Bronchial Branch Tracing without Navigation Systems

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Bronchoscopic diagnosis of peripheral pulmonary lesions remains challenging, particularly in the absence of advanced navigation systems. Conventional approaches often rely on operator experience and limited fluoroscopic guidance, which may lead to suboptimal lesion localization and reduced diagnostic yield. This lecture introduces a structured and practical method of bronchial branch tracing that utilizes thin-section computed tomography (CT) images in conjunction with radial endobronchial ultrasound (rEBUS) to optimize diagnostic performance without the need for expensive or complex navigation platforms.

The proposed technique is based on systematic step-by-step analysis of bronchial anatomy on thin-section CT. By carefully identifying and following branching patterns, operators can predict the most probable pathway toward the target lesion. Key anatomical landmarks and directional cues are highlighted to guide the bronchoscopist during the procedure. Once a preliminary route is established from CT review, rEBUS is employed to confirm lesion location and orientation in real time, thereby minimizing unnecessary sampling and improving procedural efficiency.

Real-world case applications illustrate how this approach can be applied across a spectrum of peripheral pulmonary nodules, including those in challenging subsegmental locations. The method emphasizes reproducibility, making it suitable for training settings as well as routine clinical practice. Importantly, it addresses the need for accessible and cost-effective strategies in institutions where navigation systems are unavailable or limited.

By combining careful CT-based branch tracing with rEBUS confirmation, clinicians can achieve enhanced diagnostic accuracy, reduce procedure time, and improve patient safety. This lecture will provide practical insights, illustrative cases, and troubleshooting tips, equipping participants with actionable skills to integrate into their daily bronchoscopic practice. Ultimately, the approach aims to democratize advanced diagnostic capability and improve outcomes for patients with suspected peripheral lung disease.