

Bronchoscopy for Pulmonary Peripheral Lesions with Virtual Fluoroscopic Preprocedural Planning Combined with EBUS-GS

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Background: Virtual Fluoroscopic Preprocedural Planning, which was firstly initiated by one of our co-authors, is the figure that the trace lines are drawn along ductal structures such as vessels or biliary ducts related to target lesions on Ray Summation image similar to fluoroscopy. The lines can be displayed by any angle with 3Dimage, and allow us to search the responsible vessels more easily during angiography or the responsible biliary ducts during the settlement of stent, for example. Virtual Fluoroscopic Preprocedural Planning is easy to prepare by volume data from MDCT and workstation, and might make vessel structure-related procedure more accurate.

This time, we applied this system to bronchoscopic procedure. The trace lines between the trachea and the target lesions were constructed along the responsible bronchus and made reference to during the procedure, as a new type of navigation system. We report the feasibility of Virtual Fluoroscopic Preprocedural Planning on bronchoscopy, that has never been tried before.

Methods: The peripheral lung lesions less than 30mm in longer axis were selected for the study. Bronchoscopy was performed by simultaneous display of Virtual Fluoroscopic Preprocedural Planning.

Results: For twenty seven patients with 27 lesions, bronchoscopy with simultaneous display of Virtual Fluoroscopic Preprocedural Planning was performed safely without major complications. The median lesion size was 20.2 mm (10 to 30 mm). The lesion size was ≤ 20 mm in 12 lesions, >20 mm in 15 lesions. Five lesions couldn't be visualized by radiographic fluoroscopy. The median examination time was 24.5 min (range, 12 to 50 min). 18 lesions were visualized by EBUS and diagnosis was made for 17 lesions of the 27 lesions. Lung cancer was diagnosed in 12 lesions, nontuberculous mycobacterial disease in 1 lesion, lymphoid hyperplasia in 1 lesion, and inflammation in 3 lesions.

A diagnosis was not made in 10 lesions. Four lesions are diagnosed as adenocarcinoma by operation or transthoracic biopsy. Two lesions consistent with the clinical characteristics of cancer were performed radio-surgery without definitive diagnosis. And the other lesions are still under observation without diagnosis.

The diagnostic rate of this procedure was 63.0 %. The sensitivity, specificity, negative predictive value, positive predictive value, and accuracy for malignant disease were 66.7%, 100%, 45.5%, 100%, and 73.9%, respectively.

Conclusions: Virtual Fluoroscopic Preprocedural Planning was easy to prepare and useful for selecting target bronchus. It might contribute to better diagnostic rates.