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UNDERSTANDING THE EFFICACY OF APNEIC OXYGEN INSUFFLATION DURING THORACOSCOPIC LOBECTOMY

To the Editor:

The recently published randomized controlled trial by Jung and colleagues¹ outlining the use of apneic oxygen insufflation (AOI) through the nondependent (operative side) lumen of a double-lumen endotracheal tube (DL-ETT) showed that the incidence of hypoxemia during one-lung ventilation (OLV) was effectively reduced to 0% in the AOI group compared with 18% in the non-AOI controls ($P = .009$). In addition, the decrease in the partial pressure of oxygen from 15 minutes to 45 minutes of OLV was also substantially reduced in the AOI group (-29 mm Hg vs -69 mm Hg, respectively; $P = .005$). Although one cannot dispute these differences in the incidence of hypoxemia and adequacy of oxygenation between their AOI and non-AOI groups, part of this difference may have been a function of how the DL-ETT of the nondependent lung was managed during the OLV itself. For example, Bussieres and colleagues² recently suggested that by closing the operative side lumen to the ambient atmosphere during OLV—paradoxically, because it is usually opened with the belief that this will aid the egress of air—can actually have a beneficial effect itself. This is as a result of the nondependent lung continuing to absorb oxygen at the alveolar level, which subsequently decreases the airway pressure, and essentially draws in room air gas (containing poorly absorbed nitrogen) through this usually open lumen, which can subsequently contribute to the development of hypoxemia. In the study by Jung and colleagues,¹ by simply insufflating oxygen into the same operative side lumen, they essentially may have prevented the drawing in of this room air, thus preventing this cause of hypoxemia. Indeed, had Jung and colleagues¹ simply closed this lumen and not administered any oxygen, this alone may have prevented the development of the hypoxemia.

Whereas it may be difficult to completely disregard the benefits of AOI, perhaps a more suitable comparator would

have been a third group in which no gas was insufflated, but with the lumen closed to atmosphere, thus avoiding nitrogen getting into the lung. Without this, one may be erroneously left with the impression of an AOI benefit that is probably greater than it actually is, in part because of the management of the non-AOI group.

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BLOCKING THE DOUBLE-LUMEN ORIFICE VERSUS APNEIC OXYGENATION DURING 1-LUNG VENTILATION

Reply to the Editor:

We greatly appreciate Grocott's interest and comment on our article.

In our study, apneic oxygen insufflation (AOI) decreased the incidence of hypoxemia and maintained partial pressure of oxygen (PaO_2) higher compared with the control group during 1-lung ventilation (OLV). The mechanism of AOI was suggested as ventilatory mass flow, which enables the oxygen absorbed in alveoli to be replaced by passive oxygen movement through an AOI catheter.¹

Grocott suggested another mechanism: partial blocking of the nondependent side of the double-lumen tube (DLT) by an oxygen insufflation catheter may have contributed to the higher PaO_2 in the AOI group. He referenced an article by Bussieres and colleagues.² That article compared the speed of lung collapse between the bronchial blocker (BB) and the DLT during OLV and reported slower lung collapse in the DLT. The suggested mechanism was continuous inflow of ambient air through the opening of the nondependent side of the DLT (ventilatory mass flow). They used the BB, the opening of which was closed when used. However, they did not report on hypoxia or PaO_2 between the BB and the DLT.

The suggestion by Grocott that "just closing the lumen of the nondependent side of DLT would bring higher oxygenation by preventing ventilatory inward flow of room air and nitrogen trapping in the alveoli" is very interesting and worth studying. Our only concern is that blocking the

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