The devil is in the detail

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The ability to safely perform a lobectomy depends in part on adequate exposure using 1-lung ventilation provided by our anesthesia colleagues. Most of our patients in need of lobectomy have abnormal lung function, and it can be challenging to avoid hypoxemia during 1-lung ventilation. When hypoxemia occurs, the 2 most common rescue maneuvers are application of continuous positive airway pressure to the nonventilated lung¹ or temporarily resuming 2-lung ventilation. Unfortunately, these maneuvers compromise surgical exposure and can prolong the operation; evidence is needed to support or refute alternative mechanisms for preventing intraoperative hypoxemia.²

In this issue of the *Journal*, Jung and colleagues³ present the results of their randomized trial comparing apneic oxygen insufflation (AOI) versus no AOI during lobectomy. AOI involves administering oxygen to the nonventilated lung without applying pressure, thereby providing oxygen without compromising exposure. The primary outcome was hypoxemia, defined as arterial oxygen saturation less than 90%. Remarkably, there were no patients with hypoxemia in the AOI group versus 18% in the non-AOI group.

Jung and colleagues³ did their due diligence via literature review and preliminary studies, leading to a well-executed trial. For example, it is known that oxygen insufflation at the initiation of single-lung ventilation can lead to a delay in lung collapse. Therefore, Jung and colleagues³ began the study protocol 15 minutes into 1-lung ventilation. The flow rate of 3 L/min was chosen on the basis of a preliminary study during which 5 L/min led to lung reinflation and prior work indicating that 1 L/min was too low to deliver oxygen to the alveoli. Last, the optimal catheter depth was determined by performing animal studies. It is this attention to detail that is critical to designing a randomized trial and improving the odds that it will yield clinically useful results, which is precisely what the authors achieved.

There was no statistically significant difference in the duration of surgery between the 2 groups. However, the AOI group had a median duration that was 23 minutes less than the non-AOI group. This is a clinically significant difference that may have reached statistical significance

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Central Message

AOI during lobectomy avoids hypoxemia while maintaining surgical exposure.

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with a larger sample size, but the trial was powered to detect a difference in hypoxemia, not duration of surgery. In addition, approximately half of the patients in each arm underwent an open operation during which it may be possible to make progress despite limited exposure as opposed to video-assisted lobectomy in which the operation ceases with even minor lapses in exposure.

Jung and colleagues³ excluded patients with forced expiratory volume in 1 second/forced vital capacity less than 60% and forced expiratory volume in 1 second less than 50% or forced vital capacity less than 50%. The more severe the lung disease, the more challenging 1-lung ventilation is going to be. The authors should be congratulated on rigorously evaluating APO for avoiding hypoxemia while maintaining surgical exposure. The next step is to investigate this method in patients with more severe lung disease undergoing video-assisted lobectomy as this is the clinical scenario in which this technique may be even more beneficial.

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