Peer Review File
Article information: https://dx.doi.org/10.21037/jtd-22-442

Reviewer A

Comment: This manuscript has several limitations, starting with the fact that surgical procedures are not described and we do not know if you have used two different techniques. I think you should at least outline the two procedures.
Reply: We appreciate the reviewer's feedback and agree it's important for readers to be aware of our operative technique. We did revise the paper to only focus on robotic plication, but we did describe the technique in detail.
Changes in text: After the introduction we have added sections discussing our robotic plication technique.

Comment: Another big problem is the inconsistency of the primary end-point. The results at 60 days are of little significance for evaluating recurrence after diaphragmatic plication. It would be useful and interesting to present the data with a longer follow-up. Looking at the period of the study it would seem possible to me. This would certainly raise the level of the manuscript.
Reply: We appreciate the reviewer bringing attention to this important point. While we agree that longer follow-up is needed to evaluate long term success rates and efficacy of robotic plication, we have chosen to focus on short-term results after the operation to assess feasibility and short-term operative success. At our institution patients are generally seen for standard postoperative follow-up approximately 4-8 weeks post discharge, occasionally sooner based on scheduling. If the patient is recovering uneventfully and imaging (chest x-ray) is satisfactory, the patient is seen on an as needed basis. We therefore do not have longer term data on the majority of our study population and have chosen to focus on short term outcomes. We agree that it is possible for patients who underwent robotic plication to have future recurrence of symptoms and diaphragm elevation. Furthermore, we have changed our primary endpoint to be recurrence before and during the first planned post-operative visit.

Comment: Finally, of the 25 patients eligible to complete the follow-up questionnaire (interesting!) after robotic surgery, only 16 agreed to participate. This makes the results unreliable because the patients who did not participate could be those who benefited little or no benefited from surgical procedure.
Reply: We appreciate the reviewer's important point. We agree that while we attempted to contact all possible participants through letters and phone calls, this is a limitation of our work which could introduce non-response bias. We have now included this in the discussion of limitations.
Changes in text: We have now included a brief discussion of this point in our limitations section.

Reviewer B

Marmor and colleagues present a single-institution retrospective analysis of patient undergoing diaphragm plication from 2014-2021 and subsequently compared outcomes with regards to surgical approach (thoracotomy vs. robotic). The article is concise and well-written and will make a nice addition to the literature. I do have a few questions/concerns which could make the manuscript stronger:

Comment: Why was 60 days the chosen time-frame for recurrence? Surgeons usually look at 30-day outcomes. I'm curious why 60 days was chosen for this study…especially when median follow-up time for your cohorts was 29 and 36 days.
Reply: We appreciate the reviewer's important comment about follow-up and agree 60 days is not the most useful time-frame to investigate given the shorter median follow-up times. We have therefore modified our primary outcome to short-term recurrence of symptoms and diaphragm elevation by first routine post-operative follow-up appointment. We believe this primary endpoint captures the important data to be able to assess short term success, efficacy, and feasibility of the procedure. Recurrence that has occurred during this time frame is likely related to the technical aspect of the procedure as opposed to progression of a disease process. As the goal of our manuscript is to investigate short-term feasibility and efficacy of robotic-assisted transthoracic cases, we feel this primary outcome is appropriate.
Changes in text:
We have changed the early recurrence from 60 days to first routine post operative follow up appointment

Comment: Why was re-do plication for recurrences done via thoracotomy and not with the robot?
Reply: One redo plication was done via thoracotomy because dense adhesions along the diaphragmic surface were not amenable to minimally invasive takedown. The other, we are unsure of the clinical rationale from chart review alone. However, with addition of more recently operated patients, we added an additional recurrence that underwent re-do plication robotically.

Comment: How many different surgeons are represented in the cohort? Is it the same surgeon who was doing open cases and then transitioned to robotics?
Reply: We thank the reviewer for this important feedback. There are four surgeons represented in the robotic group. We changed the focus of our paper and only looked at robotic cases. However, within the four surgeons, surgeon A did 17 cases, surgeon B did 13, surgeon C did 6, surgeon D did 5 total cases.

Comment: Operative time was significantly longer for robotic, but I'd be curious at the trend of operative time for the 27 robotic cases. We all know that the learning curve for the robot is about 50 cases…thus I'm curious at the OR time for case #1 vs.

case #27. It very well could be that with more time the robotic approach operative duration will become equivalent to thoracotomy.
Reply: We agree with the reviewer that it's important to consider the learning curve for robotic cases and have included statistics for operative time at various intervals (i.e., median operative time for the first 9 cases, second 9 cases, and third 9 cases). We show that the median operative time does indeed decrease as these intervals. We acknowledge the limitations of this data given the small sample size among each surgeon and potential confounding factors such as trainee involvement, and have including these in our discussion as well.

Reviewer C

This is a single-centre retrospective study investigating short-term outcomes of robotic-assisted thoracoscopic plication of the diaphragm compared to open transthoracic approach. In total, the study included 27 patients who underwent robotic-assisted diaphragmatic plication and 22 patients who underwent open plication. The authors found no statistically significant difference in 60-day recurrence rates between the two approaches. Thoracotomy was associated with shorter operative time; however, the robotic approach conferred less blood loss, shorter chest tube duration, and reduced length of hospital stay. The authors, therefore, conclude that robotic-assisted thoracoscopic plication of the diaphragm is a safe procedure with satisfactory short-term outcomes.

Here, I have made a few suggestions that, in my opinion, could help improve the overall quality of the manuscript.

Abstract
Comment: The authors may consider reporting the results of the outcomes (values of corresponding variables) for which they found a statistically significant difference (i.e., minutes of operative time, ml of blood loss, as well as days of chest tube duration and length of stay). This could aid readers understand the clinical relevance and significance of the above differences.
Reply: We appreciate the reviewer's point and agree these values could assist readers in understanding clinical relevance.
Changes in text: We have added values for median operative time, blood loss, length of chest tube duration, and length of stay to the results section of our abstract.

Methods
Comment: The authors may consider commenting if their questionnaire has been used and/or validated in previous studies. It is worth noting that a questionnaire assessing health-related quality of life in patients with unilateral diaphragmatic paralysis was recently published (Kosse NJ, Windisch W, Koryllos A, et al. Development of the Diaphragmatic Paralysis Questionnaire: a simple tool for patient

relevant outcome. Interact Cardiovasc and Thorac Surg 2021;32:244-9).
Reply: We thank the reviewer for sharing this feedback and information. Our questionnaire had not been used previously and has not been validated. We did include questions based on the MRC dyspnea scale and SF-36 survey. We created the questionnaire to be able to specifically compare dyspnea and activity level currently (within the past month) versus immediately after surgery. We were additionally interested in pain levels and overall patient satisfaction with the procedure. We recognize not having preoperative questionnaire data is a limitation, as well as the possibility of non-response and recall biases.
Changes in text: We have included in the discussion the limitations of using this questionnaire.

Comment: The authors may consider stating if there were any differences in the perioperative management of the compared groups, considering that patients were treated during different time periods depending on the approach.
Reply: We thank the reviewer for sharing this feedback. We've decided to only include robotic plication cases in our analysis to strengthen our project by focusing our attention on the evaluation of robotic plication short-term outcomes, which is the ultimate motivation of our study. For the revision, we included 14 additional patients who underwent robotic plications for our analysis.

Results

Comment: Line 185: The authors may consider reporting the interquartile range, along with the median time, from the day of operation to questionnaire administration.
Reply: We agree the addition of the interquartile range is important here as well. However, due to a lack of record keeping of the exact date interview questions were answered, we could not report this important data.

Reviewer D

It is a retrospective study comparing short term results of diaphragm plication after robotic surgery and open surgery though thoracotomy. The goal of such comparison is interesting because of the increasing number of thoracic robotic surgery in all continents.

Comment: However, the design of the study is not optimal because the criteria to compare the 2 approaches are not relevant in diaphragm dysfunction and the surgical technique used. Usually the is no blood loss, the chest tube duration is short and the operative time is not a problem in patients with no major comorbidity.
Reply: We agree and are thankful for this comment. We've decided to only include

robotic plication cases in our analysis to strengthen our project by focusing our attention on the evaluation of robotic plication short-term outcomes, which is the ultimate motivation of our study. For the revision, we included 14 additional patients who underwent robotic plications for our analysis.

Comment: The other important limitation of the study is the small sample size of patients in both groups (27 / 22) and also a median follow-up time of 29 days for robotic surgery and 36 days for open surgery !! It is a functional surgery requiring more time to appreciate the results.
Reply: We are thankful for the reviewer comments. We agree that this is a functional surgery that will require more time to appreciate the results, especially in cases with long amount of dysfunction leading up to the surgery. The focus and scope of the paper is to observe short-term outcomes and recurrences to look for concerns regarding technique. As you can see from our data, majority of patients noted some improved post operative symptomatic improvement in the short-term follow up, and we are also able to detect recurrences by radiographic and/or symptom during that short follow up time as well. While the questionnaire has many limitations, it does give us an idea of longer outcomes.

Comment: Other limitation is the lack of postoperative functional results, no complete clinical information of the cohort, no precise data of chestXray before and after surgery, a median preoperative symptom duration of 10 months in the robotic group (some diaphragm eventration are reversible sometimes in more than 2 years!
Reply: We are thankful and value reviewer's comments. We completely agree with the lack of post operative functioning results and lack of complete clinical information of cohort. We are somewhat limited in our ability to do so in this study due to the cost, time and financial, it would incur that would be outside of our current standard of practice post operatively. We base the outcomes on post operative imaging and clinical outcome based in patient symptom report. The chest x-ray, while not given in precise or discrete data, the diagnosis of intact plication or recurrence is confirmed by a board-certified radiologist and surgeon.

Comment: The surprising result is the high level of postoperative complications after both open and robotic surgery: For open surgery: 41% of complications including exceptional situations: pacemaker placement, vocal fold immobility (why?), chest wall hernia, readmission for pulmonary emboli, pulmonary infection, and diverticulitis ? For robotic surgery: 19% of complications

Reply: Thank you reviewer for your comment. We agree that these complication rates were high, particularly in open surgery. We did, however, decide to only include robotic plication cases in our analysis to strengthen our project by focusing our attention on the evaluation of robotic plication short-term outcomes, which is the ultimate motivation of our study. Regarding complication rates associated with robotic surgery, a great number were from temporary and common hospitalization-

related complications such as AKI and urinary retention. While we certainly should strive for being better than 20%, it is not too much higher compared to the average reported rates of post operative complications for elective surgery.

Comment: At the end, the main criticism of this study is to validate a functional surgical procedure using robotic approach despite 11% of relapse, meaning surgical failure, in a really short time after surgery (60 days) associated with 7% of missing data in this group. In the control group, no short time relapse, and no missing data. Therefore, recurrent diaphragm elevation also occurred in this "open group" in 3 patients at 1, 3 and 4 years. These results are surprising! Did the authors explain such results?
Reply: Thank you for reviewer's comments. We agree the relapse rate is high, even when we added 14 new patients for a cohort of 41 total of robotic cases. Seeing early recurrences in robotic surgery at our institution was one of the driving motivations for our study. While further investigation is warranted, we suspect there is an association of extracorporeal knot-tying device use with early recurrences that we discuss in the revised manuscript.

For Methodology:
Comment: Question 1: why the authors created a questionnaire only for all patients who underwent robotic diaphragm plication?
Reply: We've decided to only include robotic plication cases in our analysis to strengthen our project by focusing our attention on the evaluation of robotic plication short-term outcomes, which is the ultimate motivation of our study. For the revision, we included 14 additional patients who underwent robotic plications for our analysis.

Comment: 2 patients with short-term recurrence after robotic surgery were excluded. If we correctly understand they not included in the results? is is true? If yes why are not included?
Reply: They underwent open redo plications, and their outcomes would not be pertinent to robotic plication.

Comment: Question 3: is it reasonable to propose diaphragm surgery in patient with BMI 36? Did the authors explain how they select and prepare their patients for surgery?
Reply: Unfortunately, this was a retrospective review, and the rationale for surgery is not explicit per chart review regarding the selection and preparation of patients for the surgery.

Comment: Question 4: 68% of idiopathic dysfunction in the open group justify some explanation. From how long time did patients had the diagnosis of diaphragm dysfunction.
Reply: We've decided to only include robotic plication cases in our analysis to strengthen our project by focusing our attention on the evaluation of robotic plication

short-term outcomes, which is the ultimate motivation of our study. For the revision, we included 14 additional patients who underwent robotic plications for our analysis.

Comment: Question 5: The criteria DLCO is probably not interesting in such disease
Reply: We are thankful for the comment. We included to see whether the breathlessness in certain patients is multifactorial with a large contribution by intrinsic lung disease, such as COPD, which would influence the post operative patient reported outcomes on the questionnaire.

Comment: In Table 3: It would be interesting to detail the complications in each group because 41% complications in open group is important. What is the etiology of mortality in this group.
Reply: We've decided to only include robotic plication cases in our analysis to strengthen our project by focusing our attention on the evaluation of robotic plication short-term outcomes, which is the ultimate motivation of our study. For the revision, we included 14 additional patients who underwent robotic plications for our analysis. For the robotic cases, we have included the details of the complications in the results and discussion.

Comment: Question 1: In the "open approach group" 21 about 22 patients had clinical improvement. What about the patient with no improvement but no recurrence. I suppose that the concerned patient is the dead patient?
Reply: We've decided to only include robotic plication cases in our analysis to strengthen our project by focusing our attention on the evaluation of robotic plication short-term outcomes, which is the ultimate motivation of our study. For the revision, we included 14 additional patients who underwent robotic plications for our analysis.

Comment: Concerning the patient who died, his clinical preoperative state probably contraindicated the surgery? More information is needed to understand. It is probably a mistake of indication and not post operative probably due to indication of functional surgery.
Reply: This patient was in the open plication group. We've decided to only include robotic plication cases in our analysis to strengthen our project by focusing our attention on the evaluation of robotic plication short-term outcomes, which is the ultimate motivation of our study. For the revision, we included 14 additional patients who underwent robotic plications for our analysis.

Comment: In the robotic group, patients had shorter chest tube duration ….. but 3/27 patients developed postoperative pleural effusion ! One about the 3 required readmission for pneumonia, another acute renal failure and the third had tube replacement for a pneumothorax.
Reply: Thank you for the reviewer's comment. There is an area that will be further investigated in our future research. We did, as part of our revision, include 14

additional robotic patients in our analysis, and no one in the new group developed pleural effusion that was documented or needed any intervention. Making our rate to be 3/41.

Comment: Only 59% of questionnaire results: It is probably not enough to give robust information, But 56% improved patients and the other half endorsed or worsened represents a bad result for this functional surgery.
Reply: Your comment is well-received. After adding additional patients to the cohort and a second round of recruiting for the questionnaire, we are at 72% of participation and 89% noting improvement.

Comment: I don't agree with the conclusion given in this manuscript: 11% of relapse in a median follow-up time of 29 days in the robotic group doesn't represent a safe approach for diaphragm plication.
Reply:
Your comment is well-received. We have revised the manuscript with more emphasis on the recurrences and do agree it is a significant issue that needs to be further investigated.