

Peer Review File

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Reviewer A

Comment 1: How did the included patients being assigned into the two distinct kinds of procedure?

Reply 1: We adopt different minimally invasive surgical procedures for patients according to their admission time.

Changes in the text: Please see “Method-Study population”. Patients admitted to our department from January 2007 to June 2017 were treated with robotic approach, while patients admitted from September 2017 to January 2020 were treated with thoracoscopic approach.

Comment 2: Both of the two groups received the NYHA class IV, what is percentage? is there some emergency case in the subgroup? Or they were treated with anti-heart failure medication before procedure? Did it represent the condition at the admission period?

Reply 2: The number of NYHA Class IV patients in robotic group and thoracoscopic group was 15 and 16 respectively. No emergency operation was performed. All patients were treated with anti-heart failure medication before procedure. All data represented the condition at the admission period.

Changes in the text: Please see “Method-Study population”.

Comment 3: There is only one conversion to sternotomy? What is the cause? Did this data count in the conversion because of pleural adhesion?

Reply 3: One case of perforation of the aortic leaflet was complicated in the Robotic MVP Group and conversion to upper hemisternotomy was performed to repair the aortic valve.

Changes in the text: Please see “Result-Perioperative Outcomes”.

Comment 4: What’s the caution of early failure requiring reoperation? Is it due to early repair failure? Did the second procedure to being performed? How did them to be done?

Reply 4: There were three patients in Robotic MVP Group and one patient in Thoracoscopic MVP Group required mitral replacement within 30 days for early postoperative repair failure, and all achieved success.

Changes in the text: Please see “Result-Perioperative Outcomes” .

Comment 5: As we known, the currency was devalue, but did the medical prices in Chinese Yuan rise during the period of studying years?

Reply 5: As the price level and the purchasing power of the population were different at different times, the inflation rate and the income growth of the population need to be taken into account when comparing expenses. We use the consumer price index to calculate the inflation rate, that is, inflation rate is equal to the value of a group of fixed commodities at current prices divided by the value of a group of fixed commodities at base prices and multiplied by 100. The calculation of the increase in the income of the population takes the annual per capita wage income released by the National Bureau of Statistics as a coefficient. The adjusted medical expenses are the actual medical expenses multiplied by the inflation rate and then divided by the income growth coefficient.

Changes in the text: Please see “Methods-Measures of Clinical outcomes and Hospital cost”

Reviewer B

Comment 1: Why the robotic group has CPB time and cross-clamp time shorter than the

thoracoscopic group, but it has ICU time and length of stay longer?

Reply 1: In terms of surgical technique, more artificial chordae tendineae were implanted in thoracoscopic group (59.3% vs. 16.5%), so the time of cardiopulmonary bypass and aortic occlusion were longer. However, due to the different development periods of the two surgical methods (the robot group was earlier, and the thoracoscopic surgery was only carried out in our center in only recent 4 years), the concept of "rapid intensive care unit rehabilitation" was advocated in recent years, so the ICU time of patients in the thoracoscopic group was shorter.

Changes in the text: Please see "Discussion"

Comment 2: Why some patients don't need prosthesis implantation?

Reply 2: Indeed, in recent years, cardiac surgeons in the world have widely used artificial annuloplasty to treat mitral valve diseases. At present, our medical center also implants annuloplasty rings for all patients in mitral valve plasty. However, this study started very early (since 2007, patients have been included), so some patients have adopted simple valvuloplasty, such as isolated commissural magic stitch, Congenital crack suture or commissurotomy, without implantation of annuloplasty ring.

Changes in the text: Please see "Table 3"

Reviewer C

Comment 1: The inclusion and exclusion criteria should be provided.

Reply 1: All patients were diagnosed as MV disease. Patients who received emergency operation or with concurrent procedure (coronary artery bypass grafting, congenital heart disease, aortic disease, etc) were excluded.

Changes in the text: Please see "Methods-Study population"

Comment 2: There are significant differences between the two groups regarding age, sex and concomitant diseases, as shown in table 1. So, propensity score matching might be a solution to eliminate the differences of baseline characteristics.

Reply 2: Dear reviewer, thank you for your suggestions. We extended this study to include more patients. We are glad that there is no significant difference in general data between the two groups after comparing their basic characteristic again.

Changes in the text: Please see "Table 1"

Comment 3: Besides cardiopulmonary bypass and clamping time, I'm interested in operation time.

Reply 3: Dear reviewer, we very much hope to answer your question. Unfortunately, our database does not contain the data of the operation duration of patients. However, we believe that the comparison between cardiopulmonary bypass time and aortic block time is also of great significance for patients undergoing cardiac surgery, because it is related to the postoperative recovery speed of patients. But as far as our experience is concerned, it usually takes longer to establish robotic approach than thoracoscopic approach.

Comment 4: As the author described in Page 7, Line 21, the reason for longer time in the thoracic MVP may be associated with the implantation of artificial chordae. Whether the implantation of artificial chordae had to be performed? Further, the implantation of artificial chordae may be easier to complete in robotic surgery. Whether there was selection bias during patient selection process?

Reply 3: This is a retrospective study. However, all patients received two different surgical procedures according to the time of admission. Therefore, we believe that the patient's choice bias is small. Whether artificial chordae tendineae is implanted during operation is decided by the surgeon according to the patient's condition. We listed the surgical techniques applied by all patients for reviewer's reference.

Changes in the text: Please see "Table 3"

Comment 5: All patients had normal results of hemoglobin prior to surgery. However, nearly half of included patients required transfusion with relatively small volume of drainage. Please explain the reason for transfusion and bleeding?

Reply 5: The decision on whether to give blood transfusion to patients should be made by the surgeon according to the general condition of patients before operation, the amount of bleeding during operation and the drainage after operation. Patients included in this study are older and have a higher NYHA class III/IV ratio, so there are more blood transfusions.

Comment 6: The reason for conversion should be provided.

Reply 6: One case of perforation of the aortic leaflet was complicated in the Robotic MVP Group and conversion to upper hemisternotomy was performed to repair the aortic valve.

Changes in the text: Please see "Result-Perioperative Outcomes" .

Comment 7: Patients in the thoracoscopic group had more concomitant diseases listed in Table 1 (eg. cerebral infarction, and COPD) and longer duration of cardiopulmonary bypass as well as clamping; whereas patients in the robotic group had better EF value determined by TTE. Why patients in the robotic group had longer duration of mechanical ventilation and ICU stay, which may have an influence on hospital cost? Please explain the reason.

Reply 7: Thank you for your questioning. We expanded the patient inclusion period of this study to include more patients. However, the difference of basic characteristic between the two groups is very small. Besides, due to the different development periods of the two surgical methods (the robot group was earlier, and the thoracoscopic surgery was only carried out in our center in only recent 4 years), the concept of "rapid intensive care unit rehabilitation" was advocated in recent years, so the ICU time of patients in the thoracoscopic group was shorter.

Changes in the text: Please see "Discussion"

Comment 8: Mid- or long- term follow-up results should be provided, especially for mitral valve repair procedures.

Reply 8: Thanks for reviewer's advice. Up to now, we have followed up the patients in the robot group for an average of 8 years, while this time is 3 years in the thoracoscopic group. Unfortunately, different surgical approaches have little difference in the medium and long-term follow-up results. Therefore, we have not introduced the medium and long-term results in this paper, nor have we drawn the survival curve. We hope to introduce the results of perioperative period and the cost of hospitalization through this article. At the same time, the patients in the two groups were followed up to compare the difference between the two surgical methods for more than 5 years.

Comment 9: In addition to univariate analysis, multivariate analysis (such as logistic or Cox regression) should be conducted.

Reply 9: We do realize the importance of logistic analysis. However, because there was only one death and fewer complications in both groups in this study, the results were difficult to have

statistical significance. Therefore, we did not use logistic analysis. We hope to follow up the two groups of patients for a long time (for example, 5 years), and then use logistic analysis according to the follow-up results.