The Dawn of the Age of Virtual Biopsies

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In this engaging case report, Shiina et al offer a glimpse into the future of endobronchial ultrasound (EBUS) staging for lung cancer.[1] Using impedance ultrasonography, they were able to demonstrate that areas of metastasis in a lymph node demonstrate different stiffness than normal lymph node tissue, effectively mapping out the area where the biopsy needle should be directed. In an elegant, one-sample experiment, they showed that a biopsy from the normal looking center of the node will yield normal lymphocytes, whereas a needle aspirate from the stiff malignant looking periphery will yield cancer cells.

The major criticism of this work is that it was a case report, rather than a case series. The authors also chose a large, PET positive node, effectively maximizing the pretest probability of malignancy. Will this technique work normal looking nodes on CT and PET? Will it be feasible is nodal stations other than 7? Will it be reproducible by other endoscopists? Although the answers to these questions are still uncertain, there is one truth that is certain: technology such as this one will play a radical role in the evolution of lung cancer staging.

The rapid evolution of EBUS as the preferred technique for mediastinal staging has been nothing short of groundbreaking. Only 5 years ago, mediastinoscopy was still considered as the "gold standard" for mediastinal staging. . .not anymore.[2] EBUS has demonstrated better sensitivity, specificity, and capability of access to nodes that are not typically reachable via the mediastinoscope. However, the main advantage of endosonography is that it provides information that is not obtainable by mediastinoscopy. It has been recently demonstrated that assessment of mediastinal lymph nodes using the 4-point Canada Lymph Node Score can accurately predict malignancy in greater than 90% of cases without biopsy.[3] The addition of pretest information provided by the staging CT and PET, and the real-time information provided by impedance ultrasonography can only improve this rate. Recent experiments with deep learning computer neural networks have also demonstrated encouraging results in the identification of metastatic lymph nodes without biopsy.

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Central Message

Impedance ultrasonography can provide real-time guidance to direct the biopsy needle at the time of EBUS-TBNA for lung cancer staging.

This work by Shiina et al is only the tip of the iceberg. It will need to demonstrate scientific merit by going through the time-tested process of the clinical trials cycle: internal validation, external validation, inter-rater reliability assessments, and finally a randomized controlled trial. When all of this is accomplished, dare we imagine an era where lymph node biopsies will not be required anymore?

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