Author's response to reviews

Title: Lasting effects of short term non-invasive ventilation in the PACU on postoperative lung function in obese adults

Authors:

Martin Zoremba (zoremba@med.uni-marburg.de)
Gerald Kalmus (kalmus@med.uni-marburg.de)
Dominique Begemann (dominiquebegemann@gmx.net)
Leopold Eberhart (l.eberhart@web.de)
Norbert Zoremba (nzoremba@ukaachen.de)
Hinnerk Wulf (h.wulf@med.uni-marburg.de)
Frank Dette (dette@med.uni-marburg.de)

Version: 3 Date: 25 January 2011

Author's response to reviews: see over
Letter to the reviewers

Name of Corresponding Author: Dr. med. Martin Zoremba
Manuscript Title: "Lasting effects of short term non-invasive ventilation in the PACU on postoperative lung function in (morbidly) obese adults".

BMC Anaesthesiology
Co-Editor:
BMC-series Journals
BioMed Central
Floor 6, 236 Gray’s Inn Road
London, WC1X 8HL

The authors thank all reviewers for their careful review of our manuscript and for their helpful comments. We have changed the manuscript based on their comments and suggestions. In the following section, we describe the changes that were made in detail.

Reviewer 1:
1) We agree that it might be possible that overall difference may not be meaningful. This is partly reasoned by our study population only focusing on obese (healthy) adults. We do believe that overall difference is possibly greater in a population with a higher possibility large respiratory impairment (e.g. OSA or abdominal surgery). Our primary intention was to evaluate the impact of an early NIV initiation on lung function after general surgery. Moreover we wanted to reveal possible lasting effects. Overall NIV within an intensive care population and immediately post surgery have different underlying conditions. For this purpose we selected a population exhibiting only minimal interfering factors with our lung function measurements (e.g pain after abdominal surgery). This limitation now added in the manuscript.

2) Yes this is a limitation. At first we intended to take blood gas analyses at the pre-anaesthetic visit, but our local ethics committee refused to perform preoperative blood gas analysis. Thus solely postoperative blood gas analyses were allowed within the study protocol.

3) Yes we added this limitation within the manuscript. Anyhow the error of the pulse oximetry measurement might affect both study group thus our measured difference is possibly not based on overall precision variance of this measurement. Nevertheless we agree that not all data are necessary. Thus we illustrate lung function and blood gas measurements as figures (including MEF25-75 and AaDO2) as suggested.

4) Within the methods section we added a special idem “Postoperative Care”.

5) We added figures and deleted Table 3 as suggested.

6) Now added as a figure.

7) We changed accordingly to absolute values within the figures.

8/9/10) see above

Minor revisions:
TOF is now described in detail
Statistic analysis especially power calculation is now mainly based on arterial oxygen pressure. Additionally we added the testing of normal distribution within the statistics section.
Description for table #2: we added the annotation “values breathing room air….”
We limit overall parameters for table #2 as suggested.
References for pulse oximetry precision we added within the discussion section.
Reviewer 2:

We were very pleased that there is a great interest in our work and our manuscript was read very carefully. At first we want to give a summary of our workgroup. Since 2005 we included more than 1000 patients within our database including all relevant anesthetic parameters. Our primary objective is to give a broad survey of respiratory impairment within the immediate postoperative period. At first we focused on obese patients and minor surgery, because potential factors interfering with our measurements are minimized in minor elective surgery. And we learned a lot about respiratory impairment. We know that PORC is the major factor even if a TOF ratio of 0.9 is ensured. Eikermann reported that a residual neuromuscular block at a TOF ratio of 0.5-0.7 has an impact on pulmonary function. But this study was performed in young healthy patients only receiving NMBA. Within the perioperative setting patients suffer several influencing factors on respiratory function (e.g. premedication, opioids, pain, hypnotics and surgery) thus slight relaxation is more important than previously assumed. Moreover a further study of Eikermann proofed the upper airway collapse even at higher TOF ratio’s. Currently we evaluate these potentially influencing factors in a more detailed form using static and dynamic force measurements, lung function, pulse oximetry as well as mental tests and overall transmission times from the operating theater to the PACU. We do expect that this data may proof our theory. Anyhow our premise is a modest style, thus we don’t like to cite ourselves in a self-indulgent manner. But we agree that you are missing some links to our previous work. The only study which may be suitable is our physical therapy treatment study (Ethics committee #AZ 201/07), but with the addition that blood gas analyses were not performed in this study. Nevertheless this study is now added within the discussion section. The other studies are not definitely suitable as they were somewhat of topic. The study about intraoperative pressure support ventilation (Ethics committee #AZ 105/07) was performed in overweight patients, not in morbidly obese subjects. Moreover we use the laryngeal mask as the respective airway device avoiding NMBA. Within the current study (Ethics committee #AZ 70/08) we focus on obese and morbidly obese subjects after general anesthesia with tracheal intubation. The adjusted fraction of inspired oxygen can contribute to atelectasis but these changes of our study (Ethics committee # AZ 129/06) are very small and should not be overrated. In this regard both study groups received the same FiO2 during general anaesthesia, so we solely added a remark about know detrimental effects of a high fraction of inspired oxygen on lung function/atelectasis. Anyhow we do believe that PORC may be the main factor within the immediate postoperative period which is different from an intensive care setting. This difference is now highlighted within the discussion.

Changes according to the reviewer suggestions:
1.) This limitation added now.
2.) Further studies (Hedenstierna/Rothen) are now considered at the beginning of the discussion.
3.) Treatment of the control group was added as “General postoperative care”; see methods
4.) Added the passage “This effect cannot be reasoned by supplemental oxygen, as measurements were performed five minutes after discontinuation of NIV / supplemental oxygen” within the discussion.
5.) see above, text passage was changed to “Thus the inclusion criteria for prophylactic NIV in the immediate postoperative setting are still to define. Additionally, we do not know whether NIV is superior to CPAP alone. Furthermore we cannot draw any conclusion about clinical outcome or other gold standards like incidence of pneumonia during course. In this regard large scaled studies especially in a day case setting focussing on patients at risk for postoperative pulmonary complications (e.g. OSA) may produce important findings.”
6/7/10) see above
8.) As also suggested by reviewer #1, we changed to absolute values. Furthermore we added the calculated AaDO2. Nevertheless we agree that overall changes were possibly not clinical relevant. Thus we added the remark that in order to achieve an increased benefit of early postoperative NIV patient selection has to be focused in a more detailed way. Despite these limitations an early short term approach of NIV has lasting effect. This may be beneficial for patients who were at risk for pulmonary complications. Especially against the background that patients at risk are more frequently scheduled for day case surgery procedures.
9.) Our measurements were normally distributed, added within the statistics section. Age, BMI and surgery time were not normally distributed (see attached PDF file contains an extract of our statistic analysis). This difference may be responsible for a higher incidence of latent postoperative residual curarization (PORC) as previously described (see Debaene et al.). This possible influencing factor is now highlighted within the discussion.
“This lingering effect is more present after short time surgery procedures and was aggravated by an increased age [35/36]. Overall patient’s age and surgery time were not normally distributed within our study population, thus it seems feasible that this effect was present within the first two postoperative hours.”

Minor comments

1.) Abstract was shortened
2.) the focus on short term NIV was added
3.) we kept the statistics within the abstract as in our opinion this should be mentioned here.
4.) The results section was rewritten and blood gas analysis results were added.
5-7.) The introduction section was changed based on the reviewer comments.
8.) We shortened this passage and refer only to a previous study.
9.) We changed this sentence accordingly to:
“We excluded patients who had history of gastro-oesophageal reflux disease, hiatus hernia or emergency operation which were possibly scheduled for a rapid sequence induction. Additionally we excluded patients with suspected presence of difficult airway or possibly pre-existing lung impairment (pregnancy, asthma, severe renal dysfunction) as well as cardiac disease resulting in marked limitation of physical activity, corresponding to NYHA class>II, severe psychiatric disorders or difficulties in cooperating during measurements.”
10.) Fast track criteria are well defined within the manuscript “White PF, Song D. New criteria for fast-tracking after outpatient anesthesia: a comparison with the modified Aldrete’s scoring system. Anesth Analg. 1999 May;88(5):1069-72.” Reference #18
11.) Cuff pressure was adjusted by the respective anaesthetist using a Rüsch cuff pressure device (Now added within the methods section).
12.) Pain status was recorded using the VAS. Changed accordingly
13.) Changed within the methods section.
14.) Yes. The body position was all the same during PACU stay. The first mobilisation was performed within the first 6 postoperative hours but after PACU discharge.
15.) Changed and added to a General care section.
16.) Changed to “Basic data”
17.) Colour within the figures was removed. Overall figures were rearranged according to reviewer #1 suggestions.

Finally the authors hope that all necessary corrections are made according to the high quality standards of “BMC Anaesthesiology” and we are looking forward to receive your decision letter as soon as possible.

Sincerely

Dr. Martin Zoremba