

Augmented Endobronchial Fluoroscopic Navigation and Localization System: Integration of multi modalities and biopsy tools to increase diagnostic yield

Dr. Patrick Whitten, OSF Saint Francis Medical Center, Peoria, IL, USA

Abstract:

Background: Lung cancer is the lead cause of cancer-related deaths worldwide. Early diagnosis of peripheral pulmonary nodules (PPNs) is a key factor in improving the overall survival rate.

Several diagnostic modalities and variety of biopsy tools are currently being used to access PPNs endobronchially. Still, the reported diagnostic yield of PPNs is below 42%. The first challenge for the bronchoscopist is the need to navigate to the PPN through the complex bronchial tree beyond the bronchoscopic vision. The second challenge is getting a stable sample from the area of interest under the condition of moving and breathing lungs. Today both navigation and biopsy are blind hence decreasing the probability of definitive diagnosis.

LungVision is a novel system (LungVision, Body Vision Ltd, Israel), that is integrating existing imaging modalities and biopsy tools utilizing novel machine learning and artificial intelligence approach, to enable live guided endobronchial navigation and biopsy of PPNs that has shown to increase diagnostic yield.

Methods: Patients with PPNs referred for bronchoscopy were offered to participate in the study. CT scans were imported into the LungVision planning software, where the physicians identified the PPN and selected the desired pathway. LungVision system was used for real-time localization of the airways and PPN using fluoroscope images. When the LungVision display showed the PPN had been reached, a radial EBUS (r-EBUS) probe was advanced down the catheter to verify LungVision display and r-EBUS image at the tip of the catheter was captured. Finally, the desired tissue samples were taken under LungVision guidance.

Results: 20 patients were enrolled to the study. The average age was 67. Average PPN size was 21.6mm+11.9 (range 5-50mm, Median 18mm), and 69% of the PPNs were located in the upper lobes.

No peri-procedural adverse events were reported. PPNs location displayed in real time by the LungVision system was verified successfully by r-EBUS in all cases

(100%). Tissue samples were successfully acquired under LungVision guidance with a diagnostic yield of 75%. A follow up is now in progress for indeterminate samples.

Conclusion: Some navigation systems available today to physicians, such as ENB or VB, are relying on virtual pre-procedure imaging. These modalities are not capable of presenting real-time images during navigation nor during sampling of the PPN. LungVision's ability to integrate routinely any available imaging modality including a bronchoscope, fluoroscope and r-EBUS together with off the shelf biopsy tools during navigation and biopsy, allows physicians to maintain their protocol for diagnosis of PPNs, while adding the revolutionary benefit of augmented real-time imaging to increase diagnostic yield.