Editorial

Make visible palpable, a "double-insurance strategy" for nodule localization

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Localization for tiny pulmonary nodule during video-assisted thoracoscopic surgery (VATS) approach to facilitate sublobar resection remains a challenge for thoracic surgeons. To look for a needle in a haystack, adjuvant techniques such as hookwire insertion, colour dye or radionuclide injection have been well reported (1). However, such traditional techniques require a patient being transferred from the radiographic suite for localization and the operation room for resection, which would lead to more substantial complications, for example, pleuritic pain, label or marking migration, and pneumothorax to mention just a few.

To solve these problems, simultaneous localization and operation workflow is gaining popularity. A recent report by Luo and colleagues (2) described their novel experience of using fibrin sealant mixed with methylene blue injection through electromagnetic navigation bronchoscopy (ENB) for localization of small pulmonary nodules. Thirty lesions with a median size of 11.0 mm (range, 6–19 mm) were successfully localized and the average time from ENB navigation to the start of operation was around 40 minutes. After the establishment of one-lung ventilation during the VATS procedure, the adjacent parenchyma around the target lesion marked by blue dye was inflated, and due to the blockade of the airway to the nodule, thus enable easy visual identification.

This innovative method is associated with good success rate and low complication. Other advantages may include: (I) enable tactile feedback for digital palpation though this can only help in more peripherally located lesions; (II) avoidance of label dispersion because the dye is "sealed" in the adjacent airway to the nodule; (III) cost-effective and do not require radiologists to be on-site.

Interestingly, the authors successfully localized 36.7% in the 30 nodules in the right lower lobe. Lesions located in the basilar segments near the diaphragm can sometimes be challenging to reach via percutaneous route using hookwire or micro-coil insertion. Hence, the ENB approach may be appealing for handling such tumours. However, it remains unclear when bullous emphysema around the lesion may be regarded as a contraindication for this method. The technique may have a further impact on sublobar resection as the authors reported that their resection margin was concurrent with the inflated parenchyma, which could be crucial if a sub-segmentectomy is scheduled.

The use of ENB-guided trans-bronchial dye-labelling was also described by Marino *et al.* (3) that 70 of the 72 lesions were localized successfully. In their technique, one shot of methylene blue (<0.5 mL) was injected into the nodule and another shot was given to mark the pleura if the nodule was located more than 5 mm from the pleural surface. To enhance the exact positioning of the extended working channel (EWC) of ENB system which is critical for dye or gel injection, it is believed that hybrid theatre with real-time imaging may help improve the diagnostic and localizing yield. Our group had previously described that cone-beam CT scan could improve the exact localization of the tip of EWC towards a pulmonary lesion (4,5). Hopefully, the conjoint use of these techniques would help to make these techniques less operator dependent and to facilitate easier resection for tiny pulmonary nodules.

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