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Review Comments

First, the current study is only a comparative study, not longitudinal study, can only ascertain the relationship between NVAF and valve structure and biochemical parameters, not the effect of NVAF on valve structure and biochemical parameters. The authors need to revise the title to clearly indicate this, and the clinical research design of this study.

Reply 1: This study is really a comparative study, not a longitudinal study. It can only determine the relationship between NVAF and valve structure and biochemical parameters, and cannot determine the effects of NVAF on valve structure and biochemical parameters. The article title and research design were revised according to the suggestions.

Changes in the text 1: we have modified our text as advised (see Page 1, line 3-4 and Page 5, line 18-22).

Second, the abstract needs further revisions. The background did not indicate the clinical significance of the research focus on the relationship between NVAF and valve structure and biochemical parameters and what the knowledge gap is on this relationship. The methods need to describe the inclusion of subjects, the assessment of clinical factors including NVAF, diagnosis of VHD and the measurements of valve structure and biochemical parameters. The results need to first summarize the clinical characteristics of the whole sample and provide detailed outcome data to quantify the valve structure parameters between those with and without NVAF. The conclusion needs comments for the clinical implications of the findings, not to repeat the main findings again.

Reply 2: we have modified our test as advised (see Page 2, line1-10, line 15-20 and line 26-33)

Third, the introduction of the main text needs to briefly review what has been known and unknown on the relationship between NVAF and valve structure and biochemical parameters, analyze the knowledge gaps of prior studies, and, importantly, what the clinical contributions of this analysis are. The current version did not clearly describe the clinical significance of this research focus.

Reply 3: The significance of this study is to understand the relationship between atrial fibrillation and degenerative valvular heart disease, so as to find possible structures or biomarkers, and provide reference data for further exploration of the effect of atrial fibrillation on degenerative valvular heart disease in the elderly.

Changes in the text 3: we have modified our text as advised (see Page 5, line3-16 ,line 24-30).

Fourth, the methodology of the main text needs to describe the clinical research design, sample

size estimation, diagnoses of NVAf and VHD, and the assessment of clinical factors such as age, sex, and disease course. The assessment of clinical covariates is important for the PSM matching. In statistics, the authors need to first examine the relationship between NVAf and valve structure and biochemical parameters in the whole sample by adjusting clinical covariates in the multiple logistic or linear regression model. The analyses on the direct comparisons within PSM samples should be viewed as a sensitivity of the primary analysis, as PSM would result in selection bias.

Reply4: This was a retrospective study, a total of 234 VHD patients were included. The sample size was based on the available data from Jan 2015 to Dec 2018 in the database of the first affiliated hospital of Shantou university. Diagnosis of NVAf and VHD was based on clinical evaluations according to ACC/AHA guidelines, and echocardiogram was used to confirm the structures changes. As shown in table 1, some clinical assessment like age and history of hypertension were differ between the 2 groups, then we performed PSM to balance these 2 groups.

Changes in the text 4: we have modified our text as advised (see Page 7, line30-31 and Page 15 Table 2).

Finally, please consider to cite the below related paper: Rao A, Tauber K, Szeto WY, Hargrove WC, Atluri P, Acker M, Crawford T, Ibrahim ME. Robotic and endoscopic mitral valve repair for degenerative disease. *Ann Cardiothorac Surg* 2022;11(6):614-621. doi: 10.21037/acs-2022-rmvs-28.

Reply5: Application not considered.