Clinical Radiology 70 (2015) 610–613

Contents lists available at ScienceDirect

Clinical Radiology

journal homepage: www.clinicalradiologyonline.net

# Brain imaging in lung cancer patients without symptoms of brain metastases: a national survey of current practice in England

B.J. Hudson*, M.B. Crawford, J.J. Curtin

*Norwich Radiology Academy, Norfolk and Norwich University Hospital, Cotman Centre, Colney Lane, Norwich NR4 7UB, UK*

ARTICLE INFORMATION

*Article history:*
Received 19 October 2014
Received in revised form
21 January 2015
Accepted 4 February 2015

AIM: To determine current practice regarding brain imaging for newly diagnosed lung cancer patients without symptoms of brain metastases.

MATERIALS AND METHODS: A survey questionnaire was sent by e-mail to all the lung cancer lead clinicians in England currently on the National Cancer Intelligence Network database. The survey asked whether brain imaging was used in new lung cancer patients without symptoms or signs to suggest brain metastases; and if so, which patient subgroups were imaged according to cell type, stage of disease, and intention to treat, and which techniques were used to image these patients. Responses were received between February and May 2014.

RESULTS: Fifty-nine of 154 centres replied to the survey (38%). Thirty of the 59 centres (51%) did not image the brain in these patients. Twenty-nine of the 59 (49%) centres imaged the brain in at least certain subgroups. Of those centres that did image the brain 21 (72%) used CT as the first-line imaging technique and six (20%) used MRI. Twenty-five of 59 (42%) centres stated that the 2011 NICE guidelines had led to a change in their practice.

CONCLUSION: There is wide variation in practice regarding brain imaging in this patient group in England, with no brain imaging at all in approximately half of centres and a spectrum of imaging in the other half. When the brain is imaged, CT is the technique most commonly used. The 2011 NICE guidelines have led to some change in practice but not to national uniformity.



## Introduction

The 2011 NICE guidelines for the diagnosis and treatment of lung cancer suggests that clinicians should "consider MRI or CT of the head in patients selected for treatment with curative intent, especially in stage III disease".[1] There was no guidance on whether the imaging strategy should be related to tumour cell type or which imaging technique should be used. There are no published data on current practice in England regarding brain imaging in new lung cancer patients without clinical features of brain metastases. Therefore, the aim of the present study was to determine what this practice was and whether or not the 2011 NICE guidelines had led to any change in practice.

* Guarantor and correspondent: B.J. Hudson, Norwich Radiology Academy, Norfolk and Norwich University Hospital, Cotman Centre, Colney Lane, Norwich NR4 7UB, UK. Tel.: +44 01603 286140; fax: +44 01603 286146.
*E-mail address:* benjaminjameshudson@hotmail.com (B.J. Hudson).

http://dx.doi.org/10.1016/j.crad.2015.02.007
0009-9260/

## Materials and methods

A short questionnaire was devised to ascertain current practice in brain imaging in asymptomatic new lung cancer patients in NHS trusts within England and whether the most recent NICE guidelines of *The Diagnosis and Treatment of Lung Cancer* has had any effect on local practice.

The survey included four sections: (1) Do you routinely image the brain in lung cancer patients who do not have any symptoms or signs to suggest brain metastases at/near the time of initial staging? (2) Do you image all patients? Do you image selected patients (based on stage I–IV; non-small cell carcinoma versus small cell carcinoma; treatment with radical versus palliative intent)? (3) Which imaging technique do you use as your first-line investigation in the imaging of the brain in this patient group (unenhanced, pre- and post-intravenous contrast medium and post-intravenous contrast medium CT head; unenhanced, pre- and post-intravenous gadolinium and post-gadolinium MRI brain)? (4) The updated NICE clinical guidelines on *The Diagnosis and Treatment of Lung Cancer* from April 2011 say "consider MRI or CT of the head in patients selected for treatment with curative intent, especially in stage III disease". Has this led to a change in practice locally for brain imaging in lung cancer patients with no clinical features to suggest brain metastases?

An electronic copy of the survey was sent to all lung cancer lead clinicians currently on the National Cancer Intelligence Network database in February 2014. The majority of responses were received in the first round of replies. A reminder email was distributed to all of those who had not responded in May 2014, with a minority of the total number of replies received in the second tranche.

## Results

Fifty-nine completed surveys were returned from a total of 154 recipients of the survey, equating to a 38% return rate. There was a wide geographic spread of the returned surveys throughout England, with responses from hospitals of differing size and type: 10 centres offering thoracic surgery (17%), six non-thoracic surgery teaching hospitals (10%), and the remaining 43 from district general hospitals (73%). All were NHS hospitals.

Regarding question (1) 30 of the 59 (51%) centres who responded said no, 29 (49%) said yes. Regarding question (2) three out of 59 centres (5%) stated that they imaged the brain in all new asymptomatic lung cancer patients regardless of their stage, cell type or treatment intent, whereas 26 of the 59 centres imaged the brain in certain patient subgroups (Tables 1 and 2). In non-small cell lung cancer patients with curative treatment intent, brain imaging in centres varied dependent on stage between 66–83%. Stage IIIa patients were imaged most commonly, with 83% centres routinely imaging this patient group. Stage I patients were least likely to undergo imaging with 19 of the 29 centres (66%) imaging this group routinely.

**Table 1**
Routine brain imaging rates in those patients ($n = 29$) with non-small cell lung cancer, by stage, and curative or palliative treatment intention.

| Stage | Curative | % | Palliative | % |
|---|---|---|---|---|
| I | 19 | 66 | 3 | 10 |
| IIa | 20 | 69 | 3 | 10 |
| IIb | 22 | 76 | 3 | 10 |
| IIIa | 24 | 83 | 3 | 10 |
| IIIb | 21 | 72 | 3 | 10 |
| IV | – | | 3 | 10 |

In non-small cell lung cancer patients with palliative treatment intent, 10% of the centres perform brain imaging in patients with stage I–IV disease. This number was completely comprised of the three centres that perform brain imaging in all patient groups.

On the whole, patients with small-cell lung cancer undergo a very similar rate of brain imaging compared to non-small cell lung cancer patients. In those with a curative treatment intent 69–83% of centres performed brain imaging, with stage IIa patients undergoing the highest rate of imaging (83%) and stage IIIb the lowest (69%).

In those small-cell lung cancer patients with a palliative treatment intention, brain imaging was performed a little more commonly than in the non-small cell lung cancer group with 21% of centres imaging stage I–IIIb and 17% imaging stage IV patients.

Regarding question (3), of the 29 centres that routinely performed brain imaging in new, asymptomatic lung cancer patients, 10% carried out unenhanced CT of the head, 62% performed an intravenous contrast-enhanced or pre- and post-intravenous contrast medium enhanced CT of the head. One centre (3%) reported that they undertake an unenhanced MRI brain examination, and 17% of centres undertake a gadolinium-enhanced MRI brain examination. Two centres (7%) gave no indication of which method of imaging was their preferred choice.

Regarding question (4), 29 of the 59 (42%) centres who responded to the survey stated that the NICE guidelines had led to a change in practice, while 34 centres (58%) stated that the guidelines had led to no change in practice. Respondents were asked to describe what, if any, changes had been implemented as a result of the NICE guidelines. Seventeen of these 25 centres undertake some form of routine brain imaging, whereas the other eight do not. Twelve centres stated that as a result of the guidelines they now routinely imaged certain patient groups, often those

**Table 2**
Routine brain imaging rates in those patients ($n = 29$) with small cell lung cancer, by stage, and curative or palliative treatment intention.

| Stage | Curative | % | Palliative | % |
|---|---|---|---|---|
| I | 23 | 79 | 6 | 21 |
| IIa | 24 | 83 | 6 | 21 |
| IIb | 22 | 76 | 6 | 21 |
| IIIa | 22 | 76 | 6 | 21 |
| IIIb | 20 | 69 | 6 | 21 |
| IV | – | | 5 | 17 |