

## Peer Review File

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### Reviewer A

**Comments 1:** Definitions for study outcomes are confusing. Is positive/negative remodeling determined when even 1mm increased/decreased in the TL/FL? In general, positive remodeling means disappear of FL after thrombosis. Moreover, I cannot find “total aortic remodeling”, “remodeling type (Line41)” in the Definition of method section although those are one of the main findings. In addition, supplement figure 5 does not seem like positive remodeling. There is no change in the celiac level, and even reduced TL in the below renal level.

**Reply 1:** We are sorry for the ambiguous expression. The definition of remodeling in this study is to guide the next treatment plan. If negative remodeling occurs, it indicates poor prognosis and a high risk of complications like aortic rupture. Identifying patients with negative remodeling in the definition does not mean that a small increase of 1mm in false lumen is considered negative remodeling, but refers to the viewpoint of “Society for Vascular Surgery (SVS) and Society of Thoracic Surgeons (STS) reporting standards for type B aortic dissections.” and “The frozen elephant trunk technique in acute DeBakey type I aortic dissection.” Based on the patient's aortic diameter, it is considered that the increase in false lumen's diameter within 1 year is greater than 10% of the original diameter, indicating negative remodeling. The rest are considered positive remodeling. The phenomenon of false lumen thrombosis and then disappearing cannot be observed during the recent follow-up period of this study (average follow-up time is one year). We appreciated your suggestion and agreed that this is a worthwhile research topic for our next research to focus on the prognosis of patients in the medium to long term. Our selected four levels for observation and discussed the remodeling of each level separately. Finally, returning to the patients themselves, we want to know who should be performed reoperation, so we are interested in the absence of negative remodeling in all four levels. If negative remodeling occurs in any level, it is considered necessary to classify it as a negative remodeling patient group. For the figure 5, we chose a more suitable figure to illustrate positive remodeling.

**Changes in the text:** In this study, aortic remodeling was classified as positive or negative, negative remodeling was defined as the diameter of the false lumen increases by more than 10% before surgery, while positive remodeling was defined as patients without negative remodeling. Pay attention to the overall aortic of the patient, ‘the total aortic remodeling’ situation is who have positive remodeling in all levels of aorta.

**Comments 2:** Abstract should be edited. It is hard to catch how the study proceeded statistical analyses and main findings were extracted. As written in the abstract, total N seems to be 204. Abbreviation should be listed after the first use of full name. “The farther away from the stent, the greater the probability of negative remodeling.” (Line 36) is not a correct sentence.

**Reply 2:** Thank you for your careful review. We totally understood the reviewer's concern and modified the abstract for clearer explanation of analyzing our data. 204 is the total number of patients collected, with 161 remaining after exclusion criteria, including exclude chronic dissection patients. Abbreviations added in the modified article. Line 36 was modified

according to the article.

**Changes in the text:**

and 161 people satisfied the criteria.

Firstly, conduct a single factor analysis on the relationship between the diameter and remodeling of the true and false cavities, and then introduce other factors of interest for multi factor analysis. It was found that the maximum false lumen diameter of the aorta is the only factor affecting negative remodeling of aortic dissection, and its threshold was determined.

Glossary of Abbreviations: CTA, computed tomography angiography; FL, false lumen; TAAD, type A aortic dissection; TL, true lumen;

The farther away from the stent, the greater the probability of FL diameter expansion.

**Comments 3:** Chronic dissection patients should be eliminated from the cohort for the homogeneity. In addition, as the aortic diameter change is time-varying result, the evaluation should regard time factor. Please expand follow-up and use evaluations regarding time factor such as mixed effect model rather than logistic regression.

**Reply 3:** Thank you for your nice suggestion. After discussion, we adopted your opinion and excluded patients with chronic dissection, it seems that results more matched our expectations. We expand follow-up and found that average follow-up time is  $697 \pm 302$  days and the mixed effect model illustrated in table 2.

**Changes in the text:** There are 12 patients with chronic aortic dissection should exclude too.

**Comments 4:** Statistical methods need to be edited. The risk analyses seem to be multivariable regression not multivariate analysis. In addition, “Multifactor analysis” (as listed in the manuscript) is a multivariate data analysis method for summarizing and visualizing a complex data (J. Pagès 2002). The evaluations in the tables, however, are multivariable logistic regression.

**Reply 4:** We gratefully appreciate for your valuable suggestion. We choose multivariate analysis for quantitative analysis all factors relationship with remodeling.

**Comments 5:** In general, AUC 0.76 is not regarded significant.

**Reply 5:** The AUC value is indeed not high. According to ‘Alba AC, Agoritsas T, Walsh M, Hanna S, Iorio A, Devereaux PJ, McGinn T, Guyatt G. Discrimination and Calibration of Clinical Prediction Models: Users' Guides to the Medical Literature. JAMA. 2017 Oct 10;318(14):1377-1384. doi: 10.1001/jama.2017.12126. PMID: 29049590.’ It said greater than 0.75 is clearly useful discrimination.

**Comments 6:** Line 160-186, authors cannot list spiculation in the result (“so their gap was shrinking. (Line 168)”, in particular). “Positive remodeling of the TL diameter was greater than negative remodeling” these two values were not compared in the manuscript.

**Reply 6:** Thank you so much for your careful check. We deleted this sentence. The true lumen diameter of positive remodeling is greater than that of negative remodeling, we changed the description, and as reflected in Supplementary Table 3.

**Changes in the text:** deleted ‘so their gap was shrinking.’

The true lumen diameter of positive remodeling is greater than that of negative remodeling.

**Comments 7:** In the multivariable analyses, there are too many related variables (ex. Mild/mod/severe AR...). Please provide collinearity test.

**Reply 7:** We reconsidered the choice of reshaping factors, divided the aortic valve into two groups: whether there is insufficiency or it is normal (no need to treatment). We calculated vif for all factors, their value is between 1~10.

age	gender	operation	diseasetime
1.254758	1.326014	1.935635	1.133840
drink	AV	diameter	size
1.440658	1.950406	1.144167	1.128742

**Comments 8:** Please clarify why the authors performed circulatory arrest instead of selected cerebral perfusion for the arch surgery.

**Reply 8:** We feel sorry for the misunderstanding brought to the reviewer. The measures taken by our center are circulatory arrest of descending aorta and unilateral cerebral perfusion at the same time.

**Changes in the text:** At the same time, aortic arch replacement was performed with circulatory arrest of descending aorta and unilateral cerebral perfusion at the same time, using the artificial vessel branch to suture three branches of the aortic arch.

**Comments 9:** Wasn't there IMH in the cohort? If so, they should be eliminated in the cohort. Please explain why 2 patients received medical treatment for type A AD.

**Reply 9:** Intermural hematoma is not in the cohort. Two patients have high surgical risks and unsatisfactory laboratory results. After evaluation, the risk of surgical treatment is greater than that of drug treatment, so we suggested patients to undergo medication treatment and close monitoring.

**Comments 10:** Supplementary table 2 & supplementary fig 8 are same. Use only one of them. (Same as supple table 3 and fig 9.)

**Reply 10:** We deleted part of them.

**Comments 11:** Line 203, "Logistic regression analysis was conducted to assess associations of the aortic diameter and other basic factors with total aortic remodeling." Is hard to understand.

**Reply 11:** Multivariate analysis was used to assess the relationship between total aortic remodeling type and the aortic diameter and other basic factors.

**Changes in the text:** Multivariate analysis was used to assess the relationship between total aortic remodeling type and the aortic diameter and other basic factors.

**Comments 12:** English editing seems to be required.

**Reply 12:** We have retouched this manuscript.

## Reviewer B

### General comments:

1) A careful revision of the English language should be considered and is strongly advised. I

am not a native speaker myself, yet some sentences appear hard to read.

2) Please correct all spelling mistakes throughout the text (punctuation and orthography)

3) Title and abstract must be improved.

4) The cohort is from 2017 to 2018, and the article was recently written according to the references. The authors should explain this gap of time.

**Reply:** Thank you for your advice. We retouched this manuscript. Due to the impact of the COVID-19 on research progress, more representative data collected earlier, there were some changes in patient types during the epidemic and some patients were unable to undergo successful surgery. So we selected the research population in this interval.

**Abstract:**

1. No abbreviations should be in the Abstract section.

2. Please clarify the results section

a. P3 L35 “positive remodeling was observed in 17 (10.1%) patients”: what is the N of patients? How did the authors arrive to “10.1%”?

**Reply:** N=161, and we accepted the suggestion to exclude chronic patients and extend the follow-up time, there are 33(20.5%) patients occurred positive remodeling. We added ‘161 people satisfied the criteria.’ in manuscript.

**Introduction:**

1. The introduction needs an overall improvement to guide the reader into the topic.

**Reply:** We gratefully appreciate for your valuable comment. We re-edited the introduction.

**Methods:**

1) Please provide the Ethic Votum number from the Institutional Review Board.

**Reply:** The Ethic Votum number is 2023069X.

2) P6 L76: “age 20-80 years”: Was it randomly taken? Why not 18 to 80 years, as this is standard?

**Reply:** This study counted all eligible patients over the past two years, and no patients younger than 20 years old were found. Among them, the youngest patient was 22 years old, and 20-80 was written to facilitate age stratification.

3) P7L91: For the non-expert/unexperienced reader, please clarify exactly what the Sun’s procedure is, as this is not one of the standard procedures for the treatment of the aortic arch.

**Reply:** Sun’s procedure is using tetra-vascular graft to replace aortic arch +stent elephant trunk, this type of surgery is beneficial for patient recovery. ----‘Ma WG, Zhu JM, Zheng J, Liu YM, Ziganshin BA, Elefteriades JA, Sun LZ. Sun's procedure for complex aortic arch repair: total arch replacement using a tetrafurcate graft with stented elephant trunk implantation. Ann Cardiothorac Surg. 2013 Sep;2(5):642-8. doi: 10.3978/j.issn.2225-319X.2013.09.03. PMID: 24109575; PMCID: PMC3791186.’

**Changes in the text:** (1) ascending aorta replacement (replacing diseased blood vessels in ascending aorta by artificial graft) + aortic arch replacement + intraoperative stent placement and (2) Bentall procedure + aortic arch replacement + intraoperative stent placement. Thoracotomy was

performed under general anesthesia and aortic valve replacement was performed during cardiopulmonary bypass for moderate to severe aortic insufficiency. At the same time, aortic arch replacement was performed with circulatory arrest of descending aorta and unilateral cerebral perfusion at the same time, using the artificial vessel branch to suture three branches of the aortic arch. An intraoperative stent (CRONUS™ Stent Graft System; MicroPort Endovascular, Shanghai, China) was implanted and sutured to the four branched artificial graft. The stent length (80, 100, or 120 mm) and diameter (21–32 mm) were selected based on preoperative CTA.

4) P7 L92: "...was performed after cardiopulmonary bypass for moderate....": This sentence states that the aortic valve was replaced after CPB was ended. Please rephrase.

**Reply:** Valve replacement is performed during cardiopulmonary bypass.

**Changes in the text:** ...was performed during cardiopulmonary bypass...

5) The authors should provide an illustration of the procedure, as the understanding could be difficult for the non-familiar reader.

**Reply:** The basic concept of surgery is using tetra-vascular graft to replace aortic arch, and placing stent elephant trunk into the thoracic aorta. (1) Exposure and cannulation; (2) Stented elephant trunk implantation; (3) Arch vessel reconstruction. The specific methods are reflected in the following text: Ma WG, Zhu JM, Zheng J, Liu YM, Ziganshin BA, Elefteriades JA, Sun LZ. Sun's procedure for complex aortic arch repair: total arch replacement using a tetrafurcate graft with stented elephant trunk implantation. *Ann Cardiothorac Surg.* 2013 Sep;2(5):642-8. doi: 10.3978/j.issn.2225-319X.2013.09.03. PMID: 24109575; PMCID: PMC3791186.

### **Results:**

1) p9 L145: Please quantify "consumed alcohol". Alcohol abuse or occasional consumption?

**Reply:** the consumed alcohol equal to alcohol abuse.

**Changes in the text:** Alcohol abuse

2) P10 L152: Please rephrase "Bentall procedure (Bentall + Sun's) ...", as the reader understands that every mention of Bentall procedure is the mix of both procedures.

**Reply:** This statement raises objections and mainly emphasizes the impact of Bentall surgery, and all patients underwent replace aortic arch +stent elephant trunk. We made some adjustments.

**Changes in the text:** Bentall procedure

3) P10 L156: Please specify the procedure of ascending aorta replacement.

**Reply:** ascending aorta replacement is replacing diseased blood vessels in ascending aorta by artificial graft.

**Changes in the text:** replacing diseased blood vessels in ascending aorta by artificial graft.

4) P12 L175: 99 vs 72: Is this n=.. or a percentage?

**Reply:** It is number.

**Changes in the text:** number

5) P12 L176: please rename "celiac shaft" to "celiac trunk" throughout the text (as well in the

tables).

**Reply:** Thank you for your suggestion.

**Changes in the text:** celiac trunk

6) P12 L177: please add “of” between “22.8%” and “patients”.

**Reply:** Thank you for your suggestion.

**Changes in the text:** 22.8% of patients

7) P12 L183: please use terms like “tended” instead of “was” as the p-value was not significant but showed a tendency.

**Reply:** Thank you for your suggestion.

**Changes in the text:** tended

8) P13 L203: “other basic factors”: please specify

**Reply:** We feel sorry for the inconvenience brought to the reviewer. We have written the details.

**Changes in the text:** Multivariate analysis was used to assess the relationship between total aortic remodeling type and the aortic diameter, Demographic features, Echocardiography indices and Surgical data.

#### **Discussion:**

1) P14 L212: Please rephrase as the sentence does not make sense.

**Reply:** Thank you for your suggestion. We re-edited this manuscript.

**Changes in the text:** The results of this retrospective study showed that the diameters of the TL, FL, and total aorta were different in each level.

2) P14 L226: “Previous studies” needs more than 1 reference. Please add.

**Reply:** Thank you for your suggestion. We added a new reference.

**Changes in the text:** add a new reference “Remodeling of Aortic Configuration and Abdominal Aortic Branch Perfusion After Endovascular Repair of Acute Type B Aortic Dissection: A Computed Tomographic Angiography Follow-Up”.

3) The discussion is a nice summary of the results; however, it does not sufficiently discuss the topic.

**Reply:** We made some modifications in discussion to better close to the topic.

**Changes in the text:** Patients who have been treated their type A aortic dissection can be classified to predict the prognosis by preoperative diameter of FL as the above discussion.

#### **Study limitations:**

P17 L277: “22”: Is this a reference? Please correct.

**Reply:** We are sorry for this misunderstanding. Yes, it is a reference.

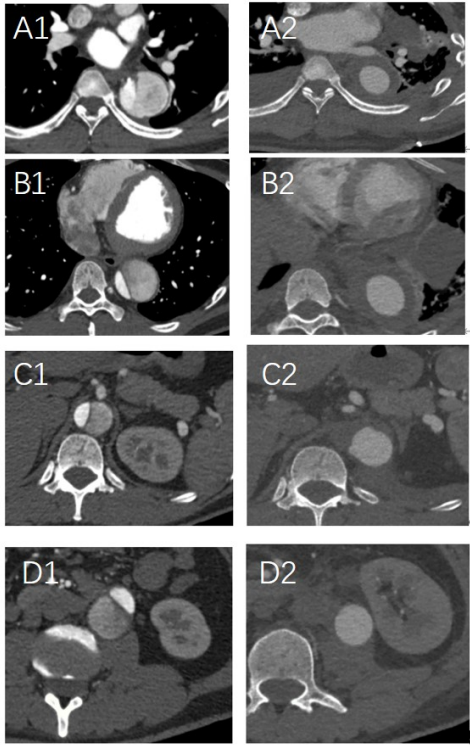
**Changes in the text:** [22]

Supplementary Figure 5:

The authors should replace the Figure C1 with another cut illustrating better the Celiac Trunk.

**Reply:** Thank you for your suggestion. We chose a more suitable patient's figure.

**Changes in the text:**



Supplementary table 1:

1) This table should not be as a supplementary table but as a table in the text to ease the reader to understand the demographics of this cohort.

**Reply:** We change it as table 1

**Changes in the text:** table 1

2) Please improve the English (e.g. “Drank”)

**Reply:** We feel sorry for the poorly formulation.

**Changes in the text:** drink

3) Change “Ultrasound” by “Echocardiography”

**Reply:** Thank you for your suggestion.

**Changes in the text:** Echocardiography

4) Please add the Cardiopulmonary bypass times.

**Reply:** Thank you for your suggestion. We added the cardiopulmonary bypass times.

**Changes in the text:** cardiopulmonary bypass times(min)=  $200.8 \pm 42.0$