AUDIT, RESEARCH AND GUIDELINE UPDATE

The LungPath study: variation in the diagnostic and staging pathway for patients with lung cancer in England

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ABSTRACT

The LungPath project investigated differences in lung cancer diagnostic practice by following the diagnostic pathways of 1507 patients from 19 representative English lung cancer centres. We found large variation in the proportion of patients receiving positron emission tomography-CT scan (range 13%–64%) and endobronchial ultrasound (range 2%–31%). There was also wide variation in the proportion of patients with good performance status who had their tumours histologically confirmed (range 61%–100%). The variation is discussed with reference to current national guidelines and implications for patient care.

INTRODUCTION

Accurate pathological diagnosis is central to delivering the optimal treatment for patients with lung cancer.[1] The National Lung Cancer Audit has demonstrated wide variation in tissue confirmation rates.[2] Current national clinical guidelines state that lung cancer should be histologically confirmed wherever practical, and make clear recommendations around the sequence of investigations that should be used to diagnose and stage lung cancer.

The LungPath project was designed to investigate variation in the investigations used and circumstances in which histological confirmation of lung cancer was not achieved.

METHODS

Centre recruitment

A letter of invitation was sent to the 154 lung cancer multidisciplinary team leads in all lung cancer centres in England. Seventy five (49%) expressed a willingness to participate, and a sample of 22 of these was selected at random.

Data collection

Each centre completed a questionnaire detailing the investigations available for diagnosis and staging, and whether these were available on-site.

All new patients with lung cancer first presenting to the 22 centres between January and June 2012 were identified. Data submitted on each patient comprised age, gender, performance status, dates of all radiological examinations and copies of all histology, cytology and molecular reports. Where a tissue diagnosis was not made, centres were asked to record the reason(s). Papworth Hospital is a specialist tertiary centre and differed from the other units in our study in that data were submitted on all patients with lung cancer referred there during the study period.

Data analysis

The clinical data were added to a database at the Thames Cancer Registry. The diagnostic and staging pathway for each patient was derived, including investigations performed and their sequence. The proportions of patients having key investigations were calculated. The temporal relationships between CT scanning and bronchoscopy, and between bronchoscopy and endobronchial ultrasound (EBUS) were examined.

RESULTS

Data collected

From the 22 centres selected to participate, 19 provided adequate data, and were retained for analysis. One centre provided partial data, and two centres did not provide any information. The total number of patients enrolled was 1507, and the data collected is summarised in table 1. There were no important differences in age and sex distributions. One of the 19 centres was not able to provide any information about whether their patients had had an EBUS procedure.

We retrospectively extracted data of performance status and cancer stage in the participating hospitals, using data from the National Lung Cancer Audit from the same time period as this study.[2] With the exception of Papworth Hospital, no large differences were observed in the proportions of patients from each centre with regard to performance status or stage.

CT scan

All 19 centres had facilities for CT scanning within their trust. Almost all (99%) patients had a CT scan during their diagnostic pathway.

Positron emission tomography-CT

Four of the 19 centres had positron emission tomography-CT (PET-CT) scanners within their trust; the remaining 15 had access to PET in their local area. The proportion of patients in each centre that received a PET-CT scan ranged from 13% to 64%. The three centres with the highest PET-CT use had scanners on-site.

Bronchoscopy

All 19 centres were able to perform bronchoscopy within their trust. The proportion of patients that

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Table 1 Number of patients surveyed, key investigations used, proportion of patients with a performance status 0–2 and histological confirmation rate for each of the 19 centres included in the LungPath study along with the proportion of patients with stage I–IIIA taken from the NLCA for the same period

Centre	Number of patients	Proportion having a CT scan before bronchoscopy (%)	Proportion having PET-CT scan (%)	Proportion having EBUS (%)	Proportion of EBUS patients having a prior bronchoscopy (%)	Proportion of patients with good performance status (0–2) (%)	Histological confirmation rate for patients with performance status 0–2 (%)	Proportion of patients with Stage I–IIIA (NLCA data) (%)
Papworth	159	100	64	30	7	91	92	80
Sheffield	129	100	43	13	29	89	94	40
South Manchester	112	92	36	26	45	82	94	60
Northumbria	153	78	28	21	19	68	78	Not available
Derby	142	98	38	2	50	84	89	33
Birmingham	107	100	57	15	7	80	100	40
Brighton	107	100	38	6	33	71	93	38
Poole	72	71	40	2	0	79	88	29
Ipswich	68	81	13	11	15	62	81	35
Worthing	67	80	17	3	50	64	81	Not available
Southend	55	100	31	4	100	71	61	37
East Cheshire	52	100	42	11	68	63	73	47
NW London	47	93	40	11	20	87	100	36
Croydon	47	87	22	3	0	50	96	32
Whipps Cross	45	83	28	Not available	Not available	84	95	44
Lewisham	39	77	31	3	0	74	92	29
Royal Free	37	100	35	3	100	70	92	30
Peterborough	37	100	17	11	50	54	80	33
Harrogate	34	94	41	27	44	88	97	43

EBUS, endobronchial ultrasound; NLCA, National Lung Cancer Audit; PET-CT, positron emission tomography-CT.

received bronchoscopy ranged from 17% to 53%. Most patients who had a bronchoscopy had been previously CT scanned. However, there were six centres where more than 15% of patients had a bronchoscopy without a preceding CT scan.

EBUS

Five of the centres were able to perform EBUS within their trust, 12 had access to EBUS locally and two centres referred patients further afield. The proportion of patients receiving an EBUS ranged from 2% to 31%. Ten centres performed an EBUS on <10% of patients; none of these had EBUS facilities within their trust. Five of the six centres with the highest proportion of EBUS use had the procedure available on-site. The proportion of patients that had an EBUS preceded by bronchoscopy on a separate occasion varied from 0% to 100%.

Histological confirmation

The proportion of patients that had tissue confirmation of the diagnosis of lung cancer in each centre varied from 54% to 93%. Among patients with a performance status of 0–2, the proportion that had their tumour sampled varied from 61% to 100%. Three centres sampled less than 80% of these patients. The most common reasons given for not obtaining histological confirmation were being considered unfit for biopsy (53%) or a failed sampling procedure (24%).

Sixty nine per cent of all histologically confirmed patients had a positive sample from the primary tumour in the lung, 9% had a positive sample from local lymph nodes and 22% had a metastatic site sampled, most commonly the pleura or cervical lymph nodes.

DISCUSSION

The study found large variation in diagnostic practice between centres, particularly regarding the histological confirmation rate and the use of PET-CT and EBUS. Variation was also found in the practice of pathologists, as published separately.[3]

Chemotherapy or targeted therapy is recommended for a significant proportion of patients with lung cancer, but these options are not appropriate without a tissue diagnosis. Some patients unfit for chemotherapy may well be able to tolerate targeted therapies if their tumours are mutation or translocation positive. Although there is no agreed national standard, the variation in histological confirmation rate is marked and becomes more pronounced when patients who are most likely to be suitable for active treatment (performance statuses of 0–2) are considered. The most common reason for not sampling a given patient's tumour was ill health. This may be a subjective judgement, and differences in how 'fitness' is perceived seem likely to be a significant contributory factor in the degree of variation in histological confirmation rates that we have demonstrated. The second most common reason was failed diagnostic procedure. These tissue sampling techniques require operator skill and experience, and the non-diagnostic sampling rate should be monitored as a routine part of local quality assurance. Where a failed attempt to sample a tumour occurs, it may be appropriate to refer the patient to a centre with more expertise or consider sampling a different site.

These data suggest that centres with low histological confirmation rates may be denying some patients the opportunity for active treatment. National guidelines recommend that centres consider each patient carefully before opting not to obtain a tissue diagnosis.[4] Interventions for tissue diagnosis available at other nearby specialist centres should also be considered.

PET-CT and EBUS have quickly become cornerstones of lung cancer diagnosis and staging. PET-CT is used to determine whether patients are suitable for treatment with curative intent while EBUS is being increasingly used as a minimally invasive alternative to mediastinoscopy to stage the mediastinum, and thus, determine whether a patient is suitable for surgery or chemoradiotherapy, in addition to providing a histological diagnosis.

We demonstrate a wide range in the use of PET-CT between centres. Using CT to stage lung cancer has been shown to be inferior to PET-CT.[5] These data raise concern that the centres with low PET-CT use may not be staging their patients as accurately as possible, and, consequently, some patients may be receiving treatment with curative intent where it is ineffective while others may be denied the opportunity of potentially effective treatment. National guidelines recommend PET-CT be included in the staging pathway in all patients in whom treatment with curative intent is an option.[4] Excluding Papworth Hospital (a specialist tertiary centre), we found no evidence of variation in tumour stage or performance status to explain our results.

There is also a large variation in EBUS use. Units with low use of EBUS may be basing the staging of the mediastinal nodes on radiological investigations only, which has been shown to be inaccurate in a significant proportion of cases.[6] This may deny some patients a chance of curative surgery, and allow others to proceed to inappropriate surgery. National guidelines recommend mediastinal node sampling be performed in all patients in whom the nodes appear abnormal radiologically and when treatment with curative intent is being considered.[4]

Patients were more likely to receive a PET-CT or EBUS if these investigations were available on-site at the centre where they presented, raising questions about the adequacy of provision of, and access to, these services.

Some centres are bronchoscoping a proportion of their patients before they have had a CT scan. Others appear to be regularly undertaking EBUS in patients who have already had a bronchoscopy. These practices are counter to current guidelines, which recommend a CT scan as the first investigation in all patients to select the most appropriate site to sample.

Although this project was conducted retrospectively on a sample of units in England, and information was not collected on tumour stage and physiological fitness of individual patients, we believe our data genuinely highlight major clinically relevant differences in practice that need to be addressed. The findings have been presented and discussed at a series of regional educational events with the aim of highlighting differences, reinforcing best practice and reducing the variation in lung cancer care in England.

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