244. Progress in endoscopy for the diagnosis of lung cancer

P1967

Quality matters in lung cancer diagnosis – Comparison of endobronchial cryobiopsy with conventional forceps biopsy

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Introduction: Endoscopic forceps biopsies are often small and inadequate for detailed analysis whereas biopsies obtained with cryoprobes may provide tissue samples that are larger and better preserved. We compared the quality and complication rate of endoscopic forceps- and cryobiopsies.
Methods: Prospectively collected data of patients who underwent cryobiopsy (CB, n=14) were compared with randomly selected patients who had conventional forceps biopsies (FB) during the same time period (n=13). All patients were considered prospectively to have definite endobronchial tumour. Sample size and quality was assessed. Complication rate and final diagnosis were also recorded.
Results: Maximum sample diameter was significantly larger in the CB group (median 1.6cm, range 0.7-3.0cm) compared to the FB group (median 0.5cm, range 0.3-1.3cm, $p<0.001$). All biopsy samples were diagnostic of malignancy apart from 1 CB sample showing necrosis only. Semiquantitative analysis showed a smaller proportional tumor area within the biopsy when forceps were used (median 50%, range 0-90%) compared to the cryoprobe technique (median 90%, range 50-100%, $p<0.001$). 6 of 13 FBs had artifact changes affecting up to 90% of the biopsy whereas only 1 CB had minor artifact changes of 5%. 1 FB patient had mild bleeding. Mild and moderate bleeding were seen in 2 CB patients, respectively.
Conclusions: Cryobiopsy appears to provide larger and higher-quality tumour specimens than conventional forceps biopsy. These differences may become important in an era of targeted therapies for individual patients, when multiple testing of biopsies is required. We believe the technique of cryobiopsy merits further evaluation.

P1968

Bronchoscopic cryotechnique gains high diagnostic rate in submucosal tumor growth

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Introduction: The diagnostic yield of endoscopic biopsy in the central bronchial system is impaired when submucosal tumor growth is present. Conventional forceps biopsy fails to reveal conclusive histology even in cases of extrabronchial compression or other indirect tumor signs. Since endoscopic cryotechniques have increasing impact for diagnoses of malignant and inflammatory lung disease we compared the diagnostic rate of forceps and cryoprobe in patients with suspected submucosal tumor growth.
Methods: 116 patients with macroscopic submucosal tumor infiltration were investigated prospectively with forceps- and cryobiopsy from 05/2009 to 02/2011. In all cases 1-3 forceps and 1-2 cryoprobe biopsies were obtained, other biopsy methods were added as needed. Specimens underwent routine histopathological processing.
Results: Histological diagnosis was achieved with the following specimens: Forceps 4/116 pts. (3.5%), cryo 48 (41.4%), forceps/cryo 34 (29,3%), cryo/TBNA 2 (1,7%), cryo/EBUS 6 (5.2%), forceps/cryo/TBNA 2 (1,7%), forceps/cryo/EBUS 2 (1,7%), TBNA 4 (3,5%), EBUS 12 (10.3%), CT-guided biopsy 2 (1,7%). Hit ratio of forceps in contrast to cryoprobe in all combinations was 42 (36.2%) and 94 (81%) respectively. Severe hemorrhage (>3 min) as the only complication occurred in 8 (6,9%) cases.
Discussion: In case of endobronchial submucosal tumor growth we found a relevant difference of diagnostic yield and a decisive superiority of cryotechnique, which should be considered for routine use in diagnostic bronchoscopy.

P1969

Does routine use of EBUS-TBNA and EUS-FNA improve the accuracy of staging of non small cell lung cancer patients – A national tumor registry based study

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Background: Evaluation of the extend of disease or stage (TNM) is a prerequisite for correct treatment of lung cancer. Several studies have showed that biopsies and fine needle aspirations obtained by EBUS-TBNA and EUS-FNA yield similar results as mediascopy, which previously have been considered the gold standard for evaluation of mediastinal nodal involvement in NSCLC. Thus EBUS-TBNA and EUS-FNA should now be considered as procedures which are equally effective as mediastinoscopy in staging while at the same time being more gentle to the patient.
Material: We therefore used data from a population based lung cancer registry to evaluate the association between frequency of use of EBUS-TBNA/ EUS-FNA and precision of mediastinal diagnostic work-up. EUS in diagnostics and staging of lung cancer have been used in several centres for more than a decade and since 2005 several centres have inter grated EBUS TBNA in their procedures.
Results: The material consisted of 7000 operated patients since 2003. The use of endoscopic ultrasound (EBUS-TBNA/EUS-FNA were mostly used in one region and mediastinoscopy in another. The concordance between cN and pN were higest and equal in the regionswhere mainly mediastinoscopy were used and the reion where Endoscopic Ultrasound were used
Conclusion: For the first time it is possible to get an impression of the impact of the use of EBUS-TBNA and EUS-FNA in a national populationof lung cancer patients. The were no difference in the cN/pN ratio in the areas where they used mediastinoscopy and where they used endoscopic Ultrasound.

P1970

Impact of endobronchial ultrasound guided transbronchial needle aspiration (EBUS-TBNA) in the evaluation of mediastinal adenopathy in lung cancer

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Introduction: TBNA is an established technique for sampling mediastinal nodes in the diagnosis and staging of lung cancer. The advent of EBUS-TBNA has allowed the respiratory physician to access more and sample smaller nodes than conventional TBNA.
Aims: To determine the diagnostic yield, sensitivity and specificity of conventional TBNA (cTBNA) and EBUS-TBNA in our unit.
Methods: Data collected included patient characteristics, nodes sampled, pathological diagnosis and clinical outcome. Following EBUS introduction, this data was collected prospectively over a 6 month period.
Results: 63 cTBNA procedures were performed in the months preceding EBUS introduction. The overall diagnostic yield was 71.43% (n=45) and 46.67% (n=21)

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of these specimens were from station seven. 78 specimens were acquired via EBUS-TBNA in the first 6 months of the programme. The diagnostic yield was 83.33% (n=65), 42.3% (n=32) samples were from station 7, 28.1% (n=22) from 4R, 5.1% (n=4) from 4L and 9% (n=7) from 10R. Sensitivity for cancer improved from 80.65% in the cTBNA group to 83.33% in the the EBUS-TBNA group despite a dip to 75% in the first 3 months of the programme when analysed seperately. Specificity was 100%. There were no major complications.
Conclusions: EBUS-TBNA was associated with improvement in diagnostic yield and sensitivity for lung cancer nodal involvement when compared to conventional technique. A clear learning curve was seen but overcome within 3 months. This improvement in yield and the ability to sample more nodal locations may reduce referral for surgical or repeat procedures.

P1971
Evaluation of endobronchial ultrasound-guided needle aspiration selected samples – The point of view of pathology
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Some studies were done to compare EBUS-TBNA with other methods.
The diagnostic finding of the EBUS-TBNA probes and every other medical report of the patient was recorded. Malignancies were subdivided in NSCLC NOS, Adenoca, Squamous Cell Ca, Small Cell Ca, Malignancies other than the lung cancer and Maligancies NOS. The same localisation of the lung analysed with TBNA was examined with another method such as resection or biopsy in selected cases. With this data, the accordance between the sampling techniques was controlled. Of these 222 TBNA probes, from lymphnode stations 7, 10, 4 and 2 such as upper thoracal lesions, in 206 (93%) cases a diagnose (tumor or not-tumor) was made, in 16 (7%) cases no clear diagnosis could be made concerning the worse tissue quality. 128 (62%) probes were without tumorcells and 38% probes contained tumorcells. EBUS-TBNA samples were compared with the resected tissue or biopsy findings. In 17 of 128 of tumor-containing samples had a resection or biopsy, 82% had the same diagnosis, 6% another diagnosis and in 12% cases no diagnosis could be made on this material.
These 78 tumor-containing probes 31% were also checked by biopsy or resection. In 75%cases the same diagnosis was made on EBUS-TBNA and the method. In 8%cases the diagnosis could not be specified and was doubtful, in 13% cases the diagnosis was different and in 4% case the EBUS-TBNA was done twice with two different diagnosis.
EBUS-TBNA was proved clinical as safe technique and reliable in lung cancer staging and metastases detection. Histological subtyping of lung cancer is possible such as molecular-pathological analysis can also be done from resected tissue or biopsy material.

P1972
Can mediastinoscopy after negative endosonography in lung cancer be omitted? Subanalysis of ASTER with focus on CT
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Background: Mediastinal staging in non-small cell lung cancer with endosonography (EUS-FNA plus EBUS-TBNA) followed by mediastinoscopy is more sensitive to detect nodal metastasis as compared to mediastinoscopy alone (ASTER trial, JAMA 2010;304:2245). However 11 patients need to undergo a mediastinoscopy to detect one with N2/3 missed by endosonography. We analysed if lymph node size measured on CT scan can identify patients in whom the mediastinoscopy can be omitted.
Methods: In ASTER, 123 patients were randomized to endosonography followed by mediastinoscopy if the former did not show mediastinal metastasis. Sensitivity, negative predictive value (NPV) and number of mediastinoscopies needed to detect one false negative endosonography were calculated in the cases with complete data (n=120; 98%).
Results: With CT, 74 patients had enlarged mediastinal nodes (≥10mm), the prevalence of N2/3 was 65 (54-75)%. Sensitivity and NPV of endosonography was 86 (74-93) and 77 (60-88)%. Adding mediastinoscopy increased sensitivity and NPV to 96 (87-99) and 93 (77-98)%. In the 46 patients without enlarged mediastinal nodes (N0/1) the prevalence of N2/3 was 39 (26-54)%. Sensitivity and NPV of endosonography was 89 (67-97) and 93 (79-98)%. Adding mediastinoscopy did not improve this. In patients with enlarged vs normal-sized mediastinal nodes, the number of mediastinoscopies needed to detect one false negative endosonography is 6 vs. infinite (p=0.026).
Conclusions: A negative endosonography should be followed by a mediastinoscopy in patients with enlarged mediastinal nodes on CT. In the absence of enlarged nodes, a mediastinoscopy following a negative endosonography can be omitted.

P1973
Can mediastinoscopy after negative endosonography in lung cancer be omitted? Subanalysis of ASTER with focus on PET
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Background: Mediastinal staging in non-small cell lung cancer with endosonography (EUS-FNA plus EBUS-TBNA) followed by mediastinoscopy is more sensitive to detect nodal metastasis as compared to mediastinoscopy alone (ASTER trial, JAMA 2010;304:2245). However 11 patients need to undergo a mediastinoscopy to detect one with N2/3 missed by endosonography. We analysed if FDG-PET identifies patients in whom the mediastinoscopy can be omitted.
Methods: In ASTER, 123 patients were randomized to endosonography followed by mediastinoscopy when the former did not show mediastinal metastasis. Sensitivity, negative predictive value (NPV) and number of mediastinoscopies needed to detect one false negative endosonography were calculated in the cases with complete data (n=120; 98%).
Results: With PET, 77 patients had FDG-avid mediastinal nodes; the prevalence of N2/3 was 73 (62-81)%. The sensitivity and NPV of endosonography was 88 (76-94) and 75 (57-88)%. Adding mediastinoscopy increased sensitivity and NPV to 96 (88-99) and 91 (73-98)%. 43 patients did not have FDG-avid mediastinal nodes, the prevalence of N2/3 was 23 (13-38)%. The sensitivity and NPV of endosonography was 70 (40-89)% and 92 (78-97)%. Adding mediastinoscopy increased sensitivity and NPV to 80 (49-94)% and 94 (81-98)%. In patients with FDG-avid vs. FDG-cold mediastinal nodes, the number of mediastinoscopies needed to detect one false negative endosonography is 6 vs 36 (p=0.078).
Conclusions: A negative endosonography should be followed by a mediastinoscopy if PET positive mediastinal nodes are present. In the absence of PET positive nodes, a mediastinoscopy following a negative endosonography can be omitted.

P1974
Risk of lung cancer in patients with preinvasive bronchial lesions followed by autoflurescence bronchoscopy and chest computed tomography
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Introduction and aim of the work: To assess risk of lung cancer (LC) in patients with preinvasive bronchial lesions and to identify factors associated with higher risk.
Patients and methods: 124 patients with one or more preinvasive bronchial lesions and normal chest computed tomography (CT) (mean age 66.7 years, 121 males and 3 females), followed-up by white light and autofluorescence bronchoscopy (AFB) every 4-6 mo and chest CT every 6-12 mo, end points were development of carcinoma in situ (CIS) or LC.
Results: Among 124 patients with 240 preinvasive bronchial lesions, 20 CIS or LC lesions were detected during follow-up in 20 (16%) patients, 7 were detected as new endobronchial lesions, 10 as new peripheral lesions and 3 as local progression from severe dysplasia to CIS. Median time to progression was 24 months (range: 6-54 mo). The Cumulative risk of progression was 7% at one year, 20% at three years and 44% at 5 years. Among detected lung cancers, 80% were stage 0 or stage1 and underwent treatment with curative intent. Diagnosis of new SD during follow-up (p=0.0001), chronic obstructive pulmonary disease (COPD) (p = 0.001) or smoking index >52 packyear (p = 0.042) was associated with higher risk. Even after controlling for other risk factors,COPD was associated with risk of progression. Baseline lesion grade was not predictive of patient outcome (p = 0.146).
Conclusions: Patients with preinvasive bronchial lesions, especially those with new SD during follow-up, COPD or smoking >52 pack-year are at high risk of LC, AFB and CT follow-up facilitated early detection and treatment with curative intent.

P1975
Validation of diagnostic molecular markers in bronchial fluid for lung cancer
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Aim: To set a diagnosis method in bronchial fluid to detect lung cancer (LC) with high sensitivity. For this, using proteomic techniques, we have identified some biomarkers which are increased in patients with LC.
Material/Methods: We have included bronchial aspirates samples from 204 patients diagnosed with lung cancer by biopsy 141 non-microcytic (NSCLC) (59

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adenocarcinoma and 82 epidermoid), 63 microcytic (SCLC) and 49 control patients with other non malignant pathologies.
Inmunoassays have been performed based on xMAP technology (luminex R) for each specific molecular marker. Once the assay has been designed and optimized, the amount of each marker has been quantified in each sample. Both groups were compared with control group using t-student test. The diagnostic capacity of each marker has been evaluated by ROC curve. Finally, model was obtained by multivariate logistic regression analysis.
Results: Inmunoassays have been performed and optimized, for each marker, such as NSCLC as SCLC cancer, in bronchial aspirates samples:
- 5 markers that detect NSCLC with sensitivity of 95% and specificity of 77% have been obtained. The calculated ROC area was 0,95.
- 6 markers that detect NSCLC with sensitivity of 95% and specificity of 81% have been obtained. The calculated ROC area was 0,96.
Conclusions: Some protein markers are expressed differently in patients with cancer, not only NSCLC but also SCLC, and in patients without cancer. These proteins detect these tumors with high sensitivity and specificity. Due to this, these markers could be used to design a diagnostic test in clinical routine.

P1976
Curette lavage fluid analysis of *EGFR*, *KRAS*, and *P53* mutations in lung cancer patients
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Purpose: Mutation analyses of individual lung cancer patients should provide useful information for determining treatment. When sufficient tissue samples for pathology cannot be collected by bronchoscopy, cytology is substituted to establish diagnosis. In this study, epidermal growth factor receptor (*EGFR*), *KRAS*, and *P53* mutations in cells attached to the curette were analyzed by collecting the lavage fluid.
Subjects: Samples were obtained from 63 lung cancer patients receiving treatment from April, 2009 to October 2010 at the Department of Respiratory Medicine, Showa University Fujigaoka Hospital. Official approval for the study was obtained in advance from the Ethics Committee for Genomic Research at Showa University.
Methods: DNAs were extracted from cells in the curette lavage fluid. PCRs were performed to amplify mutation hot spot regions in *EGFR*, *KRAS*, and *P53*. The PCR products were direct-sequenced, and the mutations confirmed by sequencing with both forward and reverse primers.
Results and discussion: Seven patients were found with *EGFR* mutations and seven with *P53* mutations. No mutation in *KRAS* was identified. The mutation rates observed here for the three genes were lower than those reported previously by others. However, *EGFR* exon 19 deletions were identified in 6 of 53 non-small cell lung cancer patients in this study (11.3%), making it comparable to that reported elsewhere. It is felt that in instances where the number of cancer cells in the test sample is low, it becomes difficult to detect point mutations and insertions. It should be cautioned that in instances where direct sequencing is utilized, mutation detection standards may vary according to the individual facility.

P1977
Clinical utility of EGFR gene mutation analysis with cytological materials from bronchoscopy not histological materials
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Rationale: Epidermal growth factor receptor (EGFR) gene mutation analysis becomes essential in medical cares for non-small-cell lung cancer after the report of the effectiveness of Gefitinib for non-small-cell lung cancer patients who have EGFR gene mutations. Although most of materials for EGFR gene mutation analysis in the past reports or clinical practice is submitted from lung tissue, we must sometimes diagnose patients as lung cancer with cytological materials because it is sometimes difficult to get enough tissue materials in clinical practice.
Method: In our hospital, after we take cytological materials from bronchoscopy, we wash devices with saline in the microcentrifuge tube and store this tube in a deep freezer immediately. When the patient is diagnosed as non-small-cell lung cancer with cytological materials, we analize the frozen materials for EGFR gene mutation with a PCR clamp method.
Result: One hundred and seventy eight patients were diagnosed as non-small-cell lung cancer with cytological materials from December 16, 2008 to August 5, 2010. We could diagnose histological materials only half of cases. The number of non-small-cell lung cancer patients who had EGFR gene mutations was 36 (20.2%). Especially 34.4% of adenocarcinoma patients had EGFR gene mutation, so there was no great difference with the rate of past reports that used tissue diagnosis. The response rate of EGFR-tyrosine kinase inhibitor for the patients who had EGFR gene mutations was 83%, similar to that of past reports.
Conclusion: Cytological materials from bronchoscopy are useful enough for EGFR mutation gene analysis.

P1978
Prognostic impact of angiogenesis factors in bronchoscopic washing fluid from patients with non-small cell lung cancer
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Background: Angiogenesis has been proven to be a process related to the migration, proliferation and metastasis of cancer cells. The prognostic value of angiogenesis factors is still controversial.
Aim: The aim of this study is to define the VEGF, VEGFR1 and VEGFR2 and the ratios of VEGF/VEGFR1 and VEGF/VEGFR2 in the blood serum and the washing of patients with newly diagnosed non-small cell lung cancer (NSCLC).
Methods: 40 patients with NSCLC participated in this study. The measurement of the circulating (c) and washing (w) levels of VEGF, VEGFR1 and VEGFR2 was carried out with the ELISA method.
Results: cVEGF levels is correlated with T descriptors in TNM staging system (r=0.021), as well as the ratio VEGF/VEGFR2 in serum and washing (r=0.03. and r=0.040 relatively). From those who were treated with chemotherapy, best responses were observed in lower concentrations of VEGF in serum and washing ($r<0.001$). Higher concentrations of wVEGF are correlated with worse overall survival (HR 2.208, 95%CI 1.132-4.308, P=0.020) and PFS (HR 2.265, 95%CI 1.145-4.483, P=0.019). Similar results for OS and PFS were observed with high values of the wVEGF/VEGFR2 ratio. Multivariate Cox analysis revealed as independent markers for overall survival VEGFR2 levels in serum and washing (r=0.017 and r=0.004 relatively), while for PFS independent markers were VEGFR1 (r=0.004), VEGF/VEGFR1 (r=0.033) and VEGF/VEGFR2 (r=0.007) in washing.
Conclusions: The circulating VEGF levels are controversial. Nevertheless, the definition of angiogenic markers in washing could recognize a high risk group of patients who could benefit from an aggressive initial therapeutic approach.

P1979
Does immediate cytological analysis at bronchoscopy lead to reduced number of biopsies?
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Introduction: The British Thoracic Society guidelines [1] for diagnostic flexible bronchoscopy in adults are currently under review. Present guidelines highlight the importance of needing five endobronchial biopsies (EBs) to optimise diagnostic yield. The aim of our study was to find out whether the availability of a cytopathologist during bronchoscopy has led both to a reduction in the number and need of EBs performed.
Method: The study period was March to October 2010. We reviewed whether the use of immediate analysis of brush biopsies or tumour roll on EBs performed had led to a reduction in number of EBs performed by comparing the number of biopsies performed during this period to numbers performed prior to our in-room cytopathologist set up. We also reviewed 14 consecutive patients who had EBs performed during the study period to look at both how many biopsies tended to be first pass positive and how many biopsies in total were taken per patient.
Results: We found that the availability of a cytopathologist within the bronchoscopy room has led to a significant reduction in the number of EBs performed without detriment to diagnostic rate or further testing like IHC and EGFR status. Of the 14 patients who had EBs 85% of cases were first pass positive with the mean of total biopsies taken being two.
Conclusion: Our retrospective study shows that the availability of an in-room cytopathologist reduces the number of biopsies performed and thus associated complications. Furthermore our small cohort demonstrates that even without a cytopathologist the recommended five EBs is unnecessary.
Reference:
[1] The British Thoracic Society Bronchoscopy Guideline Committee - Thorax 2001. 56(Suppl I):i1-i21.

P1980
The efficacy of cytology sampling in the diagnosis of suspected endobronchial lung cancer
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Introduction: Fibreoptic bronchoscopy (FOB) is a minimally invasive procedure that is regularly performed on an outpatient basis to aid diagnosis in suspected cases of lung cancer.
Objective: To review the usefulness of FOB obtained washings and brushings in the presence of an endobronchial lesion in the diagnosis of lung cancer.
Method: Retrospective analysis of 23 suspected lung cancer cases undergoing FOB (by supervised trainees). 16 cases with a visible endobronchial lesion underwent histological and cytological sampling; the remaining 7 had cytological sampling alone.
Results: 15 (94%) cases with a visible endobronchial lesion were proven to have a cancer. 7 (47%) cases had positive histology and cytology. 5 (33%) cases had

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positive histology alone. 3 (20%) cases had positive cytology but negative histology in the context of an endobronchial lesion. All 7 patients without an endobronchial lesion had negative cytology and were subsequently found not to have cancer. Only 1 patient with an endobronchial lesion had both negative histology and cytology, and was proven not to have cancer.
Conclusion: From this retrospective analysis we conclude that 20% of lung cancers would have been missed had cytological samples not been taken in addition to endobronchial biopsies. Therefore we suggest that any patient with an endobronchial lesion should have brushings and washings accompanying a biopsy. We cannot deduce from our small study whether, in the absence of a visible endobronchial lesion, brushings and washings are diagnostically valuable.

P1981
Relative contribution of cytological specimen type in the determination of lung cancer histologic identity – Analysis of one year's comparative data
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We retrospectively evaluated the relative contribution of cytological specimens in identifying the histologic type of lung cancer. Seventy-four patients (50 male & 24 female) aged 63±8.9 years (mean±SD), eventually diagnosed to have lung cancer were studied. Diagnosis was established by either bronchoscopic or surgical biopsy.The spectrum of cytological specimens included: simple sputum smear (SP), bronchial washings (BW), post-bronchoscopy sputum (PB), brushing smears (BS) and transthoracic fine needle aspirates (FNA). The distribution of histologic types was as follows: Small Cell Lung Cancer (SCLC) 24 pts (32.4%), Squamous Cell Carcinoma 20 pts. (27%), Adenocarcinoma 14 pts. (18.9%), Undifferentiated Carcinoma 6pts (12.3%), Large cell Carcinoma 2 pts. (0.28%). Analysis of data showed that simple sputum cytology was diagnostic in 24.3% (relative contribution 66.6% for SCLC and 33.4% for NSCLC). Success rate of BW was 42% (almost equally partioned between SCLC & NSCLC 52% & 48% respectively). BS diagnosed 23% of lung cancer, of which 56.3% was the yield for adenocarcinoma. The contribution of FNA smears cannot be evaluated due to the very small sample size (only 2 patients which was successful in both).The overall contribution of cytology in the diagnosis among all types of lung cancer cases studied was 57 pts among a total of 74 (77%). We conclude that simple sputum cytology should not be neglected (having a diagnostic rate of 25% of patients) while the significance of BS in adenocarcinoma (56.3%) should be emphasized given its frequent peripheral location that does not allow obtaining tissue for histologic diagnosis.

P1982
Liquid-based cytology in the diagnosis of pulmonary malignancy in bronchial brushings and washings
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Background and aims: Bronchial cytology (BC) is well established in the diagnosis of lung cancer but some cases remain equivocal. Liquid-based cytology (LBC) was developed to improve the diagnostic accuracy and increase the sensitivity for malignancy in BC. The study was conducted to compare the diagnostic performance of CytoRichRed (CRR) fixed Tripath preparations with conventional smears (CS) from bronchial brushings (BB) and bronchial washings (BW).
Methods: BB and BW from 61 patients, subjected to fiberoptic bronchoscopy were studied. BW specimens were split into two equal parts, one part was fixed in CRR and prepared according to the TriPath protocol, one part was ethanol-fixed and stained according to Papanicolaou. BBs were smeared onto slides, air-dried and Giemsa-stained, then brushes were rinsed in CRR and the cellular suspensions were processed according to the Tripath technique. Slides were evaluated in a blinded fashion and cytological diagnoses were compared with "true" diagnoses, based on histology and clinical data.
Results: In all 575 and 244 CS and 61 and 61 CRR/Tripath slides were prepared from the BB and the BW, respectively. CS diagnoses agreed in 57/61 cases. In the four discrepant cases the conventional/CRR diagnoses were atypia/benign, benign/atypia (malignancy favoured), benign/equivocal, atypia (reactive favoured)/benign. All four cases turned out to be malignant.
Conclusions: The diagnostic accuracy did not differ between conventional and CRR/Tripath preparations, Our results indicate that LBC using CCR/Tripath can replace CS, significantly reducing work load and cost.

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Endobronchial ultrasound and fluoroscopy in the study of peripheral lung lesions
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Introduction: Endobronchial ultrasound (EBUS) is a minimally invasive technique that expands the view of the bronchoscopist beyond the lumen of the airway. Radial probe EBUS (rEBUS) is used for the detection of peripheral lung lesions.
Aim: To analyze the diagnostic yield of rEBUS in peripheral pulmonary lesions.
Methods: All patients which *underwent bronchoscopy* to study peripheral lung lesions from January 2009 to February 2011 were prospectively included. Patients were randomly distributed in two groups: fluoroscopy and rEBUS (30 patients, 70.4±7.8 years) or fluoroscopy alone (64 patients, 68.1±10.9 years). All procedures were performed under fluoroscopic guidance with iv conscious sedation. rEBUS was performed using an endoscopic ultrasound system (EU-M60, Olympus, Tokyo, Japan), equipped with a 20-MHz mechanical radial type miniature probe (UM-BS S20-17S). Bronchoscopist, cytologist, study protocol, techniques and tools were the same ones throughout the whole study.
Results: 94 patients (68.9±10 years) with peripheral pulmonary lesions suspicious of malignancy were studied. The average size of these lesions was 35.2±13.6 mm in rEBUS group vs 41.8±19.6 mm in fluoroscopy group (n.s). In 26 cases (27.6%) the size was <30 mm: 7 cases (23%) in rEBUS group vs 19 (29%) in fluoroscopy group (n.s). Global diagnostic yield was 73% using rEBUS whereas it was 67% when using fluoroscopy alone (n.s.). Diagnostic yield in lesions <30 mm was higher in rEBUS (86% vs 58%, n.s.). No complications were reported related to rEBUS or iv sedation.
Conclusions: rEBUS is a promising, useful and safe technique for the diagnosis of peripheral pulmonary lesions, especially in those of small size.

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Diagnosis of pulmonary nodules localized beyond the range of standard bronchfiberoscope – Preliminary results
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Background: There is a wide range of tools used in diagnosis of pulmonary nodules localized beyond the range of standard bronchfiberoscope, but is still difficult to choose best method to obtain tissue samples.
Aims and objectives: The aim of our study was to asses safety and utility of methods currently used in Department of Pulmonology in Katowice, Poland, and on the basis of obtained results to prepare diagnostic protocol to be tested in prospective study.
Methods: 93 consecutive patients records (56 females and 37 makes) were analyzed. Included patients had at least one pulmonary nodule exceeding 10 mm in diameter, which on the basis of CT scan was not assessable by standard bronchofiberoscope.
Results: 64 transthoracic biopsies were performed: 40 CT-guided cytological [22 (55%) diagnostic], 20 ultrasound guided cytological [10 (50%) diagnostic] and 4 ultrasound guided histological [all diagnostic] respectively. Pleural fluid was examined 8 times but only one pleurocentesis was diagnostic. Sputum analysis was performed 16 times but all results were not diagnostic. Out of 39 cases in which bronchofiberoscopy was performed 6 (15,9%) were diagnostic. All, except one positive diagnoses were pulmonary cancer. Out of 40 CT guided biopsies 17 (42,5%) were complicated by pneumothorax. In 3 (7,5%) cases drainage was required. Out of 20 ultrasound guided cytological biopsies there was 1 pneumothorax not requiring drainage. There were no observed complications in histological biopsies. The diameter of nodules in patients with positive diagnosis was bigger ($p<0,05$).
Conclusions: Accurate selection of diagnostic tools seems to be crucial for effective and safe diagnosis of pulmonary nodules.

Abstract printing supported by Chiesi. Visit Chiesi at Stand D.30