

# A bird in the hand is worth two in the bush: the choice of localization technique for non-palpable solitary pulmonary nodule

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Received: 28 August 2016; Accepted: 29 August 2016; Published: 06 September 2016.

doi: 10.21037/jovs.2016.08.11

View this article at: <http://dx.doi.org/10.21037/jovs.2016.08.11>

We read with interest the comments of Martin-Ucar *et al.* (1) and Bedetti *et al.* (2) about our previous paper describing the radioguided localization technique of non-palpable solitary pulmonary nodule (SPN) or ground glass opacities (GGO) to identify and to resect them by video-assisted thoracoscopic surgery (VATS) (3).

We agree with the fact that a large proportion SPN who undertook different localization methods would have also been located without them. For an experienced surgeon, an SPN >1 cm or an SPN in peripheral locations <2 cm of the pleural surface can be identified during VATS only with the finger palpation (1). Furthermore, the invasive approaches of localization methods can carry well-known complications, such as pneumothorax, bleeding, migration, and air embolism. In particular, radioguided VATS have experienced some pitfalls as, more frequently, the outsized diffusion of the radiotracer inside the lung parenchyma and the spillage of the radiotracer into the pleural space (2). On the other hand, the intraoperative echography is potentially safer, but it requires training and equipment expenses (1).

The radioguided VATS requires the patient to be transferred to two different locations or departments to complete the entire pulmonary resection: the radiology department to localize the lesion and the operating theatre for surgery. This transfer may be time-consuming for the surgeon and uncomfortable for patient (4).

The practice of integration of surgical procedures with real-time on-table image guidance technology, the hybrid operating theatre (HOT), is pretty well established in other specialties (e.g., cardiology and vascular surgery). Therefore, the marriage of radiology and thoracic surgery techniques within the HOT may open doors to new approaches that can be potentially safer, more effective for

patients, and more cost-effective for the healthcare system. Nonetheless, in the Academy Awarded Film, *Divorce Italian Style*, Marcello Mastroianni says, “I ordered the marriage on the rocks with a twist”. Consequently, some tips and pitfalls of the HOT approach should be analyzed to avoid a quick divorce after this media-addicted marriage.

The localization and surgical workflow using the HOT reduces the risks associated with the transfers and the delays during which the patient may develop pneumothorax and hook wire displacement. Also, for lung lesions unable to be localized by hook wire, HOT allowed the on-table imaging to localize the lesion and achieve adequate margins (5). The use of HOT may reduce the risk of complications associated with the transportation of the patient and delay of the procedure such as prolonged discomfort, hook wire displacement, and pneumothorax. This approach is useful for lesions adjacent to the chest wall or near the periphery, but may not be suitable for a very deep nodule. Furthermore, the lesion may not be accessible percutaneously in areas around the apical, diaphragmatic, or mediastinal regions, and it may be more challenging to mark multiple lesions (4). It is noteworthy that the hook wire procedure may not be possible if the nodule is too close to a blood vessel or shielded by chest wall structures, such as the scapula. The potential cost of HOT depends on the country and institution-specific costs, manpower costs, interdepartmental transfer times. Use of HOT to perform hook-wire localization of SPN/GGO requires additional training and familiarization with the system by the surgeon, the anesthesiologist, the radiographer, and the radiologist (4). The HOT also needs experience in positioning for the decubitus position when conducting thoracic surgery. There is the need of a previous training using a phantom for the HOT approach before performing the procedure on the

patient; this advertence can significantly improve both the accuracy of the process and the safety of the patients. Prior training can also improve efficiency, thereby substantially reducing the dose of radiation administered to the patients. It is noteworthy that the current generation of HOT tables is not designed for thoracic surgery and does not have a hinge joint for bridging and the tables stand quite high, with a limited lowering capability. To optimize the images and avoid a collision from the rotating X-ray arm, the anaesthetic machine needs to be further away from the patient than usual requiring extension tubing (6).

In conclusion, radioguided VATS is a cost-effective technique. In comparison with other methods, radioguided VATS is currently the preferable method of localization of SPN/GGO because of its high accuracy with minimal complications and minimal operator dependence. Besides, the gamma detector is the same device used in the widespread sentinel lymph node technique in the breast cancer surgery and is, therefore, available in most hospitals worldwide (7).

### Acknowledgements

None.

### Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

*Response to:* Martin-Ucar AE, Socci L. Location techniques of pulmonary lesions during video-assisted thoracic surgery:

a perspective. *J Vis Surg* 2016;2:36.

Bedetti B, Scarci M. Commentary on the article “Radioguided video-assisted resection of non-palpable solitary pulmonary nodule/ground glass opacity: how to do it”. *J Vis Surg* 2016;2:52.

### References

1. Martin-Ucar AE, Socci L. Location techniques of pulmonary lesions during video-assisted thoracic surgery: a perspective. *J Vis Surg* 2016;2:36.
2. Bedetti B, Scarci M. Commentary on the article “Radioguided video-assisted resection of non-palpable solitary pulmonary nodule/ground glass opacity: how to do it”. *J Vis Surg* 2016;2:52.
3. Bertolaccini L, Salgarello M, Gorgoni G, et al. Radioguided video-assisted resection of non-palpable solitary pulmonary nodule/ground glass opacity: how to do it. *J Vis Surg* 2015;1:9.
4. Zhao ZR, Lau RW, Ng CS. Hybrid theatre and alternative localization techniques in conventional and single-port video-assisted thoracoscopic surgery. *J Thorac Dis* 2016;8:S319-27.
5. Yu PS, Capili F, Ng CS. Single port VATS: recent developments in Asia. *J Thorac Dis* 2016;8:S302-7.
6. Ng CS, Man Chu C, Kwok MW, et al. Hybrid DynaCT scan-guided localization single-port lobectomy. [corrected]. *Chest* 2015;147:e76-8.
7. Grogan EL, Stukenborg GJ, Nagji AS, et al. Radiotracer-guided thoracoscopic resection is a cost-effective technique for the evaluation of subcentimeter pulmonary nodules. *Ann Thorac Surg* 2008;86:934-40; discussion 934-40.

doi: 10.21037/jovs.2016.08.11

**Cite this article as:** Bertolaccini L, Viti A, Terzi A. A bird in the hand is worth two in the bush: the choice of localization technique for non-palpable solitary pulmonary nodule. *J Vis Surg* 2016;2:152.