Reviewer's report

Title: Rationale and study design of PROVAR - A randomized controlled trial on the effects of variable versus conventional lung protective mechanical ventilation during open abdominal surgery

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Reviewer: Marcos Vidal Melo

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General comments:

I believe this will be a valuable trial to test an innovative mode of mechanical ventilation. The authors are well qualified to conduct and analyze the study. The design is adequate to test the hypothesis under study, with some additional questions presented below. There are some limitations in the text in terms of providing sufficient detail to allow for replication of the study. Points are asked in the Specific Comments. The planned statistical analysis is appropriate, and the writing is clear.

Specific comments:

Introduction:

Please, be more explicit on the findings related to variable ventilation that lead to the current trial. I would suggest to specifically mention the advantages brought about by variable ventilation that are expected to be beneficial in the current trial.

Methods:

Table 1:

Typo: “suspection”

Table 2:

Please, be more specific in the definition of normocapnia. What specific values are going to be used?

Are there pre-defined adjustments to FIO2, PEEP, recruitment maneuvers in the cases of hypoxemia?

If so, what are those?
“Mechanical ventilation is performed in all patients using an EVITA XL 4Lab respirator (Dräger Medical, Lübeck, Germany) remotely controlled by a personal computer to acquire real time ventilator signals and perform VV. Basic settings are summarized in Table 2.”

What are the MRI protocols to be used for lung imaging?

How is the protocol for ET imaging?

“Study dropouts”: what about the managing physicians (surgeon and anesthesiologist)? What is their say on study discontinuation?

Statistical Analysis:

Is any consideration going to be taken into account for multiple tests?

Discussion:

“the amount, but not the pattern, of respiratory variability is crucial for the success”: please, clarify.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

'I declare that I have no competing interests’