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Is Not High-inspired Oxygen Fraction Really a Risk for Postoperative Pulmonary Complications in Obese Patients?

To the Editor:

In their randomized controlled trial that evaluated the effects of inspiratory oxygen fractions on surgical site infection and postoperative pulmonary complications in obese patients undergoing laparotomy, Staehr *et al.*¹ reported that administration of 80% oxygen compared with 30% oxygen during and for 2 h after surgery did not result in a significant difference in risk of postoperative pulmonary complications. It is generally believed that obese patients have a great respiratory vulnerability because of restricted pulmonary function. Also, respiratory consequences of general anesthesia, surgical incision, postoperative pain, and postoperative medication can add up to this preoperative susceptibility, and render obese patients at great risk of postoperative pulmonary complications.^{2,3} In this study, the authors should be applauded for trying to control most of the possible factors that can impact the postoperative pulmonary complications, such as patients' age, smoking history, body mass index, American Society of Anesthesiologists physical status, pulmonary and cardiovascular diseases, methods of anesthesia, type and duration of surgery, and estimated blood loss during surgery. Furthermore, the trial protocol emphasized an optimal perioperative care, especially for epidural analgesia and adequate temperature. However, to differentiate the impact of one factor on the postoperative pulmonary complications in the obese patients, all of the other factors have to be standardized in study design. In our view, three important factors in this study seemed not to be well addressed: proportion of patients with obstructive sleep apnea (OSA), patient's position, and use of chest physiotherapy in the postoperative period.

Obesity is associated with a 12–30-fold increased risk of OSA relative to the normal population.⁴ It has been shown that OSA patients are at increased risk of postoperative complications, including adverse respiratory events such as arterial oxygen desaturation and upper airway obstruction.⁵ Furthermore, disastrous respiratory outcomes have been reported during the perioperative management of patients with OSA and are a major concern for anesthesia care providers.⁶ For this reason, it is

recommended to screen patients for OSA syndrome preoperatively, especially for morbidly obese patients.²

The article did not specify the patient's position in the postoperative period. Considering the potentially deleterious effects of supine positioning on the pulmonary function in morbidly obese patients, these patients are more optimally managed in a nonsupine position. In this case, there is an unloading of the weight of the intraabdominal contents from the diaphragm, resulting in improvement in pulmonary function and reduction in respiratory complications, including pneumonia and atelectasis.² It has been shown that during the first 48 postoperative hours after abdominal surgery, arterial oxygenation of morbidly obese patients is better in the semirecumbent than in the supine positions.⁷ Furthermore, morbidly obese patients placed in a reverse Trendelenburg's position have improved pulmonary compliance and increased functional residual capacity, which improves oxygenation relative to the supine position.⁸ Thus, we think that in this study, maintained identical positioning in all patients is an important prerequisite to accurately evaluate effect of inspiratory oxygen fraction on the postoperative pulmonary complications.

Similarly, there was no mention of whether chest physiotherapy had been included in the optimal perioperative care of the trial protocol. Chest physiotherapy consists of deep breathing exercises, incentive spirometry, and coughing exercises. In the morbidly obese patients undergoing bariatric surgery, chest physiotherapy has been shown to prevent the reduction of postoperative pulmonary function.⁹ Since chest physiotherapy is harmless and affordable, it is recommended to be used as soon as possible during the postoperative period in morbidly obese patients, at least after abdominal or thoracic surgery. Furthermore, chest physiotherapy has been included in algorithm for the postoperative respiratory management of morbidly obese patients.²

We believe that if these three factors were also standardized in study design, the results of this study could have been more informative and conclusive.

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In Reply:

We thank Xue *et al.* for their interest in our subgroup analysis of obese patients¹ randomized to 80% or 30% oxygen in the PROXI Trial.²

We agree that it would have been interesting to screen all patients for obstructive sleep apnea, but that was not done. Patients were nursed after surgery in the semirecumbent position in all departments participating in the trial. Chest physiotherapy may be beneficial, but the evidence is not very convincing, and the effect depends on the patient's ability to cooperate.³

We do not agree that every possible risk factor has to be standardized in a randomized clinical study. We sought to optimize and standardize care as much as possible,⁴ but we realized that minor differences would still be present among centers. In our pragmatic and randomized trial, we stratified for study center, diabetes mellitus, and acute or elective surgery, and this will most likely reduce the probability of intergroup differences in known as well as unknown risk factors of postoperative complications. The aim was to enable us to detect a clinically relevant difference according to inspiratory oxygen fraction, if present. Pragmatic trials should inform decision-makers about the effectiveness of treatments in the

settings in which they are to be implemented.⁵ Tight control over every anesthetic and surgical variable may not be possible in large multicenter trials.⁶ Actually, tightly controlled explanatory trials will have little generalizability.^{7,8}

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