

Peer Review File

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Reviewer A

Comment 1: Although they mentioned that the patient urged surgery, this size of ground-glass opacity lesion is not considered an indication for removal recently. The authors must present their indication of segmentectomy for NSCLS.

Reply 1: Revisions have been made on page 5, highlighted in red.

The location of this GGO is deep, we can't guarantee that wedge resection can completely resected it, so we chose segmentectomy. We share this opinion, for 8 mm GGO, to do a high difficulty, large range segment resection and mediastinal lymph node sampling, there is a lack of surgical indications. According to the National Comprehensive Cancer Network guidelines, the indication for sublobar resection is a peripheral nodule sized <2 cm with at least one of the following: pathological type is adenocarcinoma *in situ* (AIS), nodule with 50% GGO on CT, or radiological surveillance confirming a long doubling time (>400 days).

Comment 2: The video is instructive, however, they denuded most of all of the hilar bronchovascular structures, and it will cause the dense adhesions which must disturb the second operation in the future. They wrote that “unnecessary explore during the operation could be avoided” as an advantage of preoperative three-dimensional reconstruction in the comment. I think they excessively explored the hilar structures, and there is an inconsistency. The occurrence of metachronous lung cancer is increasing, and unnecessary denuding should be avoided. The authors should comment on this issue.

Reply 2: This issue has been discussed in the Comments section on page 11, highlighted in red.

If the lesion is more peripheral, we will choose wedge resection, which is less invasive and has the same effect. However, the location of this lesion is relatively deep. We were worried that wedge resection could not completely remove the lesion, so we chose segmentectomy. The surgery was initiated through an inferior pulmonary ligament approach. we dissected most of all of the hilar vein structures, the inferior pulmonary vein was separated and distended to the distal branches until the branches of the basilar veins were seen, this is necessary. Corresponding to the three-dimensional image, determine the name of each vein branch. Then confirm and transected V9+10 with intersegmental veins V8b and V6c preserved. But we do not dissect most of all of the hilar artery and bronchus structures. we resected the lymph node of stations 13, the basal segmental bronchus was clear. Corresponding to the three-dimensional image, determine the name of each bronchial branch. Then confirm and transected B9+10. After the bronchial branch is severed, the artery A9+10 can be seen, we do not dissect the hilar other artery structures. We can verify it with three-dimensional images. At the same level of the severed bronchus, the artery A9 + 10 was cut off. The intersegmental veins preserved. Unnecessary explore about artery and bronchus structures during the operation could be avoided.

Comment 3: The volume of S9+10 seems to be quite large when we take account this smaller size of GGO. Didn't they consider the lesser extent of resection such as S9 and S10b?

Reply 3: I share the opinion of reviewer A, a lesser extent of resection such as S9 and S10b may be a better choice, the requirements for surgical techniques are also higher, the operation time may also be longer, we'll try it next time.

Comment 4: The need for surgical margin larger than 2cm is usually applied for the solid or subsolid type of tumors less than 2cm. There are various sizes of indeterminate nodules when we consider the removal of the lung tumor. Do they think this margin larger than 2cm is necessary to make resect the GGO of 8 mm in size?

Reply 4: The margin larger than 2 cm maybe a little bit more, for the GGO of 8 mm in size. We are also aware of this problem and need to be further improved in future work.

Comment 5: The description of operative technique seems to be redundant. Please make it more concise.

Reply 5: The description of surgical techniques has been simplified. We have modified our text as advised (see Page 7, line 6-21)"].

Comment 6: Minor things: There are several mistyping, as follows: Segmentectomyis, Preoperativeplanning, thoracoscopicsegmentectomy, because them are commonly variable, etc.

Reply 6: The spelling mistakes have been corrected. (see Page 3, line 16; see Page 5, line 8; see Page 6, line 17).

Reviewer B

Comment 1: Concerning 3D reconstructions: I share their opinion that a 3D reconstruction seems to me indispensable before attempting to perform a segmentectomy of the lower lobe even more in the situation described by the authors where the absence of extensive dissection of the fissure and the pulmonary artery does not allow for a precise study of the anatomy. The anatomical variations are such that almost every patient is an anatomical variation in itself. The CT study by the surgeon himself can

be long and complex and the surgeon must be assisted either by his radiologist or by reconstructions carried out by companies specializing in such work.

Reply 1: I share the opinion of reviewer B, Based on our findings, we believe that three-dimensional interactive quantitative surgical planning facilitates safe and efficient video-assisted thoracoscopic surgery anatomic segmentectomy with a learning curve of 30 cases. Such planning for video-assisted thoracoscopic surgery anatomic segmentectomy is a feasible option for inexperienced surgeons with acceptable safety and complications. If the surgeon assisted by his radiologist or third party, it might be easier.

Comment 2: Concerning the surgical technique itself: The triangular ligament approach is interesting and is well described in the article

How do the authors justify the need to make two utility incisions: one for the operator and one for the assistant? Do the authors not use trocars?

These incisions may explain why some instruments in the videos seem unsuitable in size for the fine dissection they have to perform: they are probably conventional instruments? Could the authors clarify this? Can they also justify this attitude as a technique that is not exclusively thoracoscopic? Have they sought to equip themselves with dedicated instrumentation for thoracoscopic surgery by thoracoscopy?

Reply 2: Making two incisions is the surgeon's operation habits. In order to use the surgical instruments more conveniently, both incisions are used by the chief surgeon, one for left hand and one for right hand, we used a trocar at thoracoscope port. We equip ourselves with dedicated instrumentation for thoracoscopic surgery by thoracoscopy, which may not be perfect.

Comment 3: I also wonder about the lack of opening of the fissure, which does not allow for extemporaneous analysis of stations 11 and 10: as yet known positive lymph nodes requires conversion to lobectomy, as the authors have pointed out very well when analyzing "regional" lymph nodes in the approach they describe. It is probable that these are deeper stations in the parenchyma. No analysis of these lymph node inside the fissure may compromise the oncological nature of the resection and, above all, does not follow the standards where intersegmental, segmental, hilar and mediastinal lymph node dissection is necessary in the context of resection for non-small cell lung cancer.

Reply 3: The probability of metastasis in 8mm GGO is almost zero. This GGN with no change during long term follow-up, the frozen section is MIA during the surgery. Regional lymph nodes (stations 7, 9, 13) were resected for intraoperative frozen section pathological examination, there was no lymph node metastasis. The lymph node sampling of stations 11 and 10 are not necessary, which will increase the trauma and risk of complications.

Comment 4: Concerning the delimitation of the intersegment plan: Have the authors experienced any failures of the insufflation/deflation method? What is their experience with systemic indocyanine green injection for delineation of the intersegmental plane?

Concerning the intersegmental plane severing: Can the authors provide additional information on how to staple the parenchyma which often proves difficult during these complex pyramidal resections?

Reply 4: The insufflation/deflation method is precise, simple, easy to operate, and does not require additional auxiliary materials, widely used as a standard technology in clinical practice. However, it is not easy to visualize the demonstration of the intersegmental plane in pulmonary emphysema, and the inflated lung may obstruct the view of the target segment. We have failed before. We have less

experience with systemic indocyanine green injection for delineation of the intersegmental plane. ICG at 2 mL (25 mg dissolved in 10 mL saline, equivalent to 5 mg/bodyweight), was rapidly injected into the peripheral vein, and the demarcation was also visualized using NIR fluorescence thoracoscopy, approximately 10 seconds later, the surrounding segments were stained, but not the targeted segment so that a distinct boundary between the two areas was clearly identified. The intersegmental plane was tailored along the intersegmental pulmonary veins up to the outer third of the lung parenchyma using an electrocautery or ultrasonic scalpel, and the distal intersegmental parenchyma was dissected with stapling devices to reduce air leakage. The use of a stapler for cutting the intersegmental plane does not affect the expansion of the residual lung and does not cause atelectasis.

Comment 5: How is the volume of the resection calculated on the dynamic reconstruction? Which software is used to assign one volume more than another to the segment to be resected?

Reply 5: The patient underwent preoperative chest thin-slice CT with a slice thickness of 0.625mm. Then, the data was transferred to a personal computer and converted to a 3D format by 3D reconstruction software (Mimics Medical). The 3D reconstruction software (Mimics Medical) with this function that resection calculated the volume on the dynamic reconstruction.

Comment 6: Have the authors ever had a non-localized nodule in the resected segment despite pre-operative planning as described in the literature?

Reply 6: Preoperative identification of individualized segmental bronchi and vessels is essential for safe and efficient thoracoscopic anatomic segmentectomy. Every patient had a preoperative plan. On 3D reconstructed images, the segment in which the tiny pulmonary nodule was located can be

effectively determined according to the positional relationship between the nodule and the bronchi and vessels. A safe, spherical margin was virtualized using thin-slice CT to reconstruct the pulmonary nodule. A safe resection margin was defined as a sphere extending 2 cm outside the primary tumor. The lung tissue involved in the safe resection margin was considered the target segment, and the corresponding segmentectomies were performed accordingly. The anatomic relationship between the nodule and adjacent structures was determined to design an appropriate surgical excision. According to each specific situation, we selected the most reasonable operation type and planned the surgical path.

Reviewer C

Comment 1 At present, the detection rate of ground glass nodules is increasing. The surgical indications of ground glass nodule are still controversial. The surgical indications of this patient should be stated in the article;

Reply 1: This patient has been followed up for 13 months, CT imaging defined an 8-mm solitary GGO nodule at the basal segments of the right lower lobe, with its density increasing over several months, MIA is more likely. We have modified our text as advised (see Page 5, line 3-5)"]. According to the National Comprehensive Cancer Network guidelines, the indication for sublobar resection is a peripheral nodule sized<2 cm with at least one of the following: pathological type is adenocarcinoma *in situ* (AIS), nodule with 50% GGO on CT, or radiological surveillance confirming a long doubling time (>400 days).

Comment 2 S9+10 resection can be approached from the interlobular fissure or the inferior lung ligament. The author of this article chose the inferior lung ligament approach. The advantages and disadvantages comparing the other approach and the choosing reason of this approach should be listed.

Reply 2: Three kinds of methods have been introduced to perform segmentectomy for S9+10. One method is to make a tunnel between S6 and basal segments first to expose the segmental hilum. However, aside from concerns regarding possible torsion of S6 after complete separation, tunneling itself is itself a technically demanding procedure. Another method is to track the intersegmental plane following the inferior pulmonary ligament, which is considered a landmark for intersegmental division. The third method is the “bidirectional approach”, which regards the belonging pulmonary artery as the primary landmark.

Changes in the text: The pulmonary artery is identified at the junction of the oblique and the transverse fissure. When the fissure is incomplete or inflammatory, this step can be tedious. Opening the fissure can lead to pulmonary tears and troublesome oozing. We prefer inferior the lung ligament approach. This method allowed segmentectomy of S9+10 performed without need to dissect the fissures and separate the S6 entirely.

We have modified our text as advised (see Page 6, line 17-22 see Page 7, line 1-5)"].

Comment 3 The probability of metastasis in 8mm GGO is almost zero. Is it necessary to perform PETCT before surgery?

Reply 3: I share the opinion of reviewer C, the probability of metastasis in 8mm GGO is almost zero. It is not necessary to perform PETCT before surgery, but the patient asked for this examination, she was anxious and wanted to have a general examination.

Comment 4 The postoperative chest radiograph is described in the article, of which photos should be provided.

Reply 4: The postoperative chest radiograph has been provided in the video.

Reviewer D

Comment 1: I wonder if the lymph node sampling of stations 7 is necessary when the frozen section is MIA during the surgery, which will increase the trauma and risk of complications.

Reply 1: If the frozen section is MIA during the surgery, the lymph node sampling of stations 7 is not necessary. The lymph node probability of metastasis in 8mm GGO is almost zero, the indications are insufficient.

Comment 2: I also wonder which one will the authors choose if the frozen section is lepidic predominant adenocarcinoma, lobectomy or segmentectomy?

Reply 2: If the frozen section is lepidic predominant adenocarcinoma, we choose segmentectomy. According to the National Comprehensive Cancer Network guidelines, the indication for sublobar resection is a peripheral nodule sized <2 cm with at least one of the following: pathological type is adenocarcinoma *in situ* (AIS), nodule with 50% GGO on CT, or radiological surveillance confirming a long doubling time (>400 days)

Comment 3: In addition, can the authors provide additional methods on how to determine the intersegmental plane and experiences of stapling the parenchyma during these complex pyramidal resections?

Reply 3: There are some techniques that to find the intersegmental plane of the lung, such as selective resected segmental inflation, intravenous indocyanine green injection ,endobronchial dye injection, We

have tried all these methods, and we prefer the method of inflation-deflation was used to show the intersegmental demarcation line. The intersegmental pulmonary parenchyma was further dissected along the intersegmental veins using energy devices. Then the intersegmental planes were tailored using stapler step-by-step. The use of a stapler for cutting the intersegmental plane does not affect the expansion of the residual lung and does not cause atelectasis.