Reviewer’s report

Title: Effect of individualized PEEP titration guided by intratidal compliance profile analysis on regional ventilation assessed by electrical impedance tomography – a randomized controlled trial

Version: 0 Date: 03 Sep 2019

Reviewer: Gaetano Scaramuzzo

Reviewer's report:

Dear editor,

Weber et al. conducted a randomized controlled trial in adult ASA I/II/III patients undergoing otorhinolaryngeal surgery to assess if a personalized PEEP titration method based on the intratidal dynamic compliance analysis could perform better compared to a standard of care ventilation strategy. Despite the physiological background is appealing, I have several concerns about the methodological aspects of the trial. The main outcome of the study, in fact, is not clearly stated in the methods and the consequent sample size calculation is weak. Moreover, the discussion and the conclusions of the manuscript are poorly supported by the results. Finally, it is not clear why the author decided to use the EIT average value to evaluate the regional ventilation distribution instead of more commonly used and recognized parameters (center of ventilation, regional compliance, non-dependent/dependent tidal distribution ratio). For these reasons, I cannot endorse the publication of the paper in its current form. I hereby attach my specific comments hoping to be of any help.

MAJOR COMMENTS:

* Abstract
  o Page2, line 28: primary endpoint. It is not clear which parameter was used by the authors as primary endpoint.
  o Add p values
  o The conclusions are not in line with the results. Please revise your text on the light of your data.

* Background
Page 5, line 16: please reformulate your hypothesis specifying better the primary outcome of your study. Mention that this is an RCT and which is your control group ("compared to a non-personalized PEEP ventilation technique", for example).

Page 5 line 21: regional ventilation is too generic. Specific how you measured it (EIT-derived regional ventilation?).

* Methods

Page 6, line 60. You performed a totally intravenous anesthesia. Which EEG monitoring technique did you use? Which was your target and was it comparable between the two groups?

Page 7, line 28. I understand that PEEP was adjusted dynamically according to the intratidal compliance analysis, but there is no mention on how often this process was undertaken. Was a breath-by-breath analysis? How stable was the signal between breaths? Was PEEP changed as soon as the first breath showed a variation of the intratidal shape? Moreover, it would be interesting to know in the result section how often PEEP was adjusted in the control group PEEP during anesthesia.

Page 8 line 37. What is mean electrical impedance and how mathematically was it calculated? Reference? Do you have any data on regional compliance? Please specify better what do you mean with "equal large ventral and dorsal lung area".

Page 8 line 48. It is not clear which parameter did you use as primary outcome of the study and to calculate the sample size (see next point).

Page 9, line 4. Sample size calculation is not well explained. It is not clear which parameter was used as primary outcome and therefore to calculate the sample size.

* Discussion

Page 11, line 13. The discussion is not in line with your results. The ventilation distribution was not different between groups so the authors cannot affirm that it was improved in the gliding-SLICE group.

Page 11 line 40 "less frequent that we expected". Please provide some data about the frequency of PEEP adjustment in the control group.

Page 11, line 40: "it follows… obesity". This sentence is speculative. Please reformulate.
Improvement of regional ventilation was not shown by the results. Ventilation distribution is in fact not different between groups. If you refer to EIT mean value, it can be modified by several variables like the overall fluid balance (it is not mentioned in the methods if fluid intake was liberal or not, if urinary output was comparable between the two and if the overall fluid balance was different between the groups. Becher, 2019, AJRCCM). Please comment and eventually reformulate to support your data.

Atelectasis is not the only problem of oxygenation impairment during general anesthesia. Please discuss this point on the light of recent evidences (Hedenstierna et al, Anesthesiology 2019, doi:10.1097/ALN.0000000000002693).

In this paragraph there is only a small review of the literature but no comment on your results. Please discuss your EIT results.

The limitation section is incomplete. EIT analysis showed limited results and a mention to the choice of using only EIT mean and regional tidal distribution should be done.

The conclusions are not in line with your results. Please reformulate accordingly. Specifically, regional ventilation distribution was not improved in the interventional group based on the data presented by the authors.

MINOR COMMENTS:

Why recruitment/derecruitment? If compliance rises, it suggests recruitment and not derecruitment.

"was performed in 12 patients". Please add the %.

The list misses of some recently introduced parameters. Please discuss also Zhao et al. (BMC research notes, 2014) and Scaramuzzo et al. (Critical Care, 2019).

Table 2: when were these data collected? End of surgery? Please specify. Moreover, the level of FiO2 was quite high (about 60%). How was it set during surgery?

Figure 3: Why in the figure the time reaches 40 minutes while the average duration of anesthesia was about 80 minutes? Please comment.

Figure 4: it would be interesting to compare the ratio between non-dependent and dependent impedance (Frerichs et al, Thorax, 2016) more than the absolute regional ventilation.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

No

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review

Quality of written English
Please indicate the quality of language in the manuscript:

Needs some language corrections before being published

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