SPP-P7.34

Dr Wong King Ying
Associate Consultant
DTBC, TWHGs Wong Tai Sin Hospital

Integrated use of virtual bronchoscopy and endobronchial ultrasound on the diagnosis of peripheral lung lesions

Authors : KY Wong[1], KKT Pak[2], HN Tse[3], CKC Wong[2], PS Lok[1], SH Lee[1], WY Shum[1], KCH Chan[1], YM Lee[1], KS Yee[1,3].

Institutions: [1]Department of Tuberculosis and Chest, TWGHs Wong Tai Sin Hospital. [2]Department of Radiology, [3]Department of Medicine, Kwong Wah Hospital

Background Endobronchial ultrasound (EBUS) has emerged as one of the armaments to improve bronchoscopic diagnosis of peripheral lung lesions (PLL). The procedure time is lengthened by the search through multiple bronchial branches to the target at the lung periphery. Virtual bronchoscopy (VB) generated by computer software provides endobronchial views that simulate the findings at bronchoscopy. While automated bronchoscopic navigation systems are not widely available and expensive, the endobronchial route to a PLL can be manually selected using virtual images in computer. We evaluated the usefulness of combining VB and EBUS in reducing procedure time for diagnosing PLL.

Methods This is a prospective cohort study. For VB group, digital imaging and communications in medicine (DICOM) data from 64-row multidetector CT was transferred to a computer equipped with an advanced open source processing software for generation of VB with volume rendering technique. VB route to the PLL was selected with simultaneous review of multiplanar reformation and endoluminal view(Figure 1). For non-VB group, bronchoscopy was performed based on 2D CT axial +/- coronal images. All procedures were done under local anaesthesia and conscious sedation using a 4mm thin bronchoscope (Olympus BF-P260F) without fluoroscopy. A 20MHz radial EBUS probe (UM-S20-17S) was inserted through the bronchoscope to peripheral bronchus to achieve ultrasonic visualization of PPL before tissue sampling(Figure 2).

Results Thirty-three consecutive subjects were studied including 16 in VB group and 17 in non-VB group (table 1). The average diameters of the PPL were 2.88cm and 2.98cm for VB and non-VB group, respectively (p=0.98). The mean EBUS examination time and mean total procedure time were significantly reduced in the VB group compared to non-VB group: 5.3 minutes vs 10.5 minutes (p=0.04) and 22.4 minutes vs 29.9 minutes (p=0.044), respectively. The overall diagnostic accuracy and the sensitivity for diagnosing lung malignancy were higher in the VB group 81.3% vs70.6%; and 78.6% vs 66.7%, respectively but these differences were not significant. There was one small pneumothorax in the non-VB group. No complication was recorded in the VB group.

Conclusion Bronchoscopy using VB and EBUS guidance reduced the procedural time to diagnose PLL without increasing complications.

Table 1 Demographic data of patients

	VB group	Non VB group
Number of patients	**16**	**17**
Mean age	**69.6**	**64.8**
Sex ratio (male: female)	**11:6**	**9:7**
Number of patient with previous nondiagnostic bronchoscopy	**7 (43%)**	**5 (29%)**
Diagnosis arrived at EBUS FOB in patients with previous nondiagnostic bronchoscopy	**5 out of 7 (71%)**	**3 out of 5 (60%)**
Average diameters of lesions in centimeters (range)	**2.88 (1.5 – 4.6)**	**2.98 (1.3 – 6.8)**
Numbers of lesions size <2cm	4	3
Numbers of lesions size 2-2.9cm	5	7
Numbers of lesions size >3cm	7	7

Table 2 Performance of EBUS guided bronchoscopies

	VB group	Non-VB group
EBUS examination time in minutes (range)	**5.3 (1 – 15)**	**10.5 (1 -25)**
Total procedure time in minutes (range)	**22.4 (18 – 29)**	**29.9 (17 – 52)**
Diagnostic rate according to lesion size		
Lesions < 2cm	50% (2/4)	67% (2/3)
Lesions 2-2.9cm	100% (5/5)	57%(4/7)
Lesions>3cm	86% (6/7)	86%(6/7)
Bronchoscopic Diagnosis		
Primary lung cancer	10	9
Metastatic cancer	1	1
Benign	2	2
Nondiagnostic	3	5
Overall Accuracy	**81.3%**	**70.6%**
Sensitivity for diagnostic malignancy	78.6%	66.7%

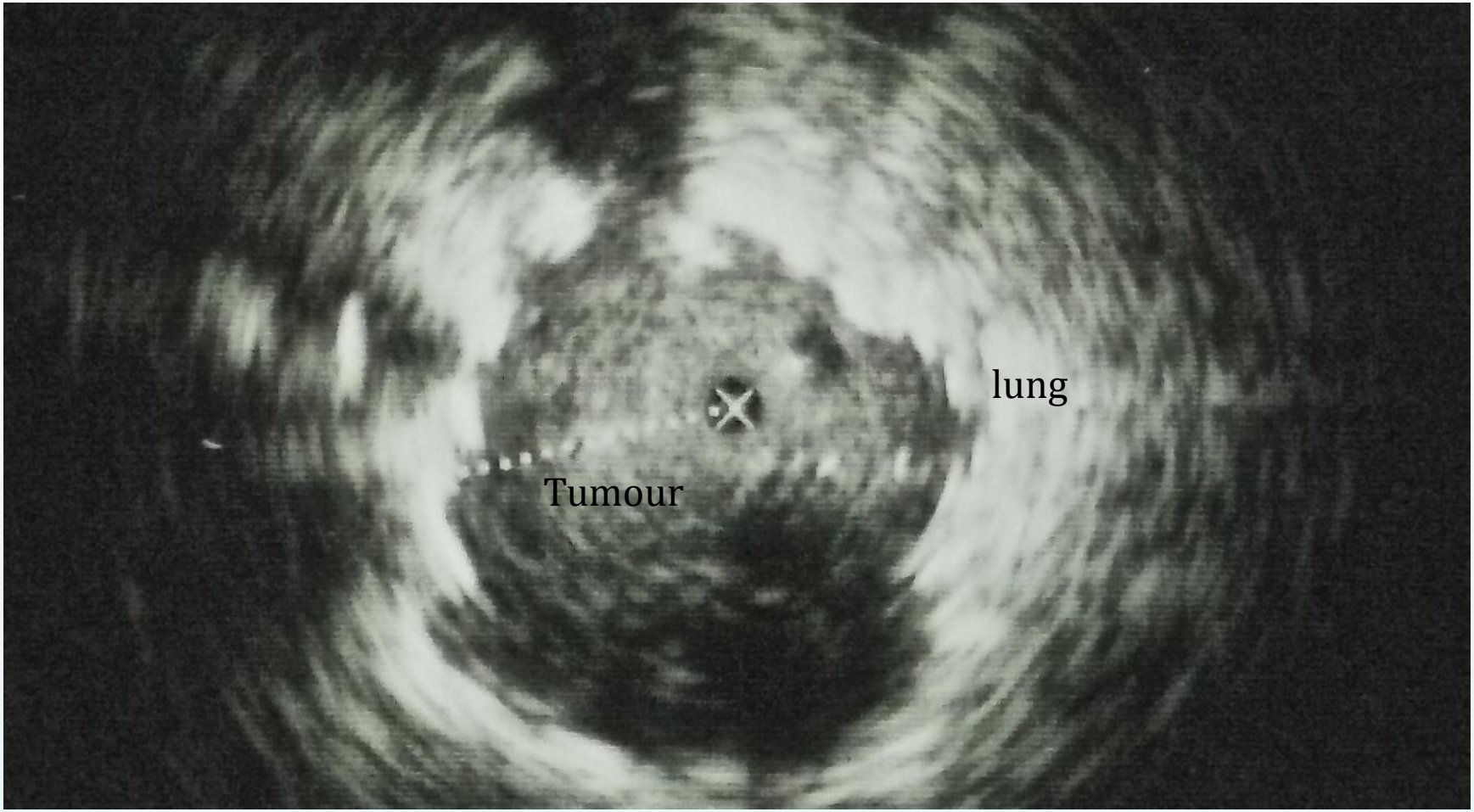

Figure 2. Ultrasound image of the left upper nodule in figure 1. Transbronchial biopsies performed through the guide sheath confirmed metastatic carcinoma from the breast. X denotes position of the miniature EBUS probe

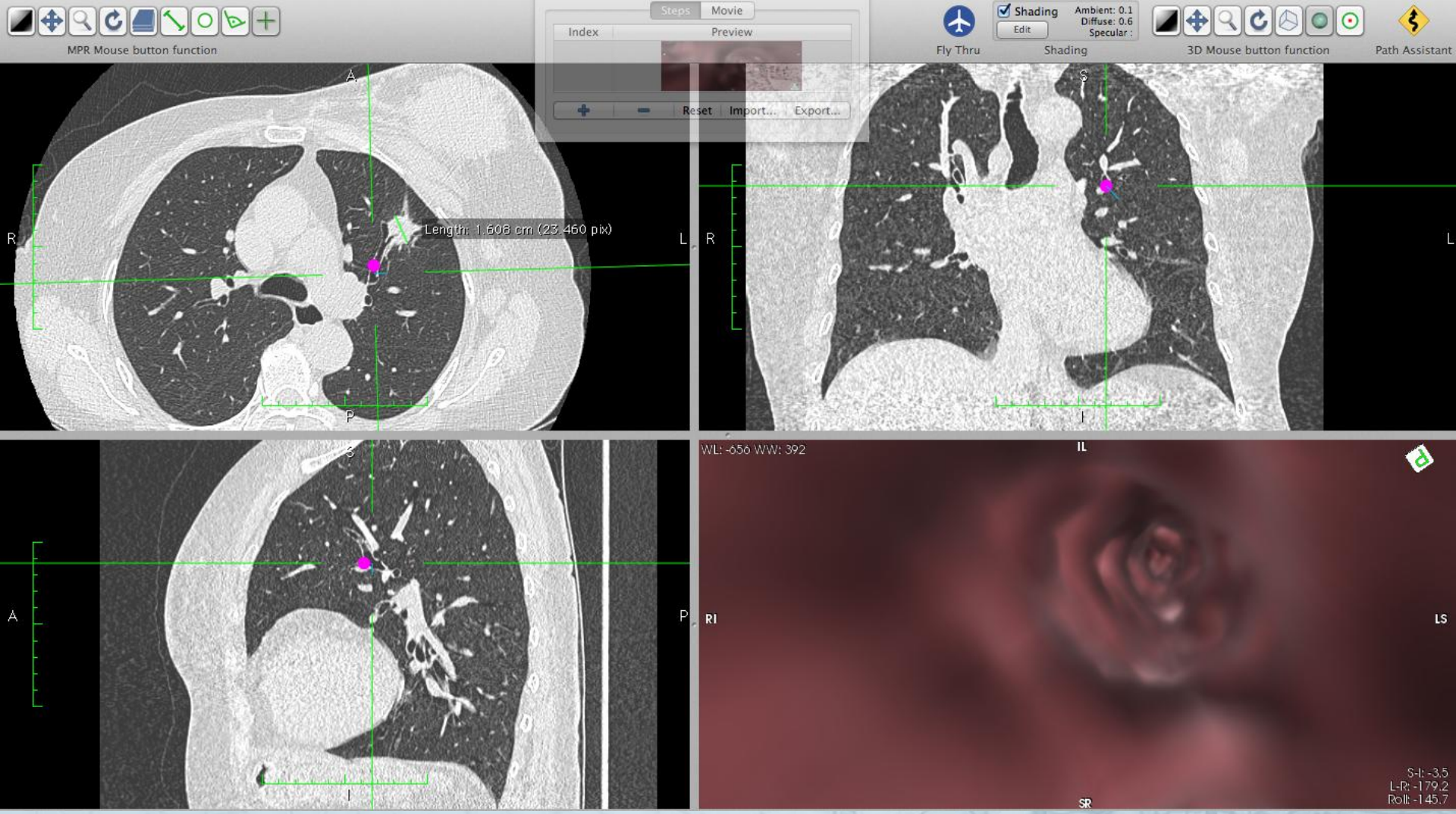

Figure 1 : Construction of virtual bronchoscopy images for a patient with a 1.6cm nodule in the left upper lobe. The endoluminal view at the seventh generation bronchus is shown.

An example on virtual bronchoscopy