Peer Review File

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The authors offer a fairly generic description of a left lower lobe segmentectomy (I would stress that they are describing a S7+8 segmentectomy, rather than « S8 »). The description is clear and to the point, however, I do not find that it provides any additional insights on top of current conventional wisdom concerning segmentectomy. The discussion offers several theoretical advantages of 3D reconstruction. However, the authors did not outline how, specifically, 3D reconstructions helped in their particular case: what was accomplished with the 3D images than was not possible using conventional 2D CT slices? What important anatomic variants were confirmed /excluded using this imaging? (Once again, that would not have been identified on the conventional CT images available to the authors)? What potential intraoperative pitfalls were avoided using the 3D reconstructions, that would not have been recognized on conventional CT?

One of the advantages of the platform cited by the authors is that it is readily accessible, even in the operating room; how did the authors manage to establish a correspondance between the bronchovascular structures encountered intraoperatively and the structures visible on the 3D imaging? Do the authors have any comments regarding the ease of interaction with the platform during the actual operation? How was the back and forth between the technical execution in the operating room and intraoperative inspection of the 3D images? Who was manipulating the images? Was the console accessible to the scrubbed team or was it operated by a « non-sterile » assistant instructed by the surgeon? Etc.

The paper lacks in such important details that, in my view, are the crux of how 3D imaging technology can eventually be effectively integrated into operative planning and intra-operative orientation and decision-making. In addition, the intraoperative technical description is a bit sketchy for the paper to be considered a technical tutorial, and the quality of the video (the version that can be accessed for peer review, at any rate) is poor. And so I find that this paper adds little to the literature.

Reply
Comment 1: I would stress that they are describing a S7+8 segmentectomy, rather than « S8 ».
Reply 1: Thank you for the comment. We would like to clarify that we used the anatomical nomenclature and descriptions of segmental anatomy in "Nomori H, Okada M. Illustrated anatomical segmentectomy for lung cancer. Springer, 2012", which refers to the segmentectomy we performed as a S8 segmentectomy.
Changes in the text: N/A

Comment 2: However, the authors did not outline how, specifically, 3D reconstructions

helped in their particular case: what was accomplished with the 3D images than was not possible using conventional 2D CT slices?

Reply 2: Thank you for the question. As mentioned in our manuscript in the Pre-Operative Preparation section (P5L105-P6L114), the 3D reconstruction allowed us to estimate the minimum margin of resection of 1.8cm with an isolated S8 segmentectomy as the software creates segmental boundaries based on the arterial blood supply of the segment of interest. This estimated margin of resection could not have been measured on 2D CT images, and is an important pre-requisite for determining whether a sublobar resection would be appropriate and also whether a segmentectomy or wedge resection could give a better margin of resection. Secondly, we also mentioned that the 3D reconstruction allowed us to better understand the anatomical variations and relative positions of the bronchovascular structures that needed to be resected for the planned segmentectomy. We agree that careful study of the 2D CT images would allow us to do this as well, but it is a lot easier with the 3D reconstruction. We will highlight these points in the case description section.

Changes in the text: See Page 6, Line 126-129 and Page 7, Line 137-140 (Final Showing Markup)

Comment 3: What important anatomic variants were confirmed /excluded using this imaging? (Once again, that would not have been identified on the conventional CT images available to the authors)? What potential intraoperative pitfalls were avoided using the 3D reconstructions, that would not have been recognized on conventional CT?

Reply 3: Thank you for the questions. As mentioned in our manuscript in the Pre-Operative Preparation section (P5L105-P6L114), the 3D reconstruction allowed us to determine that this patient had a fairly classical branching pattern of his arterial and bronchial segmental anatomy as described in "Nomori H, Okada M. Illustrated anatomical segmentectomy for lung cancer. Springer, 2012", but there were two separate vein branches draining the S8 segment we were planning to resect. This allowed us to resect both branches confidently during surgery without fearing that either one may be draining any of the adjacent segments. As mentioned above, we do agree that careful study of the 2D CT images would allow us to do this as well, but it is a lot easier with the 3D reconstruction and we will highlight this in the case description section.

Changes in the text: See Page 7, Line 137-140 (Final Showing Markup)

Comment 4: how did the authors manage to establish a correspondance between the bronchovascular structures encountered intraoperatively and the structures visible on the 3D imaging? Do the authors have any comments regarding the ease of interaction with the platform during the actual operation? How was the back and forth between the technical execution in the operating room and intraoperative inspection of the 3D images? Who was manipulating the images? Was the console accessible to the scrubbed team or was it operated by a « non-sterile » assistant instructed by the surgeon? Etc.

Reply 4: Thank you for the questions. The 3D reconstruction was available for us to view in the operating room on a laptop connected to the Internet, given the cloud-based nature of the platform we were using. We chose a static view of the relevant bronchovascular structure we

were intending to resect (similar to Figure 3 seen in the manuscript) and would refer back to that static view while the relevant structures were dissected out intra-operatively. Transection of the structure was performed once we were satisfied that the bronchovascular structure in question matched what was seen on the reconstruction. Whenever interaction with the 3D reconstruction was required, an unscrubbed member of the team instructed by the surgeon would manipulate the 3D reconstruction on the laptop. This was done quite smoothly during this case as the software has an easy and simple to use interface and there were no unusual findings during this surgery that required the surgeon to scrub out to manipulate the 3D reconstruction more precisely. We will highlight this in the discussion section.

Changes in the text: See Page 14-15, Line 307-315 (Final Showing Markup)

Comment 5: In addition, the intraoperative technical description is a bit sketchy for the paper to be considered a technical tutorial, and the quality of the video (the version that can be accessed for peer review, at any rate) is poor.

Reply 5: Thank you for your comments. We have added some details regarding the technical details of the surgical technique in the discussion section to highlight tips and tricks we used during the surgery that we hope may be helpful for readers who may be faced with a similar case in the future. In addition, we have uploaded a higher quality video.

Changes in the text: See Page 12-14, Line 261-293 (Final Showing Markup). Also, new video will be re-uploaded.

Reviewer B

Thank you for giving me the opportunity to review the manuscript.

I applauded the successful results in such a difficult case.

The author focused on the usefulness of 3DCT in the discussion section of this case report.

However, the details of surgical procedure occupied most part of the case presentation section.

Therefore, the author should describe the surgical techniques about S8 segmentectomy in the discussion section, which would made this manuscript more sophisticated.

Reply：

Comment 1: "The author should describe the surgical techniques about S8 segmentectomy in the discussion section, which would made this manuscript more sophisticated"

Reply 1: Thank you for your suggestions. We have added some details regarding the technical details of the surgical technique in the discussion section to highlight tips and tricks we used during the surgery that we hope may be helpful for readers who may be faced with a similar case in the future.

Changes in the text: See Page 12-14, Line 261-293 (Final Showing Markup).

Reviewer C

This case report well reported the usefulness of segmentectomy in the setting of bilateral synchronous lung cancer using the latest technology such as video-assisted approach,

near-infrared florescence and incocyanine green injection, 3d CT-scan reconstruction. The case report is well described, but, are present some issues that need clarification by the authors:

Comment 1: The paper is too long and some sentences should be deleted.

Reply 1: Thank you for the comment. We have removed some redundant sentences in the manuscript.

Changes in the text: See Page 3, Line 55-56 and Page 10, Line 215-220 (Final Showing Markup)

Comment 2: Some typos are present in particular P5L101

Reply 2: Thank you for pointing this out. We have removed the typo "using a using a" on P5L101.

Changes in the text: See Page 6, Line 115 (Final Showing Markup)

Comment 3: The sentence P4L75 about the localization of the nodules is not completely clear

Reply 3: Thank you for the comment. We have added additional details about the location of the right sided lung nodules in that section.

Changes in the text: See Page 4, Line 76 and Page 4, Line 78 (Final Showing Markup)

Comment 4: The video quality should be improved, but the surgical steps are clear.

Reply 4: Thank you for the comment. We will upload a higher quality video.

Changes in the text: New video will be re-uploaded.

Comment 5: From a methodological point of view, in the setting of bilateral synchronous lung cancer, EBUS should be performed evaluating the mediastinal lymph nodes, but in this paper there is no mention of this staging procedure before surgery. Did the authors perform EBUS before surgery?.

Reply 5: Thank you for the question. As mentioned in our manuscript, this case was discussed at our local multi-disciplinary tumor board after a PET scan and MRI brain was done and the recommendation was to proceed to surgical resection without invasive mediastinal staging. Our local pulmonologists did not feel that EBUS would have been helpful in this case given that there was no enlarged or FDG avid mediastinal lymph nodes seen on the PET, and thus it was not performed before surgery. We will highlight this in the case description section.

Changes in the text: See Page 5, Line 90-92 (Final Showing Markup)

This is a case report to describe the utility of preoperative 3D reconstruction in a patient with synchronous multiple lung cancer, and having several some comorbidities

The authors' surgical strategy is reasonable and easy to understand, but, I have some comments and questions.

Comment 1: About Figure 1. These CTs are too small to understand the location and morphology of lesions. Please make them bigger, and it would be great if you can use arrows or circles for lesions.

Reply 1: Thank you for the comment. We will upload a larger version of the CT images and highlight the lesions with arrows.

Changes in the text: Figure 1 will be re-uploaded as Figure 1A, 1B and 1C separately which are larger versions of the original images and with arrows added to highlight the lesions described in the in text.

Comment 2: You described the SUVmax in FDG-PET in the manuscript, but it would be better that you add a figure of PET-CT.

Reply 2: Thank you for the comment. We will upload the corresponding PET images as well.

Changes in the text: Additional Figure 1D, 1E and 1F will be uploaded.

Comment 3: I think wedge resection may be considered instead of S8 segmentectomy because this patient had several morbidities and must have received right lower lobectomy. Please mention it in the discussion.

Reply 3: Thank you for the comment. Indeed, a wedge resection was considered as an alternative to the segmentectomy for the left sided lesion for this patient, but given that long term oncological outcomes for segmentectomy may be better than wedge resection, we generally choose to perform a segmentectomy if an adequate margin can be achieved with a segmentectomy based on pre-operative 3D planning such as in this case. In cases where a wedge resection would achieve better margins (eg. lesions located close to the intersegmental border), we would perform a wedge resection instead. We will highlight this in the case description section.

Changes in the text: See Page 5, Line 95-98 (Final Showing Markup)

Comment 4: In addition, did you consider other resections for the right nodules? Though this CT is not enough to consider details now, I think that it might be able to select right S8 segmentectomy and wedge resection for basal segment.

Reply 4: Thank you for the question. We hope the new CT images uploaded will demonstrate that one of the right sided lesions (in Figure 1B) is actually quite central and close to the inferior pulmonary vein, so it would have been difficult to perform a sublobar resection with adequate margins for that lesion. Moreover, although we suspected pre-operatively that they were two separate primaries in the right lung (ie, two T1 lesions in the right lower lobe) based on their slow growth, we were also concerned of the possibility that one of them may have been an intra-lobar metastasis of the other (ie, a T3 lesion in the right lower lobe), and thus the recommendation of our multi-disciplinary tumor board was for a lobectomy for the two right lower lobe lesions. We will highlight this in the case description as suggested.

Changes in the text: See Page 5, Line 98-104 (Final Showing Markup)

Reviewer E

Thank you for this interesting case report on the use of a new cloud based 3D reconstruction platform for the planning and performance of a left basilar S8 segmentectomy.

Please find my comments and suggestions below:

Comment 1: Please add in the introduction that segmentectomy may be equivalent if not superior to lobectomy for otherwise healthy patients with peripheral lung cancers smaller than 2cm in size, with no signs of lymph node or distant metastases.

Reply 1: Thank you for the suggestion. We will add this to the introduction as suggested.

Changes in the text: See Page 3, Line 54-55 (Final Showing Markup)

Comment 2: Does the software package that you are using have CE and/or FDA clearance for use in European Union or USA? Please add in discussion if not..

Reply 2: Thank you for the comment. This software does not have CE or FDG clearance for use in the EU or USA, although it has local clearance for use in China and Singapore. As such, it is currently used by a number of hospitals in both China and Singapore. We will add this in the discussion section as suggested.

Changes in the text: See Page 14, Line 302-304 (Final Showing Markup)

Comment 3: PulmoVR is another existing platform for the planning of segmentectomy, leveraging virtual reality and AI-based 3D modeling. It might be worth mentioning this platform also as part of the existing platforms. Similarly; visible patient is another platform that is used frequently in Europe/US.

Reply 3: Thank you for the comment. We will highlight the use of these other platforms in the discussion section as suggested as well.

Changes in the text: See Page 14, Line 296-298 and Page 15, Line 320-322 (Final Showing Markup)

Comment 4: can you please discuss how the 3d platform that you are using creates the segmental boundaries? Are they based on the venous intersegmental planes or on the arterial blood supply of the segment of interest? THis is very important and should correspond to the method you are using intra-operatively to define your borders (in this case ICG; which should correspond to an arterial-based reconstruction.

Reply 4: Thank you for the questions. The software creates segmental boundaries based on the arterial blood supply of the segment of interest, which does indeed correspond to our intra-operative technique of identifying the inter-segmental plane (ie, the negative staining technique using IV ICG injection after ligation of arteries supplying the target segment). We will highlight this to our case description and discussion sections.

Changes in the text: See Page 6, Line 117-122 and Page 14, Line 304-307 (Final Showing Markup)

Comment 5: what is the novelty of your work in the light of existing literature? There have been quite some publications already that discuss the benefits of 3D reconstruction for the

planning and execution of segmentectomy; please elaborate on this in your discussion.

Reply 5: Thank you for the question. We believe our work is unique as it utilizes a novel cloud-based platform that allows the 3D reconstruction to be easily accessible anywhere. In particular, the ability to interact with the 3D reconstruction in the operating room via a laptop connected to the Internet allows us to have a constant visual guide of the relevant bronchovascular structure we are intending to resect (similar to Figure 3 seen in the manuscript) and we can continuously refer back to it while the relevant structures is being dissected out intra-operatively. Transection of the structure is only performed once we are satisfied that the bronchovascular structure in question matches what is seen on the reconstruction. Whenever interaction with the 3D reconstruction is required, an unscrubbed member of the team instructed by the surgeon would manipulate the 3D reconstruction on the laptop. This is done quite smoothly as the software has an easy and simple to use interface. We will highlight this in the discussion section.

Changes in the text: See Page 14-15, Line 298-315 (Final Showing Markup)

Comment 6: i would recommend highlighting the nodules more visible in the 2D CT-scans.

Reply 6: Thank you for the comment. We will upload a larger version of the CT images and highlight the lesions with arrows.

Changes in the text: Figure 1 will be re-uploaded as Figure 1A, 1B and 1C separately which are larger versions of the original images and with arrows added to highlight the lesions described in the in text.

Comment 7: maybe add a video reconstruction of the 3D model also in your video of the surgical case? Especially it would be interesting to see if there are any similarities in the demarcation of the segmental borders (ICG injection) and the segmental borders in the 3D model.

Reply 7: Thank you for the suggestion. We will upload an edited video which will both display a video reconstruction of the 3D model prior to surgery and also demonstrate the similarity in the demarcation of the segmental borders seen on the intra-operative video and in the 3D model.

Changes in the text: New video will be re-uploaded.

Editorial Comments

We would like to thank the editor for their helpful and insightful comments and suggestions. We shall address each comment, and changes to the manuscript are tracked.

Comment 1: In the Abstract-Background, the author needs to clearly clarify why the case report is unique and what it contributes to the existing literature (not just in the response letter). For the authors' reference, specify like "Here we report a case of synchronous bilateral primary lung cancer successfully treat with video-assisted thoracoscopic left S8 segmentectomy. This case is unique in terms of…".

Reply 1: Thank you for the comment. We have made the necessary amendments in the

Abstract-Background as suggested.
Changes in the text: See Page 2, Line 31-34 (Final Showing Markup)

Comment 2: In the case description subsection, it's necessary to describe the patient's main history (a 30 pack-year history of smoking and a background of hypertension, hyperlipidemia, benign prostatic hyperplasia), outcomes, and follow-ups after the two staged operation. Please also consider using "a right VATS lower lobectomy" instead of "second operation".
Reply 2: Thank you for the suggestion. We have made the necessary amendments in the Abstract-Case Description as suggested.
Changes in the text: See Page 2, Line 36-44 (Final Showing Markup)

Comment 3: "and the utility of routine pre-operative 3D reconstruction for the performance of safe and effective segmentectomy is discussed", the content is not the take-away lesson from this case report, which seems not to be suitable in the conclusion subsection.
Reply 3: Thank you for the comment. We have made the necessary amendments in the Abstract-Conclusion as suggested.
Changes in the text: See Page 3, Line 46-52 (Final Showing Markup)

Comment 4: Please consider adding "synchronous bilateral primary lung cancer" as a keyword.
Reply 4: Thank you for the suggestion. We have added this as a keyword.
Changes in the text: See Page 3, Line 55 (Final Showing Markup)

Comment 5: "As a result of the technical challenges of performing a segmentectomy, 3D reconstructions of a patient's computed tomography (CT) images can be used to improve surgical planning and may result in better surgical outcomes", the value of 3D computed tomography imaging and reconstructive techniques in lung surgery is described briefly. As a key point of this case report, it would be beneficial to provide a more comprehensive overview of the application for pre-operative 3D reconstruction in lung surgery in existing literature.
Reply 5: Thank you for the suggestion. We have re-structured the Introduction section to discuss the current application for pre-operative 3D reconstruction in lung surgery in existing literature.
Changes in the text: See Page 5-6, Line 78-88 (Final Showing Markup)

Comment 6: In the Introduction, please consider reorganizing the content to provide a more informative Introduction according to the "Author Instruction" (https://cdn.amegroups.cn/static/public/2.5-Structure%20of%20Case%20Reports-template-V 2022.11.4.docx). In brief, Introduction should be structured in three parts: a) Background, b) Rationale and knowledge gap, c) Objective.

Most importantly, in the "Rationale and knowledge gap" subsection, the authors need to clearly clarify why the authors need to write this article and what value this article has to the practice.

Reply 6: Thank you for the comment. We have re-structured the Introduction section as per the "Author Instruction" guidelines. We also have highlighted that our case report is showcasing a novel-cloud based 3D reconstruction platform that may have benefits over non-cloud based platforms currently available in the Rationale and knowledge gap subsection.
Changes in the text: See Page 4-6, Line 59-94 (Final Showing Markup)

Comment 7: Please kindly change the subtitle "Case Description" to "Case Presentation".
Reply 7: Thank you for the suggestion. We have amended the subtitle as suggested.
Changes in the text: See Page 6, Line 96 (Final Showing Markup)

Comment 8: For the authors' kind reference, we prefer the detailed time information of the case report (Date, Month, Year) in the manuscript. For example, "with no evidence of recurrence so far", the precise date would be helpful.
Reply 8: Thank you for the comment. We have added the month & year in which the patient had his CABG, when he was referred to us, when he was first found to have the lung nodules, when the initial CT guided biopsy of the lung nodule was performed, when his staging scans were done, when the first and second operations were done, and when the latest post-op CT thorax was done to give a temporal sequence of events as suggested. We have also updated the manuscript to reflect that the patient's latest post-op CT thorax was done earlier this month and it still shows no evidence of recurrence so far. However, we have avoided writing the exact dates as it is our institutional policy not to disclose exact dates as these may constitute potentially identifiable patient information.
Changes in the text: See Page 6, Line 99-107, Page 7, Line 114, Page 10, Line 179, Page 12 Line 238-239, and Page 13, Line 244-246 (Final Showing Markup)

Comment 9: "was referred to our department for the problem of a newly diagnosed right lower lung adenocarcinoma on the background of bilateral lower lobe nodules that have shown gradual increase over 2 years", was the patient with other primary symptoms when referred to your department (e.g., pain, cough)?
Reply 9: Thank you for the comment. The patient was asymptomatic from the lung nodules, and they were an incidental finding on a CT thorax done as part of the work-up for his CABG done in October 2020. As they showed gradual increase in size, a CT guided biopsy of the largest nodule in the right lower lobe was performed in September 2022 that demonstrated adenocarcinoma, prompting to his referral to us for surgical resection. This sequence of events has been added to the Case Presentation section.
Changes in the text: See Page 6, Line 101-105 (Final Showing Markup)

Comment 10: "The patient remains well and a repeat CT thorax 2 months after his second operation showed good re-expansion of all remaining lung parenchyma", if it's available, we suggest the authors add the CT diagnostic results.
Reply 10: Thank you for the comment. We have added an additional figure (Figure 4) which is an image from his latest post-op CT thorax done earlier this month which demonstrates that there was good re-expansion of all remaining lung parenchyma and no evidence of local recurrence so far.

Changes in the text: See Page 13, Line 244-246 (Final Showing Markup) and Figure 4

Comment 11: It is necessary and important to transparently discuss the LIMITATIONS of the study in the Discussion. A separate paragraph is highly suggested.

Reply 11: Thank you for the suggestion. We have added a separate paragraph in the Discussion section discussing the limitations of the study. We have also amended the Conclusion to reflect the changes mentioned in the Discussion section.

Changes in the text: See Page 17-18, Line 347-354 and Page 18-19, Line 369-373 (Final Showing Markup)

Comment 12: According to Author Instruction (https://cdn.amegroups.cn/static/public/2.5-Structure%20of%20Case%20Reports-template-V 2022.11.4.docx), please kindly provide the "Highlight Box", including key findings, what is known and what is new? what is the implication, and what should change now?

Reply 12: Thank you for the comment. We have added a Highlight Box as suggested.

Changes in the text: See Page 4, Line 56-57 (Final Showing Markup)

Comment 13: It's very good that the author provided almost seven minutes of the surgery video and provided a text description of the video. But because many surgical videos are distributed independently of the article, the viewers may be hindered in their understanding without seeing the video text description. So we strongly recommend the authors add English audio descriptions or captions in the video.

Reply 13: Thank you for the suggestion. We have added English captions in the video and will upload a new version of the video.

Changes in the text: New video will be re-uploaded.