**Author’s response to reviews**

**Title:** Debranching thoracic endovascular aortic repair for distal aortic arch aneurysm in elderly patients aged over 75 years old

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**Version:** 1  **Date:** 06 Dec 2019

**Author’s response to reviews:**

We are very grateful for your kind comments. We believe your comments were very helpful to improve our manuscript. We tried our best to revise our manuscript along with the reviewers’ suggestions. Our responses are as follows.

**Reviewer #1**

Thank you very much for your kind remarks.

**Reviewer #2**

Major issues:

1. Although the Author performed a PS matching for making the 2 groups more homogenous and comparable, the number of patients for each group is too low (17 pts), so that the statistical power of the study is extremely weak. As a matter of fact, although the rate of cerebral infarction was about twice as high in the TEA VR group (11.7% vs. 5.8%), the data didn't reach the statistical significance. Moreover, the Author presents the results at 5 years, but the analysis of the KM curves shows that, at that particular time of FU the number of patients at risk for the TAR and TEVAR groups are 10 and 2, respectively. With those numbers, neither definitive nor even partial conclusion can be drawn. Nevertheless, in the "Conclusions" the Author states that debranching TEVAR could be the first line therapy for aortic arch aneurysm in the elderly.

Thank you very much for your kind comments. Your comments are absolutely right. The main limitation of our study is in that the number of the patients studied were extremely small. We changed
the conclusion as “debranching TEVAR could be one of the choices for the treatment of aortic arch aneurysm in the elderly aged 75 years or older, especially with comorbidities.”

Also, we added the sentences in the limitation section as follows.

“Although using a PS matching, definitive conclusion may be difficult to be drawn due to small number of patients studied. Further study with increased number of patients should be warranted.”

2. The criteria for fixing the age cut-off at 75 years are missing. Moreover, this threshold is questionable. In literature, although no guidelines for the definition of "elderly" patients is defined, the cut-off is usually 65 years.

Thank you very much for your valuable comments. We selected the cut-off age of 75 years old, because life expectancy is about 10 years at this age in Japan. We added the explanation for this as follows.

“One of the problems of endovascular treatment for aortic aneurysms is the increased aneurysm-related mortality after 10 years as shown in EVAR trial 1[6]. We decided this cut-off criteria of 75 years of age, because average life expectancy was about 10 years at the age of 75 in Japan[7].”

3. The description and details of the statistical analysis regarding the PS matching are completely missing.

Thank you very much for your important comment. We added the description in the statistical analysis section as follows.

“Owing to the non-randomized nature of the study, and considering for significant differences in baseline characteristics, propensity-score matching was used to control for potential confounders of the treatment outcome relationship. Propensity scores were calculated using logistic regression with surgical procedure as the dependent variable. The propensity score included 10 variables, including age, sex, hypertension, chronic obstructive pulmonary disease (FEV1.0% < 70%) (COPD), diabetes (treatment with insulin or oral hypoglycemic agents), history of coronary disease (history of percutaneous coronary intervention or coronary bypass), hemodialysis, previous sternotomy, history of cerebrovascular disease, and preoperative creatinine level. For each patient of debraching TEVAR group, a propensity score-matched patient of TAR group was selected (1:1) using the one-to-one nearest neighbor method and no replacement.”

Minor issues:

a) The time frame of the series is 2008-2015. No indication regarding the time frame between 2015 and 2019 is reported.

Thank you very much for your comment. This analysis was performed in 2016 and it took two years to write down this manuscript. That is why the time frame between 2016 and 2019 were not reported.

b) The Author reported in "Methods" that patients were indicated for surgery if thoracic aneurysm was ≥ 60 mm. The ESC guidelines 2014 focusing in aortic disease suggests to treat aortic arch aneurysms when the diameter exceeds 55 mm and this data is largely accepted by the scientific community. Although in elderly patients this threshold may be increased, the reasons should be discussed in details.

Thank you very much for your kind suggestion. Your comment is absolutely right.

We added following description in the discussion.

“Our indication of surgery was the aneurysm exceeding 60 mm in diameter, which was a little bit larger than the current ESC guideline. In this study, we increased the threshold due to the advanced age of the patients.”

c) Cerebral complications following aortic surgery should be reported as follows: permanent neurologic deficit and transient neurologic deficit.
Thank you for your important comment. We divided cerebral infarction as PND and TND. The definition was described in the methods section as follows.
“Permanent neurological deficits (PND) were defined as the presence of deficits at the time of hospital discharge. Transient neurological deficits (TND) were defined as the deficits that recovered by hospital discharge.”

d) Although the data didn't reach the statistical significance, and this is probably due to the small sample size, the rate of cerebral infarction was about twice as high in the TEAVR group when compared to the TAR group (11.7% vs. 5.8%). This trend is quite clear and should be largely argued in the "Comment".
Thank you for your comment. However, the reviewer took the results contrarily. The rate of cerebral infarction was about twice as high in the TAR group when compared to the d-TEVAR group (11.7% vs. 5.8%). As the reviewer pointed out, the sample size was small, we cannot draw any conclusion from this result. We divided the cerebral infarction into PND and TND and, as the result, PND was 3.9% in d-TEVAR and 4.3% in TAR before PS matching and 5.8% in both groups after matching. The reviewer’s suggestion made the results less confusing.
We revised the results section as follows.
“No difference was observed in the surgical outcome of 30-day death (0% vs. 0%), hospital death (5.8% vs. 0%: p=0.23), and the incidence of PND (5.8% vs. 5.8%: p=0.76) between the d-TEVAR and TAR groups.”

e) The limitations of the study are nor reported.
Thank you for your kind suggestion.
We added the description of the limitation section as follows.
“Main limitations of this study are its retrospective nature, small sample size and being performed in a single-center. Although using a PS matching, definitive conclusion may be difficult to be drawn due to small number of patients studied. Further study with increased number of patients should be warranted.”