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Commentary: May the light guide your way

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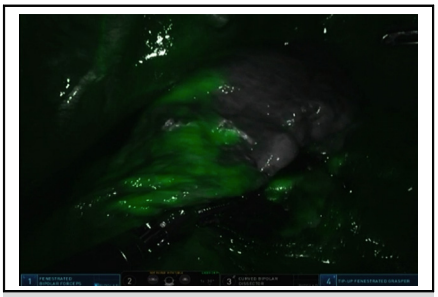

LUL posterior segment with its pulmonary artery ligated appears dark after ICG injection.

CENTRAL MESSAGE

A large-scale retrospective study confirms that intravenous use of indocyanine green and near-infrared fluorescence imaging for definition of intersegmental planes is safe and effective.

As the thoracic surgery community encounters increasing numbers of patients who present with smaller (<2 cm) multifocal or ground-glass lesions, interest in segmentectomy continues to grow. Although the oncologic outcomes of segmentectomy versus lobectomy remain a matter of debate,[1-3] there has been a renewed focus on the technical aspects of segmentectomy. One such technical challenge is delineation of the intersegmental borders of the target segment. Intersegmental planes have no anatomic landmarks, yet accurate resection margins are critical in ensuring the oncologic quality of the resection. A wide variety of methods have been studied that can be broadly categorized into selective insufflation, selective intravenous perfusion, and 3-dimensional imaging. Each method has its pros and cons; however, at present, most studies include sample sizes <100 and do not include a comparison of different techniques within the same study.[4]

Yotsukura and colleagues[5] provide a retrospective review of their experience performing segmentectomy (N = 209) with intravenous indocyanine green (ICG) to delineate the intersegmental plane. Consistent with previous studies, they found good demarcation in nearly 90% of cases. They also analyzed results between simple and complex segmentectomies and describe concurrent use of high-frequency jet ventilation (HFJV) in 76.6% of cases, allowing a comparison of the 2 methods. Unsurprisingly, they found that, owing to collateral ventilation, HFJV was less precise and yielded larger resection margins—this was more notable in patients undergoing complex segmentectomy (which tends to involve a larger intersegmental surface area) and patients with chronic obstructive pulmonary disease. ICG outperformed HFJV even in these cases and, overall, had better demarcation. In addition to its established efficacy in this large cohort, ICG allows rapid onset of visualization (within 1 minute) and does not require an experienced bronchoscopist.

We commend the authors on their consistent technique and excellent early surgical results. However, description of the 12% of patients deemed to have poor delineation may have added value, and the intraoperative methods used to determine the intersegmental planes in these cases and whether those patients had different outcomes would be worthwhile to know. Finally, although oncologic outcomes were not the focus of this study, we cannot help but notice that only 1 patient out of 186 with primary lung cancer was found to have positive nodal disease. Even with the best clinical judgment, this seems unusually low. Whether this is related to extraordinary patient selection or nodal sampling is unclear.

In our experience, the use of ICG for intersegmental demarcation is convenient and reliable. Many thoracic surgery centers have near-infrared vision thoracoscopes that are also used to assess for perfusion in cases that involve a bowel anastomosis, such as esophagectomy. The da Vinci

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Xi (Intuitive, Sunnyvale, Calif) robotic system also has near-infrared capability (Firefly mode). As we anticipate further increases in the adoption of segmentectomy for lung cancers, the ease and accuracy of ICG give it a significant advantage for widespread implementation going forward—may the light guide your way!

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