CLINICAL AUDIT

Effect of a multidisciplinary lung investigation day on a rapid access lung cancer service

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Lung cancer is the commonest fatal malignant disease worldwide causing more than 37 000 deaths in the UK per annum.¹ The five year survival rate of 5% in the UK compares poorly with rates of up to 14% in some European countries.² Serious concerns have also been raised about inequalities in patient access to oncology services related to the geographical location and age of the patients.^{3–6} The Calmann-Hine Committee report recommended a review of lung cancer services with increased emphasis on a multidisciplinary approach to care.⁷ Initial reports show that such multiprofessional teamwork improves coordination and patient support and reduces delays in diagnosis and treatment.⁸ In the British Thoracic Society (BTS) recommendations to respiratory physicians for organising the care of patients with lung cancer, emphasis was placed on reducing the delay in arranging investigations and the necessary treatment.⁹ In the new NHS Cancer Plan,¹⁰ the Department of Health has recommended that the maximum wait from urgent general practitioner referral to first treatment should be 62 days with a maximum wait of 31 days between diagnosis and first treatment for all cancers. Although there is little evidence to suggest that management delays adversely affect the clinical outcomes, anecdotal reports suggest that borderline resectable tumours at presentation may become unresectable if there is an inordinate delay in treatment planning. A multidisciplinary working group was established within our hospital trust to review the diagnostic journey of patients attending rapid access lung cancer clinics (RAC). The aim of the group was to rationalise this journey, to reduce waiting times, and improve the patients' experience of this often stressful process.

Our multidisciplinary team (MDT) coordinator visited Papworth Hospital, Cambridge, UK to review their tertiary diagnostic service, as described by Laroche *et al.*⁸ An away day was arranged to discuss these issues and was attended by the MDT coordinator, lung cancer specialist nurses, respiratory consultants, radiology consultant, a thoracic surgeon, an oncologist, two pathologists, and a computed tomography (CT) superintendent. The findings of the visit were presented to the group and different models of service re-organisations were discussed at length. Systems were put in place to provide a dedicated CT list in the morning and a lunchtime radiology meeting followed by a bronchoscopy list in the afternoon. As a result a lung investigation day (LID) was established.

METHODS

Patients with clinical or radiological features, suspicious of lung cancer are referred to the RAC, by the general practitioners or radiologists. After the initial clinical evaluation by a respiratory physician, appropriate patients are given information about the LID, which normally takes place within three working days of the RAC.

Structure of the lung investigation day

All LID patients undergo a CT scan of the thorax and upper abdomen in a dedicated lung CT session, during the morning of the LID. The CT images are reviewed at a lunch time multidisciplinary meeting attended by chest physicians and thoracic radiologists when, if necessary, the appropriate means of obtaining a tissue sample for histopathological diagnosis is determined, which may be flexible bronchoscopy (FB) biopsy or CT guided needle biopsy. The CT list included two CT biopsy slots and patients requiring CT biopsy had the procedure on the list the following week (one week after LID). Patients in whom a direct surgical approach for either treatment or diagnosis is deemed appropriate are discussed at the full multidisciplinary meeting, which is attended by thoracic surgeons, two days later. Patients who require FB undergo the procedure the same afternoon. At bronchoscopy, in cases where no obvious endobronchial lesion is seen in the proximal bronchial tree, directed samples are obtained from segments that appeared abnormal on the thoracic CT scan. Patients who require other tests such as 12-lead ECG and full lung function tests have them performed in the morning session before or after the CT scan.

Patients whose LID investigations show no evidence of malignancy are reassured accordingly on the same day and appropriate follow up is arranged in consultation with the respiratory physician. For patients with a cancer, the information obtained from the investigation day is presented to the full multidisciplinary thoracic tumour team meeting.

To determine the effectiveness of the LID, the time taken from referral to presentation at the MDT board meeting, and the time to histopathological diagnosis (HD) were measured. These figures from the first four months of operation of the LID were compared with patients assessed by the RAC during the same four month period in the previous year. Furthermore, a patient satisfaction survey was conducted. Sixty questionnaires were sent out by post to patients who had gone through the LID.

RESULTS

Fifty eight (30M, 28F) patients went through the investigation day in the four months after its inception. The mean (SD) age was 65 (16) years. The mean (SD) time from RAC to LID was five (two) days. All LID patients underwent staging thoracic CT scan. After the lunchtime meeting 36 (62%) patients went on to have bronchoscopy. All 36 patients underwent the procedure the same day. Three patients (5%) were referred directly to the thoracic surgical service for biopsy and three (5%) were referred for CT guided biopsy. In patients felt suitable for both CT biopsy and bronchoscopy, the latter procedure was preferentially performed. Twenty

Abbreviations: RAC, rapid access clinic; MDT, multidisciplinary team; HD, histological diagnosis; CT, computed tomography; LID, lung investigation day; FB, flexible bronchoscopy

Table 1 Summary of results comparing the services before and after the institution of the lung investigation day

	After LID	Before LID	p Value
Total number of patients	58	37	
Mean age (SD) years	65 (16)	66 (12)	NS
Number of bronchoscopies (%)	36 (62%)	31 (84%)	<0.05
Median (IQR) days from RAC to HD	6 (5–11)	18 (11–41)	<0.001
Mean (SD) days from RAC to MDT	9 (6)	21 (15)	0.001

The success of this model is highlighted by the significant reductions in the time to HD and MDT presentation. RAC, rapid access clinic; HD, histological diagnosis.

three (40%) patients were reassured that there was no definite evidence of malignancy on the same day. Of these, 14 (24%) were reassured after CT alone and a further nine (16%) after CT and bronchoscopy. Some of these patients were discharged from medical follow up the same day after having been reviewed by the respiratory physician, while some were kept under surveillance in the respiratory clinic. Of the 33 (57%) patients found to have a possible tumour, all except four had a definitive HD—two patients declined investigation and two were considered too frail for further assessment.

The differences between data from the LID patients and those assessed one year earlier, before the introduction of the LID, are given in table 1. We sought to compare a similar four month time period 12 months before LID was instigated rather than the same number of patients. The two groups of patients were of similar age and went through a similar referral route. After the instigation of LID, a streamlined multidisciplinary approach, with the staging CT scan as the first definitive investigation of choice, led to a reduction in the number of bronchoscopies performed. Also a significant reduction in the mean time from initial clinic visit to HD and MDT presentation was seen in the LID group. By reducing the diagnostic journey time, the LID patients were able to meet the oncologists and surgeons more quickly. Time from this meeting to treatment was unchanged in the groups and thus overall journey time was reduced as a result of reduction in the length of the diagnostic pathway. Thirty seven of 60 (15F, 22M) questionnaires were returned in the postal survey. Most (31 of 37) of patients expressed full satisfaction with the experience of having all the required investigations in one structured day and felt that all the key objectives of the LID, namely, to efficiently and quickly investigate, to ensure that the patients were kept informed and supported at all times, and to reduce anxiety for the patients and carers alike, were fully achieved.

DISCUSSION

Cancer is one of the main causes of death in the UK and the Department of Health has recognised that the reduction in cancer mortality should be a national priority. Survival rates for lung cancer patients in the UK remain particularly low and compare poorly with those of other European countries. Among the several explanations offered for this difference are advanced disease stage at the time of presentation, which often precludes surgery, lack of standardised care pathways for evaluation of patients suspected of having lung cancer, and geographical inequalities in access to oncology services. In an effort to tackle these issues, the National Cancer Plan¹⁰ set out to streamline and standardise the care of patients with suspected lung cancer. This plan required NHS trusts to efficiently use the available resources and establish standards of care for lung cancer patients. Our model for standardising care was designed after the review of previously existing care pathways in our and other trusts and tailored to suit our needs and resources. It is clear from our initial experience that the instigation of a multidisciplinary LID within the

Heart of England NHS Foundation Trust (formerly Birmingham Heartlands and Solihull Hospitals NHS Trust) has been associated with significant reductions in the number of patients requiring bronchoscopy and in the time from presentation at the rapid access clinic to both HD and presentation of cases to the MDT meeting, where definitive management plans are discussed. Prompt access to radiology and pathology services plays a crucial part in the success of rapid access cancer services. We feel that the step to introduce dedicated CT and CT biopsy slots on fixed days in the radiology department and the agreement with the pathologists to fast track the reporting on samples from the LID aided the success of this care pathway. Management input from MDT coordinator supported by the respiratory operations manager and clinical directors of the respiratory and radiology departments played an instrumental part in the setting up of this service. The fact that we would be providing the same number of CT scans but in one session rather than spread through the week was made clear. One of our initial concerns related to the potential stress the LID might cause patients, especially when required to fast all day if proceeding to bronchoscopy. The lung cancer specialist nurses undertook to meet and support patients throughout the investigation day. We agreed to exclude very frail and extremely anxious patients from the LID pathway. Subsequent patient feedback reassured us that the LID actually reduced patient anxiety by enabling rapid access of investigations. It is to note that the instigation of the LID did not incur additional costs as the same number of CT scans were performed, with a similar number of CT biopsies. There was a reduction in the number of bronchoscopies, which may have positive influence on the service costs. New staff or facilities were not required to run our LID model.

We believe that a suitable professional support network is paramount to the success of such endeavours. Further studies based on similar models are required to answer the question if such improvements in time to diagnosis and treatment planning, translate to improvements in resection rates and survival for lung cancer patients.

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SHORT REPORT

Mutation in the ATP7A gene may not be responsible for hypocupraemia in copper deficiency myelopathy

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The identified causes of copper deficiency in patients with copper deficiency myelopathy have included excessive consumption of zinc, a malabsorption syndrome, or a history of gastric surgery.¹ Not uncommonly the cause of copper deficiency has been unclear. We have recently reported on two patients with idiopathic hypocupraemic myelopathy who had increased copper content in biopsy specimens of the colonic mucosa.² This finding suggests impaired mobilisation of copper absorbed by intestinal epithelial cells as the probable defect in these patients. Increased copper content in the intestinal mucosa is well recognised in Menkes disease,³ the genetic basis for which are mutations in the ATP7A gene. Molecular defects at the ATP7A locus resulting in milder forms of the disease have also been described.⁴

To pursue the possibility that the hypocupraemia in idiopathic hypocupraemic myelopathy may relate to mutations in the ATP7A gene we undertook mutation analysis in one of our patients. Details of this patient have been reported elsewhere.^{2,5} She was a 48 year old woman with a myeloneuropathy who had a serum copper concentration at presentation of 0.11 µg/ml (normal: 0.75 to 1.45 µg/ml). Her 24 hour urine copper excretion was reduced to 6 µg/specimen (normal: 15 to 60 µg/specimen) and copper content in the colonic mucosa was 39 µg/g dry weight (normal: 6 to 13 µg/g dry weight). Her liver copper content was 71 µg/g dry weight (normal: 10–35 µg/g dry weight). With copper replacement and normalisation her neurological deficits stabilised and the spinal cord signal change seen by magnetic resonance imaging resolved.

DNA sequence analysis of the ATP7A gene did not show any abnormalities. All 22 coding exons and flanking introns were sequenced. Changes in the promoter or other non-coding regions as well as large intragenic deletions could not be ruled out. This finding suggests that hypocupraemia in

this subgroup of patients may not be related to ATP7A mutations. The understanding of copper homeostasis has become increasingly important and many different copper transporting proteins have been recognised.^{6,7} A primary absorption defect related to one of these copper chaperones may responsible for the hypocupraemia seen in copper deficiency myelopathy patients.

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