Poster sessions

trust for the same time period. From this data we could estimate the proportion of lung cancer patients from each trust that were referred for mediastinal staging with EBUS.

Results In 2012, 2302 patients were diagnosed with lung cancer in this Network. In the same period, 193 patients were referred for EBUS mediastinal staging (8.4%). The proportion of lung cancer patients referred for mediastinal staging with EBUS varied significantly across the ten trusts ranging from 3.4% to 30.2% ($p < 0.0001$). The spearman co-efficient was 0.60 ($p = 0.07$) suggesting a possible relationship between the proportion of patients referred for EBUS and surgical resection (Figure 1). However, this may be due to a very high rate of staging EBUS at one trust, which if excluded yields a spearman co-efficient of 0.45 ($p = 0.22$).

Discussion It is highly concerning that only 8% of lung cancer patients underwent EBUS nodal staging in our network given 52% of UK patients with histologically confirmed NSCLC are stage I-III at the time of diagnosis. It is of note that the Trust with the highest proportion of patients undergoing EBUS nodal staging have the highest surgical resection rate and three of the four Trusts with the lowest resection rates refer <5% of patients for EBUS nodal staging. Standardisation of referral practice across the Network is a key future goal for the EBUS Sub-group.

P216 LOCAL ENDOBRONCHIAL ULTRASOUND (EBUS) SERVICE REDUCES WAITING TIME FOR TEST RESULTS

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Introduction Endobronchial ultrasound (EBUS) is increasingly used in investigating mediastinal lymphadenopathy. A recent Thorax paper suggested EBUS should only be performed in large centres to ensure quality. A recently established EBUS service at Broomfield Hospital appeared to reduce the time taken to obtain results compared to the regional service previously used. The service was audited to ensure quality and evaluate changes to pathway times.

Objectives Compare time from decision for EBUS to test result between local and regional service and ensure safety and accuracy.

Methods Data were collected prospectively for all EBUS cases after the local service was established in August 2013. Accuracy and safety of the service were audited based on the first 8.5 months of operation. Data were extracted from the MDT database for patients referred to the regional service between November 2013 and January 2014. Time from MDT decision for EBUS referral and subsequent MDT discussion of results were compared between both services. Data were compared using the Mann-Whitney U test using the statistics package in R.

Results Average time from decision to EBUS result was 19 days in the local service based on the first 21 cases performed. There was a 40 day average turnaround for the regional service based on the 10 cases referred between November 2013 and January 2014. This represented a statistically significant reduction in waiting time of 21 days ($p = 0.0001$). The local service was safe and accurate with no reported complications in 42 cases over the first 8.5 months and an overall accuracy of 88% increasing to 94% (31/33) in suspected cancer cases.

Conclusions Our recently established local EBUS service is safe and accurate but also significantly reduces the time between decision to EBUS and test results discussed in MDT compared to

the regional referral service previously used. This is important for patients on the 62-day cancer pathway. A local service enables people to undergo investigations nearer to home. The establishment of national reference standards for EBUS is important to ensure optimal quality but this can be achieved in local services which may offer additional benefits to patients.

P217 THE NEGATIVE PREDICTIVE VALUE OF ENDOSONOGRAPHY FOR MEDIASTINAL STAGING OF NON-SMALL CELL LUNG CANCER

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Introduction and objectives The ASTER trial demonstrated that the sensitivity of combined endobronchial/endoscopic ultrasound [EBUS/EUS] is similar to that of mediastinoscopy.¹ NICE guidelines now recommend combined EBUS/EUS for initial mediastinal staging as an alternative to surgical staging.² Although surgical staging following negative endosonography is recommended, ASTER showed that 11 mediastinoscopies are required to identify one case of mediastinal disease. We aimed to determine the negative predictive value of EBUS/EUS for mediastinal staging in our practice.

Method We identified all patients who had undergone primary surgical resection with lymph node sampling for NSCLC between May 2012 and April 2014 previously staged with CT, PET-CT, EBUS+/-EUS and/or mediastinoscopy. Demographic,

Abstract P217 Table 1 Patient characteristics		
	Number	Percentage (%)
Median age	68 years	
Range	43–87 years	
Histology:		
Squamous	19	45
Adenocarcinoma	19	45
Other	4	10
EBUS only staging	35	83
EUS only staging	1	2
Combined EBUS/EUS staging	6	14
Pre-EBUS/EUS PET/CT staging:		
T1	10	24
T2	23	55
T3	7	17
T4	2	5
Pre-EBUS/EUS PET/CT staging:		
N0	9	21
N1	13	31
N2	10	24
N3	6	14
Equivocal	4	10
Tumour localization:		
Left lower lobe	6	14
Left upper lobe	11	26
Right upper lobe	13	31
Right middle lobe	1	2
Right lower lobe	11	26

histological and surgical details were extracted from clinical records. Analysis was conducted on MedCalc software v13.3.1 and reviewed by an independent statistician.

Results 42 patients who underwent EBUS+/-EUS for mediastinal staging were found to have no evidence of N2/3 disease. In 3 cases subsequent mediastinoscopy was performed as a high degree of suspicion for mediastinal disease persisted. However, in all cases surgical staging correlated with endosonographic staging. At thoracotomy, 3 (other) patients were upstaged to N2 disease. In two cases, micrometastatic disease was present in a station 7 node and one case had positive station 5/6 not accessible at EBUS/EUS. Overall the NPV of EBUS+/-EUS was 93% (95% CI, 80%–98%). In 22 of 42 patients, the same nodal stations sampled on EBUS/EUS were removed at surgery. In this subset, EBUS/EUS had a NPV of 91% (95% CI, 71% to 99%).

Conclusion We have shown that in an experienced centre, mediastinal staging by EBUS+/-EUS can have a high NPV. In these circumstances, surgical staging following negative endosonography is probably not warranted unless a high degree of clinical suspicion remains following MDT discussion. Regular audit of NPV is recommended to ensure performance standards are maintained.

REFERENCES

- 1 Annema *et al.* *JAMA* 2010;304:2245
- 2 NICE guidelines, 2011, *Lung Cancer*, CG121

P218 NODAL STAGING IN LUNG CANCER: A RISK STRATIFICATION MODEL FOR LYMPH NODES CLASSIFIED AS NEGATIVE BY EBUS-TBNA

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Background Over the last 10 years, EBUS-TBNA has become established as the first line nodal staging procedure of choice for lung cancer patients. However, the pathway for patients following a negative EBUS-TBNA has not been clearly defined.

Aims and objectives The primary aim of this study was to develop and validate a risk stratification model to categorise lymph nodes deemed negative by EBUS-TBNA into 'low risk' and 'high risk' groups, where 'risk' refers to the risk of false negative sampling.

Materials and methods A retrospective analysis of a prospectively maintained database at a UK tertiary EBUS-TBNA centre. Only patients with primary lung cancer and only negative lymph nodes by EBUS-TBNA were included in the analysis. A risk stratification model was built from a derivation set using independent predictors of malignancy and the validation set used to evaluate the constructed model. The study period was March 2010 to August 2013.

Results 329 lymph nodes were included in the analysis (derivation set $n = 196$, validation set $n = 133$). Lymph node SUV, the SUV ratio between the lymph node and primary tumour and heterogeneous echogenicity during sonographic assessment were the only independent predictors of malignancy. Using a simplified scoring system based on the natural logs of the odds ratios from the multivariable analysis on the derivation sample, lymph nodes can be stratified into 'low risk' (score ≤ 1) and 'high risk' (score ≥ 2). 141/142 and 94/96 lymph nodes classified as 'low

risk' in the derivation and validation set respectively were ultimately proven to be benign and 35/54 and 24/37 lymph nodes classified as 'high risk' were proven malignant. The negative predictive value of the risk stratification model for the derivation set and validation set was 99.3% (95% CI 96.1–99.6) and 97.9% (95% CI 92–99.6%) respectively.

Discussion This risk stratification model may assist lung cancer MDTs in deciding which patients need further staging procedures and which may proceed directly to treatment after a negative EBUS.

P219 A RETROSPECTIVE ANALYSIS OF THE RELATIONSHIP BETWEEN EBUS-TBNA DIAGNOSTIC UTILITY AND LUNG CANCER STAGE

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Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is an important minimally invasive technique in lung cancer staging and diagnosis.

Aim A retrospective analysis of EBUS-TBNA performance in patients with suspected malignancy referred between November 2009 and December 2013 to a UK tertiary EBUS centre.

Methods We reviewed consecutive EBUS-TBNA cases with CT/PET positive mediastinal/hilar nodes detected in suspected malignancy. EBUS-TBNA was performed as previously documented [Medford A. *et al.* *QJM* 2009; 102:859–864]. No rapid on-site cytology was available.

Results 186 patients with suspected malignancy (intra/extrathoracic and lymphoproliferative) were referred for EBUS-TBNA. Mean age was 66(31–87) with a 3:2 male:female ratio. In this group the sensitivity of EBUS-TBNA was 95.5%, accuracy 96.2% and negative predictive value (NPV) 80.6%. The prevalence of malignancy was 84.4%.

159 patients (85%) were referred with suspected lung cancer. In this group the sensitivity of EBUS-TBNA was 94.7%, accuracy 95.6% and NPV 78.8%. The prevalence of lung cancer was 83.6%.

The performance of EBUS-TBNA by lung cancer stage was also analysed, (See Table).

Conclusions This study shows high EBUS-TBNA diagnostic accuracy for all lung cancer stages. The NPV may have been reduced by the high prevalence of lung cancer in our cohort.

The majority of EBUS-TBNA procedures were performed for radiological stage III-IV disease where confirmation of disease would select those suitable for palliative rather than radical treatment.

Abstract P219 Table 1 Showing the performance of EBUS-TBNA by lung cancer stage

Stage	Number	Sensitivity (%)	Accuracy (%)	NPV (%)	Prevalence (%)
I and II	20	100	100	100	60
IIIa	49	92.5	93.9	75	81.6
IIIb	28	100	100	n/a	100
IV	62	92.4	93.5	69.2	85.5