Peer review file

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Reviewer A

Comment 1: The title that the authors have chosen to use is vague. This reviewer would recommend having a title that provides greater clarity with a more self-explanatory title. There is no universal acceptance of what an anterior and inferior approach refer to and many surgeons may not automatically consider their approach an inferior approach. There are several other surgeons who do not use a lower camera position but still would not be characterized as being an anterior approach. Finally, with regards to the title, the word "inferior" has a double meaning of being a lesser or worse approach. Some readers will initially be confused by this ostensibly unintended meaning.

Reply 1: Thank you for your helpful comments on our manuscript. Based on your comment, the original title was changed into the new one entitled '**Cumulative experience of the anterior approach in robot-assisted thoracic surgery for lung cancer patients**', in which the word 'inferior' was excluded. In addition, the word 'inferior approach (IA)' in the original text was thoroughly replaced by one 'conventional approach (CA)' in the revised text.

Changes in the text: We have changed the title as advised (see lines 3-4, page 1, track-changes version).

Comment 2: It is not clear why they are making a distinction between where the operator stands for the thoracotomy in comparison to a RATS lobectomy given the fact that the

operator for the latter is actually at the console. In other words, it is unclear what point they are making in the second paragraph of their background section.

Reply 2: Based on your comment, the sentence ‘as the position of the operator differs from that of thoracotomy; for example, the operator stands behind or in front of the patient when performing thoracotomy’ was removed.

Changes in the text: We have deleted the sentence ‘as the position of the operator differs from that of thoracotomy; for example, the operator stands behind or in front of the patient when performing thoracotomy’ (see lines 63-65, page 5, track-changes version).

Comment 3: In the final sentence of the third paragraph of their background they state “However, whether the AA is comparable or superior to the conventional IA remains unclear.” This statement is somewhat confusing in that it is not clear if they are trying to set up a non-inferiority comparison or trying to make a superiority comparison. I would recommend that they outline the hypothesis better.

Reply 3: Since this is just a retrospective study which compared the AA with the IA (the CA in the revised text), I believe that to set up the hypothesis for the superiority or non-inferiority comparison makes no sense. Therefore, the sentence ‘whether the AA is comparable or superior to the conventional IA remains unclear’ was changed into one ‘there are no reports comparing the AA with the CA.’

Changes in the text: The sentence ‘whether the AA is comparable or superior to the conventional IA remains unclear’ was changed into one ‘there are no reports comparing the AA with the CA’ (see lines 82-83, page 6, track-changes version).

Comment 4: Based on the time frames in which the surgeons used the IA and AA, it appears that the AA was used later in their experience. This observation suggests that they

were well into their robotic experience with their IA prior to moving to their AA. Therefore, in using the AA they appear to have already overcome some elements of the learning curve associated with just accomplishing a RATS lobectomy. How did they eliminate this bias or could they offer some information to indicate they were already off the learning curve? Some comparative data to suggest that they was still room for improvement off the learning curve could be helpful in addressing these points.

Reply 4: As you and Reviewer D pointed out, the time frame in which we used the AA and IA (CA in the revised text) was a critical limitation and we feel that only a prospective study could solve this concern. This point had been already mentioned in the Discussion section, therefore, no additional mentions were added in the revised text.

Changes in the text: No modifications were made to the revised manuscript.

Comment 5: In figure 1 they provide a schematic of the AA. For comparison sake it would to include what is what they defined as an IA wit perhaps a minor picture or alternative icon to designate what they specifically considered an IA.

Reply 5: In accordance with your comment, the schematic of the IA (CA in the revised text) was included as a **Figure 2**.

Changes in the text: The schematic of the IA (CA in the revised text) was added to the revised manuscript (see **Figure 2** and lines 373-374, page 24).

Comment 6: Could be authors explain why there was such a big difference between the median console and total operative times? This difference is over an hour. Were there any other additional aspects to the operation that were performed that could extend their operative time so by so much.

Reply 6: The difference between the median console and total operation times can be partly explained by the time needed for intraoperative pathological diagnosis of lung cancer which was performed by VATS procedure. After the intraoperative diagnosis, the patient cart of the da Vinci Si system was rolled in, and then each of the four arms was fixed to a port. In fact, among 108 patients, 23 required the intraoperative pathological diagnosis before RATS lobectomy. In addition, the time for the extraction of the resected pulmonary lobe from the thoracic cavity, the repair of pulmonary leakage, wash of the thoracic cavity and hemorrhage may explain the abovementioned difference. Because we do not feel that this point is not critical for our manuscript, no additional mentions were added to the revised text.

Changes in the text: No additional changes were made to the revised text.

Comment 7: Based on how the results are presented, there is no intuitively understandable causal reason for how the AA truly translated into improvement in their outcomes. It would be better if the authors presented their data in a way that led the reader down a pathway in which, as they were reading, they could begin to deduce that the AA was better approach. Presently, they just have a bland presentation of outcomes and then offer certain or particular reasons in their Conclusions that try to justify their findings.

Reply 7: As shown in the Discussion section, one of the merits for our AA is to obtain a good view of the hilum, which means that the surgeons can divide the pulmonary arteries and veins without any blindness. We feel that this good view of the hilum, especially pulmonary arteries and veins, offered by the AA enabled us to divide such vessels in a faster manner than the CA. This intuitive causal reason for the AA truly translated into improvement in their outcomes should be clarified in more detail by a prospective trial which compares the AA and IA (CA in the revised manuscript).

Changes in the text: The sentence ‘We feel that this good view of the hilum, especially pulmonary arteries and veins, offered by the AA enabled us to divide such vessels in a faster manner than the CA’ was added to the revised text (see lines 220-222, page 13, track-changes version).

Comment 8: In their conclusion, the author stated that reduced blood loss with the AA suggests better safety. This statement is an overstatement and, by default, hints at the fact that the IA may not be safe. This sentiment is inaccurate in the hands of many other surgeons therefore they may want to eliminate or rephrase this sentiment.

Reply 8: In accordance with your comment, the sentence ‘The reduced blood loss with the AA suggests that the AA can be performed more safely than the IA’ was removed from the original article.

Changes in the text: In accordance with your comment, the sentence ‘The reduced blood loss with the AA suggests that the AA can be performed more safely than the IA’ was removed from the original article (see lines 215-217, page 14, track-changes version).

Comment 9: While this reviewer agrees with the authors that AA may afford the surgeon better visualization of the hilum, the notion that there needs to be a more proximal dissection indicates that there is a step in their operation that perhaps most surgeon do not perform due to the fact that they do not feel this is necessary. Many robotic surgeons would argue that the robotic approach lends itself to a refined dissection that allows for the division of the pulmonary artery branches without having to do dissect more proximal dissection. As such, the authors may want to rephrase the sentiment notion.

Reply 9: Although most surgeons may not feel the proximal dissection is necessary as you mention, our institutional policy is that such proximal dissection is needed to cope with an

emergent and unexpected bleeding. Especially in left upper lobectomy, the proximal dissection is important because the first branch of left pulmonary artery is called an ‘artery of sorrow’ as most surgeons know. Furthermore, in relation to your query #13, when performing RATS lobectomy with the AA for the centrally located tumor, the more proximal dissection is necessarily required. Based on these, we feel that neither additional mentions nor modifications are needed for the revised text.

Changes in the text: No additional changes were made to the revised text.

Comment 10: The authors use the da Vinci SI system and as such they needed a bedside assistant to proceed with the stapling. Many would argue that with the updated Xi system this bedside stapling is not needed. I think acknowledging that they will investigate this further with the Xi system as they do in their discussion is reasonable. However, they may want to better defend why their approach would still be relevant.

Reply 10: In relation to the query #3 from the Reviewer D, when using the da Vinci Xi system, it should be clarified whether the robotic stapler can be used because there may not be enough distance between the chest wall and the articulation of the robotic stapler to allow it to be used. In some cases, an arrangement of port sites may be required.

Changes in the text: We have added the sentences ‘When using the da Vinci Xi system, it should be clarified whether the robotic stapler can be used because there may not be enough distance between the chest wall and the articulation of the robotic stapler to allow it to be used. In some cases, an arrangement of port sites may be required.’ to the revised text as advised (see lines 274-277, page 16, track-changes version).

Comment 11: The justification of why and how they transitioned from an IA to an AA approach in their Conclusions seems better suited for their introduction. This foundational

explanation would serve as a more natural way to justify why they have chosen to make their comparisons in this study. Therefore, they may want to move this part to the introduction.

Reply 11: Despite your comment, we believe that the Introduction section is natural to justify why we have compared the AA with the IA (CA in the revised text). So, no additional changes were made to the revised text.

Changes in the text: No additional changes were made to the revised text.

Comment 12: Their discussion about the AFT while interesting seems to stray from their main message especially without some type of text in their methods to describe their use of AFT and also without some data element in their results to lead to a discussion about it. Without this type of information, one could argue that their discussion on this point is less relevant to their overall study.

Reply 12: First of all, we had already mentioned AFT in the Methods section in the original manuscript. According to your comment, some data regarding AFT was added to the revised text and **Table 2**. After including the data regarding AFT, no modifications were made to the discussion on AFT.

Changes in the text: Some data regarding AFT was added to the revised text (see lines 183-185, pages 12, track-changes version) and **Table 2**.

Comment 13: In principle, I can certainly understand the authors advocating for their approach. However, this reviewer does question how does the tumor location affect their approach. For example, if there was a significant central tumor located anteriorly, this tumor location could affect the dissection entirely. Does the AA limit them in their options to be versatile intraoperatively in instances when they have to reconfigure their approach to

going from posterior to anterior? Other approaches may provide more versatility when encountering issues and so can the authors comment on this issue? Can the authors also clarify whether the camera is placed in port #2 or #3 with the AA. Perhaps in the same vein, can the authors please clarify how their approach could be defended if someone in the future develop some other approach say for example a superior approach. One could argue that any approach is better with added familiarity and experience. Therefore, for posterity sake, could the authors defend their position better to someone in the future who may offer another alternative approach?

Reply 13: This query appears to be related to the query #9. In our institution, RATS lobectomy was indicated for only lung cancer patients with clinical stage I in the time frames in which our retrospective study was performed. So, at present, the usefulness of our novel approach is not clear for the centrally located tumor. However, we feel that given the good view of the hilum obtained by the AA, the AA might be more useful for PA plasty and bronchoplasty for centrally located tumor compared with the conventional approach, which should be clarified by the future studies, including case reports. Since no responses seem to be needed for this query, no additional mentions were made.

Changes in the text: No additional mentions were made to the revised text.

Comment 14: This theme reappears in their conclusions and the manner in which it is presented does not have much relevance to an overall discussion given the fact that they are talking about a robotic approach and not necessarily an open thoracotomy approach thereby making this comparison less relevant to their overall study.

Reply 14: We are sorry, but we could not understand what ‘this theme’ means. We would be grateful if you kindly let us know what ‘this theme’ means.

Changes in the text: No additional changes were made to the revised text.

Reviewer B

Authors performed RATS lobectomy by the inferior approach (IA) and anterior approach (AA) using the da Vinci Si surgical system and retrospectively evaluated their data to compare the AA with the IA regarding operative and postoperative factors, with a focus safety. And they concluded that the AA is an effective technical method of performing RATS lobectomy.

I would like to suggest some points to improve this paper.

Reply and changes in the text: Thank you for your helpful comments on our manuscript. Please note that based on the comment 1 from reviewer A, the original title was changed into the new one entitled '**Cumulative experience of the anterior approach in robot-assisted thoracic surgery for lung cancer patients**', in which the word 'inferior' was excluded. In addition, the word 'inferior approach (IA)' in the original text was thoroughly replaced by one 'conventional approach (CA)' in the revised text.

Minor comments:

Comment 1: (line 40-41, 153-154)

(console time: AA vs. IA, 112 vs. 148 [median], P=0.0001; total operation time: AA vs. IA, 193 vs. 243 [median], P=0.0002),

---> (console time: AA vs. IA, 112 min. vs. 148 min., P=0.0001; total operation time: AA vs. IA, 193 min. vs. 243 min., P=0.0002)

Reply 1: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see lines 43-45, page 3 and lines 187-189, page 12, track-changes version).

Comment 2: (line 43-44, 156)

(intraoperative blood loss: AA vs. IA, 20 vs. 105 [median], P<0.0001; postoperative complications: AA vs. IA, 8.0% vs. 28.6%, P=0.0088).

---> (intraoperative blood loss: AA vs. IA, 20 ml vs. 105 ml, P<0.0001; postoperative complications: AA vs. IA, 8.0% vs. 28.6%, P=0.0088).

Reply 2: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see lines 47-49, page 3 and lines 190-192, page 12, track-changes version).

Comment 3: (line 96)

(Figure)

---> (Figure 1)

Reply 3: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see line 115, page 8, track-changes version).

Comment 4: (line 131)

Table 1 shows the clinical characteristics and operative/postoperative outcomes.

---> The clinical characteristics and operative/postoperative outcomes are shown in Table 1.

Reply 4: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see lines 156-157, page 11, track-changes version).

Comment 5: (line 149-150)

Table 2 shows the data comparing the clinical characteristics and operative/postoperative outcomes according to the surgical approach

---> The data comparing the clinical characteristics and operative/postoperative outcomes according to the surgical approach are shown in Table 2.

Reply 5: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see lines 178-179, page 12, track-changes version).

Comment 6: (line 157-158)

The period for chest tube drainage was also significantly shorter with the AA than with the IA (AA vs. IA, 1 vs. 1 [median], P<0.0001).

---> The period for chest tube drainage was also significantly shorter with the AA than with the IA (AA vs. IA, 1 day vs. 2 days, P<0.0001).

Reply 6: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see line 194, page 12, track-changes version).

Comment 7: (line 163)

Table 3 shows the console time and intraoperative blood loss according to the surgical procedures.

---> The console time and intraoperative blood loss according to the surgical procedures are shown in Table 3.

Reply 7: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see lines 200-201, page 12, track-changes version).

Comment 8: (line 165)

(P=0.0128 and 0.0108, respectively).

---> (console time: AA vs. IA, 114 min. vs. 155 min., P=0.0128; intraoperative blood loss: AA vs. IA, 41 ml vs. 125 ml, P=0.0108).

Reply 8: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see lines 204-206, page 13, track-changes version).

Comment 9: (line 166)

(P=0.0043).

---> (AA vs. IA, 8 ml vs. 101 ml, P=0.0043).

Reply 9: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see lines 207-208, page 13, track-changes version).

Comment 10: (line 168)

(P=0.0542 and 0.0734, respectively).

---> (RUL: AA vs. IA, 111 min. vs. 152 min., P=0.0542; LLL: AA vs. IA, 91 min. vs. 169 min, P=0.0734).

Reply 10: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see lines 184-185, page 9, track-changes version).

Comment 11: (line 169)

Conclusions

---> Discussion

Reply 11: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see line 212, page 14, track-changes version).

Comment 12: (line 176, 183)

(Figure and Video)

---> Please remove.

Reply 12: Based on your comment, we have deleted 'Figure and Video.'

Changes in the text: We have deleted 'Figure and Video' as advised (see lines 220 and 230, page 14, track-changes version).

Comment 13: (line 202)

inthe

---> in the

Reply 11: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see line 253, page 15, track-changes version).

Comment 14: (line 207)

Abovementioned

---> above mentioned

Reply 14: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see line 258, page 16, track-changes version).

Comment 15: (line 225-226)

As shown in Table 2,

---> Please remove.

Reply 15: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see line 282, page 17, track-changes version).

Comment 16: (Figure and video legends)

Video. The differences in the visibility of the right superior trunk and the left A3 between the AA and IA.

---> Video 1. The differences in the visibility of the right superior trunk and the left A3 between the AA and IA. A3, please explain; AA, anterior approach; IA, inferior approach

Reply 16: Based on your comment, we have modified our text.

Changes in the text: We have modified our text as advised (see lines 377-379, page 24, track-changes version).

Comment 17: (Table 1)

Table 1. Clinical characteristics and operative/postoperative outcomes in 108 patients analyzed.

---> Table 1. Clinical characteristics and operative/postoperative outcomes.

Reply 17: Based on your comment, we have modified **Table 1**.

Changes in the text: We have modified Table 1 as advised (see **Table 1**, track-changes version).

Comment 18: (Table 1)

Conversion into VATS of thoracotomy

---> Conversion into VATS or thoracotomy

Reply 18: Based on your comment, we have modified **Table 1**.

Changes in the text: We have modified Table 1 as advised (see **Table 1**, track-changes version).

Reviewer C

This is a fabulous and really innovative arrangement of robotic ports. I am an intuitive proctor and I have never seen this arrangement before and I am really keen to try your technique and see more.

Reply and changes in the text: Thank you for your helpful comments on our manuscript. Please note that based on the comment 1 from reviewer A, the original title was changed into the new one entitled '**Cumulative experience of the anterior approach in robot-assisted thoracic surgery for lung cancer patients**', in which the word 'inferior' was excluded. In addition, the word 'inferior approach (IA)' in the original text was thoroughly replaced by one 'conventional approach (CA)' in the revised text.

Comment 1: I downloaded reference 5 to learn more about the Hamamatsu method but their method seems very difference to yours. Theirs is basically the normal port placement with the camera and posterior port slightly higher, but yours is completely different to this. I think you should change your reference to funai et al to reflect the fact that their method is very different to yours and therefore you have created a completely novel port placement technique. Yours is definitely not the Hamamatsu technique, but really interesting in its own right.

Reply 1: Instead of changing the reference to Funai et al., we emphasized the difference between our original anterior approach and the Hamamatsu method as shown in lines 69-71, page 3 in the track-changes version.

Changes in the text: We have added the sentence 'But their method seems different from our original AA in that their method is basically the normal port placement with the camera

and posterior port slightly higher, suggesting that the AA is a completely novel port placement technique' (see lines 76-79, pages 5-6, track-changes version).

Comment 2: Could you make it clearer in the methodology that you are using an Si system. I was slightly unclear but I think you are only using an Si. I don't think you would need any changes with an Xi, as the lowest port could be the stapling port and would definitely work. I want to try this after reading your fabulous paper.

Reply 2: As you pointed out, we used only an Si and we made this point clearer in the Methods section.

Changes in the text: We have added the sentence 'In this study, only da Vinci Si surgical system (Intuitive Surgical Inc., Sunnyvale, CA, USA) was used.' (see lines 101-102, page 7, track-changes version).

Comment 3: Could I also commend you on the amazing achievement of no conversions. This is very impressive.

Reply 3: Thank you for your comment.

Changes in the text: No additional mentions are needed for this comment.

Reviewer D

The authors submit a manuscript comparing the "inferior" approach to the "anterior" approach for robotic lobectomy. It is a well written paper but a retrospective comparison in which the inferior approach was used earlier in the series and later the anterior approach. They have previously reported the anterior approach. There are several aspects of this manuscript that limit the validity of the conclusions:

Reply and changes in the text: Thank you for your helpful comments on our manuscript. Please note that based on the comment 1 from reviewer A, the original title was changed into the new one entitled '**Cumulative experience of the anterior approach in robot-assisted thoracic surgery for lung cancer patients**', in which the word 'inferior' was excluded. In addition, the word 'inferior approach (IA)' in the original text was thoroughly replaced by one 'conventional approach (CA)' in the revised text.

Comment 1: The authors did not discuss how many surgeons were involved in the study?
Reply 1: Two certified thoracic surgeons in Japan were involved in the study. This point was added in the Methods section.
Changes in the text: We have added the sentence 'Two certified surgeons in Japan (K.Y. and F.S.) performed RATS lobectomy' (see lines 102-103, page 7, track-changes version).

Comment 2: The inferior approach was early on, with the anterior approach following. The increased times can be solely related to learning curve. The authors should consider going back to the inferior approach and then recording times, blood loss and complications.

Reply 2: As you and Reviewer A pointed out, the time frame in which we used the AA and IA (CA in the revised text) was a critical limitation and we feel that only a prospective study could solve this concern. This point had been already mentioned in the Discussion section, therefore, no additional mentions were added in the revised text.

Changes in the text: No modifications were made to the revised manuscript.

Comment 3: Although this might be useful for some, for those using the robotic stapler, this technique would be impossible as there is not enough distance between the chest wall and the articulation of the robotic stapler to allow it to be used.

Reply 3: In relation to the query #10 from the Reviewer A, when using the da Vinci Xi system, it should be clarified whether the robotic stapler can be used because there may not be enough distance between the chest wall and the articulation of the robotic stapler to allow it to be used. In some cases, an arrangement of port sites may be required.

Changes in the text: We have added the sentences 'When using the da Vinci Xi system, it should be clarified whether the robotic stapler can be used because there may not be enough distance between the chest wall and the articulation of the robotic stapler to allow it to be used. In some cases, an arrangement of port sites may be required.' to the revised text as advised (see lines 274-277, page 16, track-changes version).

Comment 4: The stage was very early for all cases. Why was this?

Reply 4: In our institution, RATS lobectomy was indicated for only lung cancer patients with clinical stage I in the time frames in which our retrospective study was performed. Now, we are expanding indications of RATS for lung cancer patients with clinical stages II-III. Since no responses seem to be needed for this query, no additional mentions were made.

Changes in the text: No additional mentions were made to the revised text.

Comment 5: The reference to video and figures needs numerical assignment even if just 1.

Reply 5: Based on your comment, the video and figure were numbered.

Changes in the text: See line 115, page 8, line 132, page 9 and lines 370, 377 and 382, page 24, track-changes version.

Comment 6: Anatomic variations increasing the technical challenge are unaccounted for, such as completeness of the fissure.

Reply 6: Unfortunately, such data were not included because this was a study which retrospectively analyzed the previous consecutive patients. Future retrospective data are warranted to investigate the impact of anatomic variations, such as the fissure completeness on the technical challenge.

Changes in the text: Based on the above, no additional mentions were made to the revised manuscript.

Comment 7: Was the 30 degree camera used for both inferior and anterior approaches?

Reply 7: The 30 degree camera was used for the AA, while the 0 degree camera was used for the IA (CA in the revised manuscript). This point was added in the revised text.

Changes in the text: See line 107, page 7 and line 131, page 9, track-changes version.