Peer Review File

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**Reviewer A**

**Comment 1**:

The first half of the review was mainly a history of lung cancer surgery, especially segmentectomy. The second half was discussed the latest preoperative simulation and navigation techniques for anatomical lung resection. Moreover, the title includes "RATS," but there is little on RATS.

The topic of this review is "preoperative navigation and simulation techniques". I felt that the description should be more on topic and focused.

**Reply 1**:

Thank you for the comment. I think that the preoperative simulation for RATS is basically similar to the simulation for VATS.

However, I changed the title “Simulation and navigation techniques in segmentectomy for lung cancer”, which was suggested by another reviewer.

**Reviewer B**

**Comment** 1:

Abstract

- The abstract reads as in introduction without red line. In addition, what is the research question and problem to be solved?

Reply 1:

I added some description in page 4, line 57.

**Comment 2**:

Introduction

- The ratio between general introduction on lung resection and problem thesis is skewed.

- What is new regarding the method used at Shinshu University, thereby stressing the necessity/novelty of the present study

- As far as I know, a clinical practice review is not a study type. Based on the introduction, I feel that a “narrative review” or “best evidence article” is more appropriate.

**Reply** 2:

We added descriptions about 3D software used at Shinshu University, and also other new technologies such as VR in Introduction section.

From the content of the author guideline, I prefer to reclassify my article as a “mini-review”.

The revised description in the text for this comment is from page 6, line 90.

**Comment 3:**

Methods

- A methods section is missing. Given that the study type is not clearly known, it is also unknown what the intended introduction section should hold.

- How were studies identified that were elaborated on in the present study?

Main part

- The main part feels as a summation of past studies, hence also contributed by the fact that a clear research aim/question is missing. Best would maybe even be to convert the study to a systematic review according to the PRISMA-guidelines with clear research aim/question

**Reply 3:**

As mentioned above, this paper was written in a way that should be a “mini-review”, so I would like to omit the detailed methodology.

**Comment 4:**

Main part

- Line 132-133: what kind of lung function parameters showed only 3.5% increase?

**Reply 4:**

I added the description about the comment in page 10, line 154.

**Comment 5:**

Line 141-143 is not substantiated by the preceding text. The usefulness of preoperative 3D-CT simulation should first be constituted before being able to suggest a positive relationship with increasing segmentectomy volumes.

**Reply 5:**

As described in page 5, line 55, lobectomy has been the standard procedure for decades. This indicates that lobectomy was adopted for all patients shown in Figure 1. Therefore, results in Figure 1 suggests the possibility that the candidate of segmentectomy will increase.

I added some description in page 10, line 171.

**Comment 6:**

Apart from the different software packages named, along of their features to “try” to preoperatively simulate a segmentectomy, how is the difference between a fully ventilated and preoperatively collapsed lung undertaken? This is an essential part of the reproducibility of the simulation.

**Reply 6:**

In principle, the 3D-CT simulation uses the chest CT image taken in the inspiratory state, so it reflects only as a fully ventilated lung.

I added the description about that in page 15, line 245.

The RPM(resection process map) described in page 17, line 280, in the section of “Other new 3D technologies in thoracic surgery”, which does not exactly represent a collapsed lung, but it is more practical in terms of representing a dynamic virtual image. If you look at the video of their article, it is possible to move like a collapsed lung.

**Comment 7:**

Line 218: is there any explanation for the reduced length of hospital stay with the use of AR alongside tangible 3D models?

**Reply 7:**

The author described that the complication was not significantly different between groups. There is no explanation for the reduced length of hospital stay in this article.

**Reviewer C**

**Comment 1:**

This is a review on segmentectomy and 3D reconstruction. It is unclear for me if it is a systematic review or a narrative review? You should mention the method.

Then, the discussion about results and indications of segmentectomy is too long and not really adapted to the topic of your review which is the simultaion and navigation.

**Reply 1:**

From the content of the author guideline, I prefer to reclassify my article as a “mini-review”.

This paper was written in a way that should be a “mini-review”, so I would like to omit the detailed methodology.

**Comment 2:**

Navigation is briefly mentionned and should be more developed. No mentions on limitations of the 3D reconstruction.

**Reply 2:**

I added some limitation in page 15, line 245.

**Reviewer D**

**Comment 1:**

On line 108, “the lesion is located deep in the visceral pleura” can be changed to “the lesion is deeply located in the lung parenchyma”, which is considered better expression.

**Reply 1:**

Thank you for your comment.

I revised the text as you recommended in page 8, line 123.

**Comment 2:**

Please explain the details (FEV1.0, VC, etc.)) about “the functional advantage of segmentectomy” on lines 128-129.

**Reply 2:**

I added about that in page 9, line 145.

**Reviewer E**

**Comment 1:**

The literature on the results of segmentectomy is limited to those from Japan. At least the results of the trial CALGB/Alliance 140503 should be mentioned.

**Reply 1:**

I omitted it because the final report has not been published, but I added some description about CALGB140503 from the page 10, line 161.

**Comment 2:**

Table 1 summarizes the literature on segmentectomy using 3DCT, but the article by Fukuhara et al. is on lobectomy. Meanwhile, the articles using SYNAPSE VINCENT are not cited, which is unnatural.

**Reply 2:**

Thank you for point this out. The article from Fukuhara was a study on lobectomy, so it was excluded from the text, reference, and table 1.

I could not find any article that clinically applied 3D simulation using Synapse Vincent to lung segmentectomy, even there are several article using Ziostation.

**Comment 3:**

In line 171, you mention the importance of preoperative prediction of resection margins. If you want to emphasize the advantage of REVORAS’s ability to automatically measure resection margins, you should include an image of the actual measurement in the Figure.

**Reply 3:**

I added an image of margin distance in REVORAS simulation as Figure 3B, and added some text in page 14, line 236, and Figure legend.

**Comment 4:**

In Figure 2, b, c, d, and e are in the wrong position.

**Reply 4:**

I fixed the position of Figure 2b-e.

**Comment 5:**

The title of the paper is “Simulation and navigation techniques in video-assisted and robot-assisted thoracoscopic surgery segmentectomy”, which may be in keeping with the theme, but the paper discusses preoperative simulation in segmentectomy and makes no mention of surgical approach (VATS and RATS). The paper spends a lot of space to the indications and results of segmentectomy for lung cancer, and it would be more appropriate to use the title “Simulation and navigation techniques in segmentectomy for lung cancer”.

**Reply 5:**

As you suggested, I changed the title of my article.

**Reviewer F**

**Comment 1:**

Authors should offer their perspective / experience about main difficulties in using the 3D reconstruction software.

**Reply 1:**

I added the description of the limitation of the 3D simulation in page 15, line 245．

**Comment 2:**

I consider that authors should also comment on cost of the software, requirements in terms of CT quality (is it necessary to repeat the diagnostic scan?), how long each reconstruction takes…

**Reply 2:**

I added description in page 15, line 248 about cost of the software, page 13, line 215 about CT quality, page 14, line 233 about simulation time.

**Comment:3**

Additionally, it is not clear how 3D navigation could help surgeons to delimitate margins. Could the authors clarify this aspect? How do they use the 3D model intraoperatively?

**Reply 3:**

In principle, a sufficient surgical margin was secured in preoperative simulation. If the margins are close, extended segmentectomy may be performed or other marking modality will be performed, however topics of marking modality are out of the scope of this paper and will be omitted.

**Comment 4:**

From my point of view, although authors comment on their experience in their clinical practice, they should offer a more critical view of the use of simulation and navigation technology in segmentectomies.

**Reply 4:**

I added some descriptions about limitation of 3D simulation in page 15, line 245.