Author’s response to reviews

Title: Flow-controlled ventilation (FCV) improves regional ventilation in obese patients – a randomized controlled crossover trial

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Author’s response to reviews:

Flow-controlled ventilation (FCV) improves regional ventilation in obese patients – a randomized controlled crossover trial

Jonas Weber, MD; Leonie Straka; Silke Borgmann, MD; Johannes Schmidt, MD; Steffen Wirth, MD; Stefan Schumann, Prof., Ph.D.
BMC Anesthesiology

Dear Dr. Weber,

Your manuscript "Flow-controlled ventilation (FCV) improves regional ventilation in obese patients – a randomized controlled crossover trial" (BANE-D-19-00437) has been assessed by our reviewers. They have raised a number of points which we believe would improve the manuscript and may allow a revised version to be published in BMC Anesthesiology.

Their reports, together with any other comments, are below. Please also take a moment to check our website at https://www.editorialmanager.com/bane/ for any additional comments that were saved as attachments.

If you are able to fully address these points, we would encourage you to submit a revised manuscript to BMC Anesthesiology.
Once you have made the necessary corrections, please submit online at:

https://www.editorialmanager.com/bane/
If you have forgotten your password, please use the 'Send Login Details' link on the login page at https://www.editorialmanager.com/bane/. For security reasons, your password will be reset.

Please include a cover letter with a point-by-point response to the comments, describing any additional experiments that were carried out and including a detailed rebuttal of any criticisms or requested revisions that you disagreed with. Please also ensure that all changes to the manuscript are indicated in the text by highlighting or using track changes.

Please also ensure that your revised manuscript conforms to the journal style, which can be found at the Submission Guidelines on the journal homepage.

A decision will be made once we have received your revised manuscript, which we expect by 21 Nov 2019.

Please note that you will not be able to add, remove, or change the order of authors once the editor has accepted your manuscript for publication. Any proposed changes to the authorship must be requested during peer-review, and adhere to our criteria for authorship as outlined in BioMed Central's policies. To request a change in authorship, please download the 'Request for change in authorship form' which can be found here - http://www.biomedcentral.com/about/editorialpolicies#authorship. Please note that incomplete forms will be rejected. Your request will be taken into consideration by the editor, and you will be advised whether any changes will be permitted. Please be aware that we may investigate, or ask your institute to investigate, any unauthorized attempts to change authorship or discrepancies in authorship between the submitted and revised versions of your manuscript.

I look forward to receiving your revised manuscript and please do not hesitate to contact us if you have any questions.

Best wishes,

Domenico Luca Grieco
BMC Anesthesiology
https://bmcanesthesiol.biomedcentral.com/

Dear Dr. Grieco,

We would like to thank you and the Reviewers very much for the time and effort spent in reviewing our manuscript and for the very constructive and helpful comments and criticisms.

We have made any effort in revising our manuscript along the Reviewers’ suggestions and concerns and we feel that the manuscript has clearly improved. In the following we will respond point-by-point to the individual Reviewers’ comments and refer to the respective changes made in the revised manuscript. To obtain a better overview within the revision process, we have numbered the Reviewers’ comments.

We hope that the revised manuscript will be acceptable for publication in BMC Anesthesiology.
Sincerely,

Jonas Weber

Lucia Mirabella (Reviewer 1): The authors presented an interesting article on the effectiveness of FVC in improving lung ventilation in obese patients, although some corrections and clarifications should be made:

Abstract:

1. line 33, there is an error, the sentence ends with and

Reply: We excuse for the mistake and corrected the sentence in the abstract in the revised version of the manuscript.

2. results and conclusions of the abstract should be rewritten based on the changes required in the text

Reply: We corrected the results and conclusions section according to the following corrections in the revised version of the manuscript.

Background:

3. In the hypothesis of the stud, the authors speaks of alveolar recruitment which however cannot be demonstrated without oxygenation data, it would be better to express on distribution of the lung ventilation.

Reply: We thank the author for this important comment and corrected the background section in the revised version of the manuscript (pg. 4 line 15).

Methods:

4. Sample size calculation should be moved in the study design and patient population

Reply: We agree with the Reviewer that the “Sample size calculation and statistical analysis” part should be moved and shifted it to the “Study design and patient population” in the revised version of the manuscript.

Procedure

5. Is the value of the fixed peep decided on an internal protocol? Based on what? Please specify

Reply: We apologize for not having stated that a PEEP of 9 cmH2O was given by the protocol, which is in accordance to our clinical routine in obese patients. We address this in the revised version of the manuscript (pg. 6 line 25 to pg. 7 line 1).
6. Data on the type of surgical interventions are lacking, speaking of distribution of ventilation, of obese patients it is very different if the interventions are performed in open or with laparoscopic surgery.

Reply: We thank the Reviewer for this comment. Patients were scheduled for operations on the upper gastrointestinal tract, usually gastric banding and gastric bypass operations. However, to avoid irritations due to the surgical procedure (e.g. impaired respiratory mechanics by the capnoperitoneum and electrical irritations of the measurement of Electrical Impedance Tomography), our study was performed prior to the surgical intervention. Therefore, we feel that this information is not relevant for the study and omitted respective changes in the manuscript (pg. 7 line 3 to line 6).

7. Specify better how the EELV measurement was obtained and reduce the technical part on the tritube (lines 18-28 on page 7)

Reply: We apologize for not having specified the EELV measurements clearly enough and added this information to the revised version of the manuscript (pg. 8 line 9 to line 15). Further, we have deleted the technical information on the tritube and adapted the subheading of this paragraph accordingly.

8. The authors talk about compliance of the respiratory system, is it a static or dynamic compliance?

Reply: We calculated the quasi-static respiratory system compliance (CRS) by using the measured tracheal plateau pressure during FCV and calculated tracheal plateau pressure during VCV. This information was added to the revised version of the manuscript (pg. 8 line 18 to 20).

9. The Evone does not have an inspiratory lock button so when referring to Pplat how was it measured?

Reply: The Evone ventilator uses a short lasting (approx. 0.1 seconds) inspiratory hold procedure with no inspiratory/expiratory flow to evaluate plateau pressure. This procedure is repeated with every 10th breath, automatically. This information was added to the revised version of the manuscript (pg. 8 line 18 to 20).

Results:

10. The results do not include data on oxygenation, not even saturation, of ETCO2 despite being monitored

Reply: We agree with the Reviewer that oxygen saturation should be stated and included this information in the results section in Table 2. As we experienced technical problems with the capnometry during the FCV phases we did not include etCO2 data to the manuscript.

11. In tab 2 it would be better to use conventional and universally accepted acronyms, Respiratory Rate (RR) better than VF and Systolic pressure, Diastolic pressure better than RRsyst or RR dias should be confusing

Reply: The suggested corrections were implemented in the revised version of the manuscript.
12. In figure 1 the dotted line covers the curves so it would be indicated to use arrows to make everything clearer

Reply: We feel that the Reviewer meant Figure 2. We corrected Figure 2 according to the suggestions of the Reviewer.

13. Fig.2 indicate the three graphs with lower case letters, in the first and second graphs also add the basal values as statistically they have been compared and reported as results

Reply: We added lower case letters for indicating the three graphs in figure 2. The first graph and the second graph show differences between VCV and baseline and FCV and baseline, respectively. Therefore showing such barplots for baseline data is not possible (would be baseline - baseline).

Discussion:

14. It is more correct to speak of less reduction of EELV and MLV and not of increase (lines 9-12 on page 11)

Reply: We agree with the Reviewer and corrected the discussion section in the revised version of the manuscript (pg. 11 line 3 to 4).

Alberto Fogagnolo (Reviewer 2): The author conducted a study focused on flow controlled ventilation in obese patients. The topic is of interest and the conclusions supported by results. I have some comments for authors

1. The role of expiratory flow limitation must be discussed, as an issue of absolute value in this context (please see and discuss Spadaro et al, anesthesia analg). Could the ventilation mode influence this variable? Was the presence of efl investigated?

Reply: EFL was not to expect from obese patients without COPD. Furthermore, intrinsic PEEP is nearly excluded during FCV as the end-expiratory pressure is controlled on the base of tracheal pressure measurement. This is stated in the discussion section in the revised version of the manuscript (pg. 11 line 17 to 20).

2. How was static compliance evaluated? I do not know if the ventilator used allow for inspiratory hold, please specify

Reply: As already stated above, the Evone ventilator uses a short lasting (approx. 0.1 seconds) inspiratory hold procedure with no inspiratory/expiratory flow to evaluate plateau pressure with every 10th breath. With regard to this comment, we kindly refer our reply on comment # 9 of Reviewer 1.

3. Please delete "The Evone ventilator is currently the only ventilator.. To enable FCV".

Reply: According to the Recommendations of the Reviewer, this sentence was deleted in the revised version of the manuscript.

4. The discussion must be implemented. It is not clear how an increased eelv does not lead to increased crs not less inhomogeneity. Were those values measured simultaneously?
Reply: In obese patients Crs is strongly reduced by the thorax compliance resulting from the high weight. EELV was determined from EIT data which were recorded simultaneously to the respiratory data. However, Crs data were determined from the respective ventilators. Earlier our groups could have demonstrated that, the intratidal recruitment state might differ (in our case with PEEP) without affecting Crs [Wirth et al., Acta Anaesthesiol Scand. 2016 Oct;60(9):1241-50. doi: 10.1111/aas.12767, Spaeth et al., Br J Anaesth. 2016 Jun;116(6):838-46. doi: 10.1093/bja/aew115]. This is further elaborated in the discussion section in the revised version of the manuscript (pg. 12 line 14 to 16).

5. Opening closing phenomena should also be reduced with less intratidal recruitment and better recruitment to inflation ratio. Should author provide some data regarding those argument?

Reply: The named effects concern rather patients with lung injury than lung healthy patients. Therefore, we feel that discussing the phenomena of opening and closing in lung healthy patients and recruitment to inflation ratio would be too speculative for this study since we have particularly no data on absolute FRC, which would have required indicator washout techniques. We have therefore decided to omit such discussion.

6. I understand that BGA analysis was not performed. Nonetheless, at least etco2 and spo2/fio2 ratio should be reported

Reply: We agree with the Reviewer that those values might be of interest for the reader. Therefore, spo2/fio2 ratios were added to Table 2 in the revised version of the manuscript. However, as stated already in our response to the first Reviewer, we experienced technical problems with etCO2 measurements during FCV and can therefore not give the requested data.