Lung Protective Ventilation in the Intraoperative Period

To the Editor:
We read with interest the article titled "A Description of Intraoperative Ventilator Management in Patients with Acute Lung Injury and the Use of Lung Protective Ventilation Strategies". It was also discussed in detail during our journal club as part of the departmental training program. The concept and the idea behind the article are very interesting and thought-provoking and we congratulate the authors on the same.

We have a few observations, however. First, current information systems being used in hospitals are programmed to a large extent not to accept values of parameters that are invalid. It was noted that a large number of patients were excluded (320 + 265 + 31) because of invalid tidal volume, height, and weight. A total 616 of 2,652 patients, approximately 23.23% of cases, were excluded. This reflects poorly on the reliability of the database and of the entries considered as valid and included in the study.

Second, in the materials and methods section all patients undergoing surgery who had at least one preoperative arterial blood gas assessment were included in the study. There exists a possibility that there were some patients with hypoxia who had not undergone preoperative arterial blood gas assessment and so were not included in the study. This situation also would have an effect on the final analysis.

Third and most important, the mode of ventilation used intraoperatively has not been mentioned. Because only peak inspiratory pressures were monitored in the "post lung protective ventilation strategy era" it is evident that pressure-controlled mode of ventilation may have been used. As a result, the findings of the ARDSNet study cannot be applied because that was carried out exclusively using volume control ventilation. This has also been discussed by Slutsky et al.

However, if volume-controlled ventilation was used, the plateau pressures (Pplat) would have been lower than the peak inspiratory pressures. Whether the trend of peak inspiratory pressures would have accurately reflected the trend of Pplat as is the authors’ contention is a moot point. Moreover, if that was the case, Pplat would not have been universally used as a surrogate of pressures at the level of the alveolus and peak inspiratory pressures, which is actually an indicator of airway resistance would have sufficed.

Thus, it may not be appropriate for the authors to conclude that lung protective ventilation strategy was not used intraoperatively in patients with acute lung injury in their hospital. Lung protective ventilation strategy by definition is use of low tidal volumes in volume-controlled mode of ventilation targeting a tidal volume of 6 ml/kg predicted body weight and plateau pressures of 25 cm of water.

Fourth, the authors have concluded that the tidal volume settings appear to mirror the ventilator settings provided to the patients in the intensive care unit, which is borne out by the fact that table 5 shows that the tidal volume being delivered in the preoperative setting in the intensive care unit to the patients with acute lung injury is 8.25 ml/kg predicted body weight, compared with 8.58 ml/kg predicted body weight in the intraoperative period. Is it, therefore, to be inferred that even in the intensive care unit these patients were not being ventilated with a lung protective ventilation strategy using tidal volumes of 6 ml/kg predicted body weight?

Finally, there are a number of typographical errors where PaO2 has been repeatedly substituted by PaCO2 in the abstract. In table 1 and figure 1, P/F has been mentioned as PaOC/FiO2. In tables 3, 4, and 5, Fio2 has not been mentioned as a fraction but probably as the percentage of inspired oxygen.

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References

(Accepted for publication November 15, 2011.)

In Reply:
We would like to thank Dr. Singh and colleagues for their letter regarding our manuscript. We believe their concerns are justified and have the following responses.

First, with regard to the number of patients excluded, we attempted to exclude all patients who had data that was not appropriate. Because our anesthesia information system is designed to provide care for patients of all ages, heights, and weights, the values allowed for multiple variables are quite robust, which does allow for potential errors in data entry. Cases were excluded based on extremes of recorded height and weight. The 320 cases that were excluded because of excessively low tidal volume were either completed using an intensive care unit ventilator (which did not automatically port data to the anesthesia information system) or had erroneous electronic data collection,