Navigation to Peripheral Lung Nodules Using an Artificial Intelligence-Driven Augmented Image Fusion Platform (LUNGVISION): A Pilot Study

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Abstract

Introduction:

Peripheral lung nodules are a common finding in pulmonary medicine. Cancer screening programs with low dose CT will further increase the number of patients that will require tissue diagnosis. Correct diagnosis of lung cancer or benign lesions is crucial for patient management and can prevent invasive unnecessary medical procedures.

Transbronchial biopsy (TBC) of lung lesions is the safest procedure to acquire tissue for diagnosis of a pulmonary lesion, but its diagnostic yield is low. Navigation tools were developed in recent years to guide the bronchoscopist to the correct location and improve diagnostic yield. We report here our experience with the LungVision system (Body Vision Medical LTD, Israel). This technology integrates information from pre-procedural CT imaging into augmented fluoroscopic images, presenting real time visualization of the airways and location of the pulmonary lesion during transbronchial navigation and biopsy.

Methods:

We have retrospectively evaluated all procedures of TBC with fluoroscopic transbronchial guidance technology (LungVision™) that were done in Rabin Medical Center in 2017-2019. In all cases moderate sedation was used. Pre-

operative CT scan was imported into the LungVision planning software and the physician identified the targeted lesion and selected the preferred navigation pathway. Lesion location was verified with radial probe endobronchial ultrasound (REBUS). Biopsies were collected from the augmented marked area of the lesion as was presented by the LungVision system. In addition to forceps we have also used a cryo probe for tissue sampling. The endpoints for analysis were lesion localization and confirmation of correct probe location, pathological diagnosis and complications during procedure.

Results:

Twenty-seven procedures were done with the LungVision navigation system. Median lesion size was 25 mm (range 13-50) and all lobes were represented. The location of the lesion and probe were confirmed by REBUS in 21 cases. A Cryo probe was used in 22 cases (81%). The overall diagnostic yield was 74% (20/27). None of the patients suffered from pneumothorax or severe bleeding and all were discharged at the same day.

Conclusions:

LungVision is a real-time augmented endobronchial fluoroscopic navigation system. It enables lesion tracking during breathing movement and improves lesion localization and diagnostic yield. Further large-scale studies are indicated to assess the possible role of LungVision as a method for image-guided biopsy of peripheral lung lesions.

Clinical Implications:

LungVision may provide equivalent diagnostic outcomes to traditional ENB platforms at a fraction of the cost, which may have clinical implications as it pertains to procedural cost and choice of navigational system for the bronchoscopy suite.