Methods and Patients: Patients with NSCLC and proven ipsilateral or subcarinal lymph node metastases (N2 disease, 3A disease stage) who had been treated with induction chemotherapy and showing at least stable disease or partial response on CT imaging underwent mediastinal restaging by EBUS-TBNA. This was followed by surgical resection of the tumour with lymph node dissection.

Results: 124 Patients (51 male, 73 female, mean age 58 y.), had either a partial response (n=66) or stable disease (n=58) based on sequential CT scans of the thorax. After restaging all patients underwent surgery. Overall the sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of EBUS-TBNA for mediastinal re-staging following induction chemotherapy were 76%, 100%, 100%, 20% and 77% respectively.

Conclusions: EBUS-TBNA is an accurate, safe and minimally invasive diagnostic technique for the restaging of mediastinal lymph nodes after induction therapy in NSCLC. It’s routine use for this purpose should be considered.

C2-02 Factors effecting risk of pneumothorax (PNX) in CT-guided transthoracic needle biopsy of lung lesions: results of 708 consecutive procedures

Priola, Adriano M.1 Novello, Silvia2 Priola, Sandro M.1 Longo, Marina3 Cataldi, Aldo1 Errico, Luca1 Garofalo, Giorgio1 Giaj Levra, Matteo1 Scagliotti, Giorgio V.1 Fava, Cesare1

1 University of Turin, Radiology Dept, Orbassano, Italy 2 University of Turin, Radiology Dept, Orbassano, Italy 3 University of Turin, Thoracic Oncology Dept, Orbassano, Italy 4 University of Turin, Thoracic Surgery, Orbassano, Italy

Background: CT-guided Transthoracic Needle Biopsy (TNB) is commonly used in the diagnosis of thoracic lesions. PNX is the most common complication of this procedure with a reported rate from 8 to 61%, with few cases requiring chest tube insertion. The aim of this prospective study was to estimate the risk of PNX in patients undergoing CT-guided lung biopsy and to determine which factors affect its occurrence.

Methods: Between November 2002 and August 2006, 708 TNB were performed in 691 patients with a CT-documented central or peripheral pulmonary lesion: 75% were males, median age was 67 years (range 29-87). Risk factors for PNX were classified in three groups: patient-related (age, sex, emphysema around the lesion), lesion-related (size, depth, location, presence of cavitations and/or pleural tags, chest wall invasion, pleural thickening, fissure/atelectasis in the needle path) and procedure-related (patient position, needle puncture side, chest wall thickness, dwell-time (time between pleural puncture and needle removal), needle-pleural angle (smallest angle of the needle with the pleura), number of cutting specimens, number of pleural passages. Lesion depth was measured as the length of the aerated lung from the surface of pleura to the edge of the lesion. Lesion size was considered the average lesion diameter in two axial planes. Immediately after the procedure, a CT scan was obtained to control presence of PNX; patients were followed-up for 4 hours and chest radiographs were obtained at the end of this period. All variables were analysed by Chi-square and Student t test for occurrence of PNX and p value < 0.05 was considered as statistically significant.

Results: PNX occurred in 181/708 procedures (25.6%) and tube insertion was required in 18 cases (2.5%). An higher lesion depth was the most significant predictor of PNX (p=0.002): the mean depth of lesions from the pleural surface was 27.4 mm in patients with PNX and 17.2 mm in patients without PNX. There were 216 lesions in direct contact with the pleura: PNX developed in only 20 (9.2%). Among lesion related variables, chest wall invasion (p<0.03) and lesion size (p=0.03; 31.7 mm in group with vs 38.9 mm in group without PNX) showed correlation. A greater incidence of PNX was seen in smaller lesions: for lesions 1 cm or smaller, the rate was 35%. Among patient and procedure variables, age (68 vs 64 years, p<0.03) and number of cutting specimens (p=0.01) were associated with an increased risk of PNX. Number of pleural punctures, needle-pleural angle, dwell-time, lesion location, presence of emphysema along needle path and sex did not effect risk of PNX.

Conclusion: In consecutive cases of CT-guided TNB the length of the lung parenchyma crossed during the biopsy is the predominant risk factor for PNX. The risk of PNX was also related to the mean lesion size, age, presence of chest wall invasion and number of cutting specimens.

The accuracy of real-time endobronchial ultrasound (EBUS) in the staging of lung cancer

Skwarski, Kristopher M.1 McCafferty, John2 Wood, Fraser1 Wallace, William1 Murray, Maeve1 Chalmers, James1 Matthews, Jennifer2

1 Respiratory Medicine, Royal Infirmary of Edinburgh, Edinburgh, UK 2 The Royal Infirmary of Edinburgh, Edinburgh, UK 3 St John’s Hospital, Livingston, Edinburgh, UK

Accurate staging allows assessment of prognosis and determines treatment plans in patients with lung cancer. Evaluation of mediastinal lymph nodes (LN) is crucial to determine the stage of the cancer. Only up to 20% of patients with lung cancer present in early stage allowing surgical treatment. Current mediastinal staging methods include mediastinoscopy (MS) and CT-PET. MS with the sensitivity of 70% - 95% is the gold standard in evaluation of LN and provides access to LN stations: 2, 3, 4, and 7. MS is an invasive procedure, which requires general anaesthetic, carries minimal, nonetheless, mortality and for technical reasons it is usually done only once. There is therefore a need to develop less invasive techniques allowing an adequate evaluation of mediastinal LN. CT-PET has been shown to be useful in predicting malignant mediastinal LN with a high negative predictive value (97%) but with only moderate positive predictive value (75%). However, CT-PET does not provide histological diagnosis. Real-time Endobronchial Ultrasound FNA with Doppler facilities (EBUS) provides a safe alternative to MS in staging of lung cancer. EBUS allows easy access to mediastinal and hilar LN stations: 2, 3, 4, 7, 10 and 11. EBUS is performed as an out-patient procedure in conjunction with standard bronchoscopy under conscious sedation.

We have performed 300 EBUS procedures from May 2005 until Mar 2007 using an OLYMPUS Ultrasonic Linear Bronchoscope BF-UM40. Tissue samples were obtained using 22G needle and processed using a thin layer technique and stained with PAP. Any residual material was processed as a cell block.

There were 153 positive aspirations for malignancy. In 124 cases we diagnosed Non Small Cell Lung Cancer. 23 Small Cell Lung Cancer and 6 mixed tumours. The most frequently (in order) sampled LN stations were: 7, 4, 10, 11, 2 and 3. There were 7 false negative results. 87 primary tissue diagnoses were obtained and 137 MS were avoided. There were no complications. Calculated EBUS sensitivity was 94%.
with accuracy 96%. 19 patients with N2 negative EBUS pathology went on to have further staging with MS. Four of those patients proved to be N2 positive on mediastinoscopy. Two of these patients had N2 negative CT-PET.

In conclusion, EBUS in conjunction with CT-PET should be considered as a safe and effective alternative for MS in the staging algorithm in lung cancer. It is estimated that approximately 70% of MS could be avoided when EBUS is fully established. We believe that EBUS is a highly sensitive tool in staging of lung cancer and that it may offer a useful role in the re-staging of patients with lung cancer (stage IIIa) after neo-adjuvant therapy. Moreover, careful evaluation of mediastinal and hilar LN with EBUS provides very accurate, non-invasive staging in lung cancer thus assists planning the radical but non-surgical treatment with chemo-radiotherapy.

Success of EBUS TBNA on centrally located lung tumors after non-diagnostic bronchoscopy in patients with suspected lung cancer
Krasnik, Mark1 Skov, Birgit G.2 Eberhardt, Ralf3 Ernst, Armin1 Herth, Felix3

Objective: To determine the ability of endobronchial, ultrasound-guided fine needle aspira-tion (EBUS-FNA) to successfully biopsy centrally located lung tumours in patients for whom conventional bronchoscopy has been non-diagnostic

Methods: Patients (n = 110) with suspected lung cancer and an intrapulmonary tumour located near or adjacent to the central part of the bronchial tree, or with suspected metastases to the mediastinum or to the hilar lymph nodes, and who had undergone a non-diagnostic bronchoscopy, underwent EBUS-FNA. Diagnoses based on EBUS-FNA biopsies were verified by mediastinoscopy or EUS FNA and if these procedures was non-diagnostic during surgical resection if the biopsy indicated non-small-cell lung cancer

Results: EBUS-FNA biopsies established a specific diagnosis in 103 of 110 patients (97%) and a diagnosis of lung cancer in 82 patients (72%). No complications occurred. The diagnoses made possible by EBUS-FNA were confirmed in all patients by mediastinoscopy, EUS FNA or thoracotomy. In 17 patients the malignant diagnose was obtained by puncture of N1 Lymph Nodes.

In 7 patients in whom EBUS-FNA was non-diagnostic because the cell types were not representative of this disease, a diagnosis was established at surgery.

Conclusions: EBUS-FNA qualifies as the next diagnostic step in patients with suspected lung cancer, if conventional bronchoscopy is non-diagnostic and when the intrapulmonary mass is located adjacent to or near the central parts of the bronchial tree or in whom metastases to the mediastinum or hilar lymph nodes is suspected. In these cases, EBUS-FNA may decrease the number of required mediastinoscopies and exploratory thoracotomies.

Is mediastinoscopy necessary for T1N0 NSCLC on both CT and integrated PET/CT scan?
Choi, Yong Soo1 Kim, Kwhannmien1 Kim, Jhingook1 Kim, Byung-Tae2 Lee, Kyung Soo3 Shim, Young Moo4

1 Department of Thoracic Surgery Samsung Medical Center Sungkyukwan University School of Medicine, Seoul, Korea 2 Department of Nuclear Medicine Samsung Medical Center Sungkyunkwan University School of Medicine, Seoul, Korea 3 Department of Radiology and Center for Imaging Science Samsung Medical Center Sungkyunkwan University School of Medicine, Seoul, Korea

Background: Mediastinoscopy has been a gold standard for mediastinal staging of non-small cell lung cancer. We questioned that mediastinoscopy is still necessary as a staging tool for T1N0 NSCLC on both CT and PET/CT.

Methods: We conducted a retrospective review of 284 consecutive patients with T1N0 on both CT and PET/CT scan between July 2003 and December 2006. All patients were surgically examined for mediastinal node by mediastinoscopy (n=145) or direct curative pulmonary resection and complete mediastinal node dissection (n=139). Neoadjuvant therapy was planned for mediastinoscopy-positive patients (n=6) and pulmonary resection were performed for mediastinoscopy-negative patients (n=139).

Results: Median patient age was 60 years (23-81 years), and 59% were male (n=168). Cell types of lung cancer pathology included adenocarcinoma (n=201), bronchioloalveolar carcinoma (n=20), squamous carcinoma (n=44), large cell carcinoma (n=6), and others (n=13). Fifteen patients showed pathological N2 disease, therefore false negative rate of CT and PET/CT imaging was 5.3% (15/284). They had all pathology of adenocarcinoma. N2 disease was found in two patients (1 paratracheal and 1 subcarinal node) among 139 patients who underwent resection without mediastinoscopy. False negative rate of imaging combined with mediastinoscopy was 5.0% (7/139); 7 patients had N2 among 139 patients who underwent resection following mediastinoscopy-negative result (3 paratracheal/subcarinal, 3 subaortic, and 1 inferior pulmonary ligament LN).

Conclusions: CT and PET/CT scan provided satisfactory value of negative predictive rate of mediastinal node staging in T1N0 NSCLC. Further evaluation by mediastinoscopy in T1N0 on CT & PET/CT was not helpful due to limitation to examine subaortic and lower mediastinal nodes and its inherent procedural errors. In conclusion, mediastinoscopy is not recommendable for staging tool of T1N0 NSCLC on CT and PET/CT.

Integrated PET/CT versus 3T whole body MR imaging: efficacy comparison in non-small cell lung cancer staging
Shin, Kyung-Min1 Yi, Chin A2 Lee, Kyung Soo3 Kim, Byung-Tae1 Kim, Hojoong1 Kwon, O Jung4 Chung, Myung Jin5 Choi, Joon Young3 Kim, Seonwoo6

1 Samsung Medical Center, Seoul, Korea 2 Department of Radiology and Center for Imaging Science, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea 3 Division of Pulmonary and Critical Care Medicine, Department of Medicine, Samsung Medical Center,