



# Attribution of Delayed Poor Lung Function to Desflurane-Based Balanced Anaesthesia Might be Inappropriate: Our Reply to Sharma et al.'s Article

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*Cite this article as:* Karim HMR, Bhakta P. Attribution of Delayed Poor Lung Function to Desflurane-Based Balanced Anaesthesia Might be Inappropriate: Our Reply to Sharma et al.'s Article. Turk J Anaesthesiol Reanim 2020; 48(6): 511-3.

Dear Editor,

We read the article by Sharma et al. (1) with great interest. The results are intriguing, and we believe that they have clinical implication in patient management; however, we feel that some aspects need to be clarified before we employ them in clinical practice.

First, all anaesthetic agents have some impact on the pulmonary system, and anaesthesia technique used per-se has minimal impact on the postoperative pulmonary morbidity (2), whereas the mechanical ventilation technique used, parameter settings and the addition of the amount of positive end-expiratory pressure, operative insult, and the patient's ongoing pathophysiological insults have a significant impact on postoperative pulmonary functional adversities and ensuing increased morbidity (3). In addition to the amount and type of intravenous fluid used, overall fluid balance is a significant predictor (4). Elaboration and clarification of this information will help us better understand and interpret the results.

Second, the conduct of anaesthesia, perioperative analgesia used, perioperative haemodynamics, postanaesthesia recovery, and subsequent rehabilitation have also equally important impacts on the postoperative pulmonary function and morbidity (5). These details are missing in the article, which are critical in the final interpretation of the outcomes. It is now established that improper and inadequate postoperative analgesia contributes hugely to postoperative pulmonary morbidity and can even adversely impact the mortality, especially in elderly patients with pre-existing pulmonary conditions. Although the objective assessment of intraoperative analgesia is not clear and uniform yet, analgesic regimen used in this study was highly different.

Third, for accurate spirometry results, a well-cooperative patient is a prerequisite as most parameters are dependent on patient's effort. It is well known that patient's respiratory effort is significantly compromised in the postoperative period due to the ongoing pain and use of sedative and analgesic drugs, which have a significant impact on respiratory function along with ongoing operative insult (6). This possibly impacted the performance of spirometry in the patients. We believe that the authors should have assessed the amount of morphine used, efficacy of pain relief, and sedation score in the postoperative assessment to understand their impact on the performance of postoperative spirometry.

Fourth, it is hypothesised by the authors that the pharmacokinetics and pharmacodynamics of propofol and desflurane are the same. They had discontinued desflurane 3 min before the end of the surgery, whereas propofol was stopped 10 min before. Moreover, nitrous oxide was used in the desflurane group, but not in the total intravenous anaesthesia (TIVA) group. It is established that the use of nitrous oxide impacts postoperative lung collapse and atelectasis process (7).

Although we applaud the authors for their commendable work, and also assume that they indeed observed a significant change in the postoperative pulmonary function in the balanced anaesthesia group compared with TIVA, it is difficult to be convinced of the attribution of such difference to desflurane, which hardly stays for few minutes after discontinuation. This needs introspection and further discussion. Although the clinical significance of any minor reduction in the postoperative pulmonary function in a healthy individual is minimal, it can be significant in obese patients and those having pulmonary comorbidities. Thus, we propose that further study will be required to clarify whether there is any impact of desflurane-based balanced anaesthesia on postoperative pulmonary function, by addressing the issues that we have raised, before we can abandon the use of this novel agent having many clinical advantages, especially the excellent quality of rapid recovery even after prolonged surgery.

Author's Reply

### **Re: Attribution of Delayed Poor Lung Function to Desflurane-Based Balanced Anaesthesia Might be Inappropriate: Our Reply to Sharma et al.'s article**

Sir, We read the comments by Karim et al. (1) on our published study (2) with great interest. Karim et al correctly suggest that the ventilator technique used, operative insult, the patient's ongoing pathophysiological insults, amount and type of intravenous fluid used and overall fluid balance affect postoperative pulmonary function. For this reason we conducted this study in patients of ASA physical status I/II undergoing mastoid surgery only. All received the same intraoperative ventilator technique and there was no significant blood loss or major fluid shifts.

Secondly, a standard analgesia regimen was used in all patients consisting of fentanyl  $2 \mu\text{g kg}^{-1}$  5 minutes before induction of anaesthesia followed by  $1 \mu\text{g kg}^{-1}$  repeated every hour. All patients received diclofenac  $1.5 \text{ mg kg}^{-1}$  and paracetamol  $1 \text{ gm}$  for postoperative analgesia. In the PACU, pain was to be

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treated with morphine boluses  $1.5 \text{ mg}$  given at 5-min intervals to achieve adequate analgesia but this was not required in any patient.

Third, for accurate spirometry results, a well-cooperative patient is required. Before each assessment, it was ensured that the patient was warm and pain free so that there was no pain, shivering etc., which could interfere with the patients ability to breathe deeply and the patient could perform spirometry in a reliable manner. All patients underwent mastoid surgery and there was no requirement of postoperative sedative and analgesic drugs.

Fourthly, it was not hypothesised that the pharmacokinetics and pharmacodynamics of propofol and desflurane are the same. Desflurane was discontinued at the end of surgery as is recommended because of its low blood gas solubility and quick recovery whereas propofol was stopped 10 min before, keeping in mind its context sensitive half time. Nitrous oxide was used as part of a standard balanced anaesthesia technique but is not a part of a standard total intravenous anaesthesia (TIVA) technique and the purpose of this study was to compare these two techniques.

The aim of our study was to assess whether the lesser coughing and smoother emergence after use of TIVA with propofol leads to greater decreases in lung function postoperatively as compared to balanced anaesthesia with desflurane. We found that both anaesthetic techniques caused postoperative impairment in the lung function, but while TIVA caused a greater reduction in PFT in the early postoperative period, balanced anaesthesia with desflurane was associated with a greater reduction in forced vital capacity at 24 hours. We concluded that TIVA with propofol was not found to have detrimental effects on the lung function postoperatively as compared to a balanced anaesthesia technique with desflurane and suggested that further studies are required in patients who are at risk of developing postoperative pulmonary complications and have at no point suggested we abandon the use of balanced anaesthesia with desflurane.

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DOI: 10.5152/TJAR.2020.030520

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