but there are many minor errors in English syntax and
Second, the authors report in the abstract and body of the paper that there was a statistically significant correlation between incomplete proximal circulation and plaque enhancement (p=0.04); the p value in Table 3 is 0.07, and this discrepancy should be resolved.
Answer: we had checked the primary data and p=0.041 was right result.

Niha Beig (Reviewer 2): This study attempts to investigate the relationship between distal and proximal anatomical configurations of basilar artery (BA) and vessel wall features on high resolution magnetic resonance imaging (HRMRI).
Following are my comments
1. Please make a flowchart of inclusion and exclusion criteria of patient enrollment for the study.
Answer: the flow chart was done and present in the manuscript and submission.

2. Why were the plaque distributions divided only into two categories of diffuse and non-diffuse? How was the definition of these categories made? Is it similar in a clinical setting, where if the plaque is across 3 or less quadrants it is considered non-diffuse and diffuse if 4 quadrants?
Answer: Plaques spreading across four quadrants were defined as diffuse and that involving ≤3 quadrants were defined as non-diffuse. Our previous published study in Stroke journal also use the definition of plaque distribution (Please see Stroke. 2019; 50:745–749).

3. Please consider adding more cases to the experimental design, as I reviewer I fear that the results will not generalize.
Answer: this is good and key question. This study was a prospective exploratory study enrolled 202 patients with 247 symptomatic intracranial plaques from September 2014 to December 2017. Among 133 posterior circulation intracranial plaques, 65 plaques were basilar artery plaques and we only enrolled 34 symptomatic severe stenotic basilar artery plaques. This study is an exploratory study, and the conclusions of the study do require further validation of large samples in the future.

4. Lastly, the entire paper needs a review to be corrected for multiple English grammatical errors.
Answer: we have invited English language expert to revised language errors.

Dao Pei Zhang (Reviewer 3): This is an interesting study. The authors investigated the relationship between distal and proximal anatomical configurations of basilar artery (BA) and vessel wall features on high resolution magnetic resonance imaging (HRMRI). They found that the complete and incomplete group configuration of BA did not associate with vessel wall features. The proximal configuration of BA was related with intraplaque hemorrhage and the distal configuration of BA was associated with strong plaque enhancement.
However, the study had some issues which needed to elucidate.
1. There are some conflicting expressions in the discussion, such as "the author stated that the complete and incomplete group configuration of BA did not associate with vessel wall features. However, the authors also stated that the incomplete distal configuration of BA indicated different hemodynamics and blood flow reserve on the top of BA. The fPCA indicated that most or all the blood flow of PCA was from ipsilateral internal carotid artery. The fPCA will change the flow pattern causing the changing of regional wall shear force. The study showed that blood flow shear stress act on wall causing endothelial injury and plaque instability, presenting with plaque enhancement." All in all, the present study had some contradictory conclusions compared to the past studies, in my opinion, the
The author did not clearly elucidate this issue in the discussion.  
Answer: The reasons for this conclusion may be: 1. The sample size of the study is insufficient; 2. The change of local hemodynamics may be the cause of plaque formation induced by endothelial damage; the proximal structure and distal structure of the basilar artery correspond to the basilar artery. The inflow and outflow tracts, their structural changes are responsible for the changes in the overall blood flow of the basilar artery. Therefore, the phenomena discovered in this study need to be further studied by means of hemodynamic evaluation methods while expanding the sample size.

2. The study needed to perform some hemodynamics evaluations because it is very important for incomplete configuration of BA associated with plaque pattern.  
Answer: Our study was a prospective, exploratory and registry study (Unique identifier: NCT0270559) and all enrolled patients with symptomatic intracranial atherosclerotic stenosis. Some patients had received the CT perfusion and perfusion weight imaging scan, we also analyzed the stroke mechanism of every patients. Refer to our study aims, we did not analyze it. We will perform further study in the future.

3. How many stroke patients are in the study? The mechanisms of stroke also should be showed.  
Answer: We have added the flow chart in the manuscript and all the 34 patients in our study were symptomatic intracranial atherosclerotic stenosis patients. Among them, 6 were TIA, 1 was hemodynamic mechanism, 12 patients were perforator mechanism, 6 were embolic mechanism and 9 patients were mixing mechanism.

4. The figures should be showed the incomplete BA with arrows, for example, the case 2 did not clearly display the fPCA.  
Answer: We have added the arrows in the picture.

5. The study design should set up a control group.  
Answer: This is a very good suggestion. This study was a prospective exploratory study enrolled 202 patients with 247 symptomatic intracranial plaques from September 2014 to December 2017. Among 133 posterior circulation intracranial plaques, 65 plaques were basilar artery plaques and we only enrolled 34 symptomatic severe stenotic basilar artery plaques. This study is an exploratory study, and the conclusions of the study do require further validation of large samples and set up a control group in the future.

6. There are some minor language errors.  
Answer: We have invited English language expert to revised language errors.