Abstract

**Does Addition of Endobronchial Ultra-Sonography (EBUS) to Bronchoscopy and
Computer Tomography improve Diagnosis in Bronchial Cancer?**
– **A prospective study-**

Background: Conventional methods used for diagnosis of lung cancer are still inadequate for objectively estimating the exact depth of tumor invasion to bronchial wall, nodal staging, infiltration of mediastinal structures and extent of early lung cancer. Endobronchial ultrasound (EBUS) was introduced into clinical hospital practice in 2000, as a new diagnostic procedure visualizing bronchial and peribronchial tumors, mediastinal lymph nodes and adjacent vascular structures, with the aim of assessing bronchial wall and extraluminal pathology. **Purpose:** Since major European publications deal with EBUS application in general anesthesia, its use in routine bronchoscopy under topical anesthesia has been addressed more closely in this study. Hence the primary question we attempted to answer has been, is the addition of EBUS under topical anesthesia to bronchoscopy practicable and does it improve diagnosis in bronchial cancer beyond computer tomography (CT) and bronchoscopy alone? **Patients, materials & methods:** 50 consecutive patients were recruited with suspected lung cancer (suspicious shadow(s) and / or mediastinal adenopathy in chest CT) undergoing diagnostic and/or staging flexible fiberoptic bronchoscopy. In all patients, EBUS was performed as an adjuvant to bronchoscopy using midazolam sedation, lidocaine mucosal anesthesia and supplemental oxygen. A 20-mega Hz radial mechanical ultrasound probe integrated with a balloon, connected to ultrasound unit is advanced through the 2.8-millimeter working channel FFB to area of interest, where the balloon is inflated to provide a medium for ultrasound transmission. Agreement of EBUS findings with FFB/ CT and cyto-histology, additional information provided by EBUS, complications, patients tolerability under topical anesthesia were assessed. **Results:** Out of the 50 cases with suspected lung cancer, 36 cases were pathologically verified. In 36 lung cancer cases, EBUS findings coincided with those of FFB and CT in main features of the disease process. EBUS provided additional information in 25 cases (69%), in which 20 additive lymph nodes were detected; depth of tumor invasion was determined in 18 cases and compression of pulmonary arteries in 2 cases. In addition, it was helpful in explanation of bronchoscopic findings in 19 cases (53%) and exclusion of mediastinal structures infiltration. On the other hand, FFB and CT provided additional information in 7 cases (19%). In all studied cases, EBUS assisted transbronchial needle aspiration biopsy had diagnostic yield in extraluminal lesions up to 89% and 90% in mediastinal and intrapulmonary adenopathy. EBUS addition could change the nodal descriptors in 4 cases and patient stage in 2 cases, but without any subsequent therapeutic consequences. The complications encountered in all studied cases were either mild (6) or moderate (1) desaturation, mild (9) or moderate (3) cough and 2 cases of tachycardia. The procedure is completely tolerated by most of the patients (66%). There is an average increase in examination time of 15 minutes, constituting 44% of total time of bronchoscopy. **Conclusions:** EBUS application under topical anesthesia is a well-tolerated procedure, associated with mild infrequent side effects, providing valuable beneficial additional information to bronchoscopy and CT; hence its addition can improve the diagnosis and assessment of bronchial cancer. Further expected technical improvements are still needed, which may allow EBUS in the near future to play a more important role in diagnostic and interventional bronchoscopy. **Recommendations:** Prospective multicentre studies are needed for critical assessment of EBUS in operable lung cancer patients, correlating EBUS image findings with postoperative anatomical and pathological findings in same areas examined. A more applicable definition of depth of tumor invasion, the use of 30 MHz probes, the use of double lumen bronchoscopy, the cost effectiveness of procedure and the role of EBUS in peripheral lesions are recommended to be further studied. The sound indications of this new technology need to be settled, in the diagnostic investigation path of lung cancer.