Peer review file

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Reviewer A

Comment 1: How was this novel catheter inserted? Was it percutaneously inserted through an epidural needle? In that case, what is the epidural needle size?

Reply 1: Thank you for your comments. In the MPVB group, a 22-gauge Tuohy needle was advanced perpendicularly through the chest wall until the needle tip was visible, then the modified paravertebral catheter was passed through the needle into the paravertebral space.

Changes in the text: see Page 5, line 135-142.

Comment 2: As a novel catheter, readers may be interested in the characteristics of the new catheter. For example, it's texture, length, the distances between the side hole and the tip, etc. It could be supplemented in the legend of figure 1.

Reply 2: Thank you for your suggestions. We have modified our text as advised and supplemented more information in the legend of figure 1.

Changes in the text: see Page 5, line 142-144; Page 13, line 359-361; and new figure 1.

Comment 3: As a retrospective study, were there any confounders that may bias the results?

Reply 3: Thank you for your comment. In order to minimize selection bias, we retrospectively reviewed the database of consecutive 356 patients who underwent VATS lobectomy and extended lymphadenectomy with PVB by a single surgical team (Dr. Y. S) from July 2015 to December 2018 at our department. Both groups had the same management and patient selection protocols.

Changes in the text: see Page 4, line 99-102 and 112.

Reviewer B

Comment 1: The title: PVB with a modified catheter by thoracoscopic insertion but not a modified paravertebral block. I mean it is not a modified technique of PVB.

Reply 1: Thank you for your suggestion. We have revised the title.

Changes in the text: see Page 1, line 1-2.

Comment 2: The main results of applying the modified catheter (Fullcare, Beijing, China) instead of conventional catheter were:
1. With significantly less pleural perforation
2. Presenting significantly lower VAS in postoperative 24 hours for rest and cough, postoperative 12 hours for cough
3. With comparably low incidence of complications, comparable surgical outcomes

Reply 2: Thank you for the summary. The main results were as described above.

Comment 3: However, according lack of description, MPVB is associated with a significantly higher "Utilization of analgesia" in table 2, and fewer rescue drugs. Was the postoperative analgesia set with a continuous infusion at 2 mL/h or adding patient-controlled model? As more drugs may associated with lower VAS, it is crucial to elucidate before you start your prospective investigation.

Reply 3: Thank you for your suggestions. We did not add patient-controlled model to the modified catheter in this study, and we supposed that the patient-controlled analgesia device could be added to the modified catheter in our further investigation. As the pump designed in this study, the infusion rate of mixture into the paravertebral space could be approximately 2ml/h if the channel was absolutely unobstructed. The larger consumption of mixture in the pump of MPVB group might show a better infusion of drags through the modified catheter.

Changes in the text: see Page 6, line 154-156; Page 10, line 270-272; Page 10, line 288-294.

Reviewer C

Comment 1: Abstract: Introduction: should state the aim of study. It's unclear about modified paravertebral block technique or modified paravertebral catheter that the

study wants to show in this part.

Reply 1: We have revised our text as advised.

Changes in the text: see Page 2, line 31-33.

Comment 2: Abstract: Methods: state postoperative pain management protocol and main parameters need to monitor in the study. Include value of VAS, rescue medication, complications.

Reply 2: Thank you for your suggestions. The value of VAS, rescue medication and complications were included in the methods section.

Changes in the text: see Page 2, line 38-45.

Comment 3: Abstract: Conclusion need to follow up the aim of the study.

Reply 3: Thank you for your useful suggestion. The aim of the study was added in the conclusion part.

Changes in the text: see Page 3, line 58-59.

Comment 4: Method: Double lumen tube was replaced by single lumen tube after surgery or not. And whether any patient need to ventilate over 2 hours after surgery?

Reply 4: Thank you for your comments. The double lumen tube was replaced by single lumen tube after surgery. All of the patients included in this study revived during the first two hours after surgery and their VAS scores at 2h postoperatively were all recorded.

Changes in the text: see Page 6, line 158-159.

Comment 5: State clearer postoperative pain management. The initial dose of anesthetic solution. It seems not effective pain relief if no initial volume was injected into paravertebral space.

Reply 5: Thank you for your suggestions. Initial volume was injected into paravertebral space after lobectomy. The initial dose of anesthetic solution was added in the revision.

Changes in the text: see Page 6, line 149-154.

Comment 6: Ropivacaine, bupivacaine and lidocaine are not analgesic drugs.

Reply 6: Thank you for your suggestion. We have modified our text as advised.

Changes in the text: see Page 6, line 152-154.

Comment 7: Too simple to assess pain management effect by only VAS score.

Reply 7: We have modified our text as advised. The effect of postoperative pain management includes VAS scores at the 2nd, 6th, 12th, 24th and 48th postoperative hours (at the state of rest/coughing) and the number of patients who required rescue medication before removing the pump. Moreover, respiratory function and adverse events related to the analgesia could also reflect the pain management effect to a certain degree.

Changes in the text: see Page 6, line 171-174.

Comment 8: Does the number of dermatome sensory inhibitor affect the postoperative analgesia?

Reply 8: Giang NT et al. demonstrated that the more the number of dermatome inhibition they had, the more analgesia efficacy it increases (Giang NT, Van Nam N, Trung NN, et al. Patient-controlled paravertebral analgesia for video-assisted thoracoscopic surgery lobectomy. Local Reg Anesth 2018;11:115-21). We have modified our text as advised.

Changes in the text: see Page 10, line 280-281.

Comment 9: Spirometry values and blood gas analysis were not mentioned to show effectiveness of MPVB.

Reply 9: The spirometry values (FVC and FEV1) and blood gas analysis (pH, $PaCO_2$ and PaO_2) were all routinely recorded in our daily clinical work and we intended to share these results in another report which particularly analyzed the respiratory function of patients applied PVB with modified catheter. Now we have added these data in this text.

Changes in the text: see Page 6, line 174-175; Page 8, line 208-210; Table 2; Table 3.

Comment 10: Conclusion: Should focus on what is mentioned in objectives.

Reply 10: We have modified our text as advised.

Changes in the text: see Page 11, line 324-329.

Comment 11: Discussion: Should not focus on pleural disruption due to the tip of catheter: line 26-27. It caused mostly by needle.

Reply 11: We have modified our text as advised. The headend of the needle was so sharp that may disrupt the pleural easily. However, in this study, we could observe the headend of the needle arrive at the space beneath the pleura, which could decrease the risk of pleural disruption. Besides, after injection of 20-ml saline created an extrapleural detachment pocket, the catheterization of conventional epidural catheter could also disrupt the pleural because its tip was rigid. With the application of modified catheter, the incidence of pleural perforation was lower than before.

Changes in the text: See Page 9, line 261-265.

Comment 12: Is there any related respiratory complications and other major complications to MPVB?

Reply 12: We have modified our text as advised. No patients in the MPVB group suffered respiratory depression. Pneumonia and atelectasis occurred in 9(4.9%) and 6(3.3%) patients in the MPVB group, and the incidence rate were both comparable with those in the PVB group.

Changes in the text: see Page 8, line 211-215.

Reviewer D

Comment 1: How do they choose MPVB group and PVB group? From Table 1 and 2, MPVB group have a tendency of shorter operative time, shorter ICU stay, shorter chest tube insertion, more amount of analgesia, although they are not significant differences.

Reply 1: We have modified our text as advised. Before March 2017, PVB was

conducted with the conventional epidural catheter at our department. After that, the modified paravertebral catheter was applied in PVB for patients undergoing VATS lobectomy.

Changes in the text: see Page 4, line 108-112.

Comment 2: How do they choose multi-portal VATS and uniportal VATS? Moreover, how do they choose VATS instead of thoracotomy?

Reply 2: We have modified our text as advised. All patients were evaluated suitable for VATS preoperatively and no intraoperative conversion to open thoracotomy was happened in these 356 patients of this study. Uniportal VATS was tried to accomplish all of the operation first. If there was severe adhesion in the chest cavity or the operation from one port was hard, multi ports would be added to assist in completing the operation.

Changes in the text: see Page 4, line 113-115; line 102-104.

Comment 3: From VAS score, it seems almost the same in MPVB group and PVB group. On the other hand, less complication should be more focused in this manuscript. From this point of view, discussion seems too redundant. I would recommend the authors to shorten the manuscript.

Reply 3: We have modified our text as advised. Significant lower pain score was found in MPVB group than that in PVB group at 24h postoperatively (P=0.006). Besides, the pain scores on coughing in MPVB group were significantly lower than that in PVB group at 12h and 24h postoperatively (P=0.037 and P<0.001, respectively). There was no significant difference of VAS score between the two groups at other points. Moreover, the discussion of this manuscript has been simplified as recommended.

Changes in the text: see Page 7, line 201-205 and the discussion.

Comment 4: Authors said this study was approved by institutional ethics committee, but they should clarify the number of the approval.

Reply 4: We have added the number of the approval.

Changes in the text: see Page 4, line 117.

Editorial Comments:

Reply to comment 1: We have revised our manuscript according to the attached "The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement", guidelines for reporting observational studies. Besides, we have also filled in the STROBE checklist and would send back as an additional file.

Reply to comment 2: We have checked our manuscript according to the Submission Checklist for Authors point by point and revised our manuscript.

Reply to comment 3: We have filled in the checklist of Data Sharing Statement and would send back as an additional file.

Reply to comment 4: The wordings of the main text and/or figures/tables had been checked by an expert who is majoring in this field.

Reply to comment 5: The length of the abstract was 339 words.