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## Original articles

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# The practice of cardiothoracic surgeons in the perioperative staging of non-small cell lung cancer

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### Abstract

**Background** The treatment and prognosis of non-small cell lung cancer, and assessment of the results of treatment, depend on accurate perioperative staging. The extent to which this is carried out in the United Kingdom is unknown.

**Methods** A postal questionnaire survey was undertaken in 1990 to determine the perioperative staging practices of cardiothoracic surgeons in the United Kingdom.

**Results** Replies from 77 surgeons, who between them performed about 4833 pulmonary resections a year for lung cancer, were analysed. Forty four per cent of surgeons, operating on 43% of the patients, do not perform computed tomography of the thorax or mediastinal exploration before surgery. They may therefore embark on a thoracotomy for stage III disease. At thoracotomy 45% of surgeons, operating on 40% of patients, do not sample macroscopically normal lymph nodes. They may therefore understage cases as  $N_0/N_1$  when there is at least microscopic disease in mediastinal lymph nodes.

**Conclusions** The staging of lung cancer in the United Kingdom in 1990 appears in many instances to be inadequate. There should be a more organised approach to perioperative staging so that prognosis may be assessed and comparisons between groups of patients can be made.

The treatment and prognosis of non-small cell lung cancer and the valid comparison of results of different treatments depend on accurate perioperative staging. Individual cardiothoracic surgeons vary in their staging practices. In particular, they do not all perform computed tomography of the thorax routinely; some use cervical mediastinoscopy or anterior mediastinotomy for preoperative mediastinal exploration; and many do not sample mediastinal lymph nodes at operation. The extent of the variation in perioperative staging in the United Kingdom has not been quantified. A postal questionnaire survey was undertaken to determine the perioperative staging practices of cardiothoracic surgeons in the United Kingdom.

### Methods

A single questionnaire was sent to all consultant cardiothoracic surgeons in the United Kingdom in March 1989 except those known not to perform any pulmonary surgery. Surgeons were asked to answer the questions shown in table 1 and to say roughly how many pulmonary resections for lung cancer they performed in a year. Data on preoperative and operative staging procedures were analysed separately.

For preoperative staging the analysis was based on whether surgeons undertook routine computed tomography of the thorax and routine mediastinal exploration or mediastinal exploration if the computed tomogram showed enlarged mediastinal lymph nodes. For operative staging we looked at whether surgeons undertook routine sampling of mediastinal lymph nodes at thoracotomy and whether they removed only macroscopically abnormal mediastinal lymph nodes or routinely excised all mediastinal lymph nodes as part of the operation. Questions had to be answered "yes" or "no"; there was no opportunity to qualify the answer on the questionnaire.

### Results

There were 114 replies from 145 questionnaires; but as 37 replies were from surgeons performing only cardiac surgery only 77 replies were analysed. About 4833 pulmonary resections a year were performed for lung cancer. A breakdown of the replies is shown in table 1.

Most surgeons (90%) did not perform routine preoperative mediastinal exploration and 34 of the 69 (44%) did not perform routine computed tomography of the thorax (this accounted for 2095 (43%) patients). Eight (10%) surgeons performed routine mediastinal exploration and three of these did not use computed tomography scanning routinely. Five surgeons (operating on 220 (5%) patients) did not carry out routine computed tomography of the thorax or mediastinal exploration and also would not perform preoperative mediastinal exploration even if the computed tomogram scan showed enlarged lymph nodes (table 2). Although only 41 surgeons said that they would routinely do computed tomography, 68 indicated that they would do a mediastinoscopy if the computed tomography showed enlarged nodes. This suggests that some surgeons will undertake mediastinal exploration if

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Table 1 Replies from 77 surgeons to the postal questionnaire

	No (%) of surgeons replying	
	yes	no
Routinely perform computed tomography of thorax	41 (53)*	36 (47)
Routinely undertake mediastinoscopy or mediastinotomy	8 (10)	69 (90)
Perform mediastinoscopy or mediastinotomy if computed tomography shows enlarged mediastinal lymph nodes	68 (88)	9 (12)
Routinely sample mediastinal lymph nodes at thoracotomy	38 (49)	39 (51)
Remove only macroscopically abnormal mediastinal lymph nodes	49 (64)	28 (36)
Routinely excise all mediastinal lymph nodes	18 (23)	59 (77)

\*This may underestimate the prevalence of computed tomography as many patients have it before referred.

Table 2 Number of patients affected and number of surgeons who did not routinely perform computed tomography of the thorax or mediastinal exploration before operation and would not perform mediastinal exploration even if the computed tomogram showed enlarged mediastinal lymph nodes

	No (%) of surgeons	No (%) of patients
No routine computed tomography of thorax and no mediastinal exploration	34 (44)	2095 (43)
No routine computed tomography of thorax and no mediastinal exploration, and no mediastinal exploration if even computed tomography shows enlarged mediastinal lymph nodes	5 (6)	220 (5)

a computed tomogram is available, but will not routinely request one to assess the size of mediastinal lymph nodes.

At operation 39 (51%) surgeons did not sample mediastinal lymph nodes routinely, though four of the 39 excise all mediastinal lymph nodes routinely during surgery. Forty nine (64%) surgeons removed only macroscopically abnormal mediastinal lymph nodes but 14 of the 49 would perform routine mediastinal lymph node sampling. Thus 35 (45%) surgeons operating on 1947 (40%) patients did not sample macroscopically normal lymph nodes at thoracotomy.

### Discussion

The approximate annual number of pulmonary resections for lung cancer said to be undertaken by surgeons replying to our questionnaire is 828 more than the latest available national reported figures from the United Kingdom thoracic surgical register held by the Society of Cardiothoracic Surgeons of Great Britain and Ireland. This is attributed to an approximation error as most surgeons rounded the number to the nearest 20.

This survey reveals the inconsistencies in the staging practices of surgeons treating almost all the patients with lung cancer in the United Kingdom. It suggests that many surgeons fail to stage their patients' disease to a level accepted as adequate in the 1990s.

Controversy remains regarding the place of surgery in patients with diseased mediastinal lymph nodes<sup>1-4</sup> because results have varied, depending on the cell type, the form of metastasis affecting the nodes (intranodal or extranodal), and the group of nodes affected.<sup>3-5-7</sup> Nevertheless, our survey suggests that many surgeons are not considering the extent of

disease in the mediastinum during the preoperative assessment and are failing to stage the disease fully at the time of surgery.

About 20% of all patients with non-small cell lung cancer are treated surgically.<sup>8-10</sup> Ideally, less than 5% should have exploratory thoracotomy,<sup>11</sup> but this is rarely achieved—the rate was 16% in the United Kingdom and the United States<sup>12</sup> in 1986. Incomplete resections for N<sub>2</sub> disease and exploratory thoracotomies have an associated morbidity and mortality, which may be regarded as avoidable. Every effort should be made to identify inoperability before operation, although some exploratory thoracotomies are unavoidable if inadvertent overstaging of operable disease is not to deny patients a chance of a curative resection.

Preoperative assessment of mediastinal lymph node enlargement is made by computed tomography and metastases affecting mediastinal lymph nodes are found by sampling mediastinal glands and histological examination. The sensitivity and specificity of computed tomography in cases of mediastinal node enlargement varies according to the experience of the radiologist and the size of the nodes<sup>7 13 14</sup> but can never be 100%. Mediastinal exploration should be undertaken when computed tomography shows enlarged mediastinal nodes.<sup>15 16</sup> Routine preoperative mediastinal exploration detects N<sub>2</sub> disease in 30% of patients assessed for surgery<sup>7 17</sup> and reduces the number of exploratory thoracotomies for inoperable disease.<sup>11</sup> Routine mediastinal sampling would be regarded as impractical and too pedantic by many but should be considered by surgeons who do not have ready access to computed tomography. The form of our questionnaire does not allow analysis of the reasons for not using computed tomography routinely in patients before thoracotomy. They will include non-availability of computed tomography as well as reasoned decisions not to scan patients with peripheral tumours and a radiographically normal mediastinum, whose chances of having undetected N<sub>2</sub> disease are low.<sup>18-20</sup>

Nevertheless, 44% of surgeons who do not perform either routine computed tomography or preoperative mediastinal sampling in theory may embark on a thoracotomy unaware of the state of the patient's mediastinal nodes. This figure is almost certainly an overestimate for the reasons indicated above and because many patients referred to thoracic surgical units will already have been scanned. Six per cent of surgeons (table 2) do not routinely scan their patients or perform mediastinoscopy and would proceed to immediate thoracotomy even if a computed tomogram did show enlarged nodes. During surgery 45% of surgeons do not routinely sample or excise macroscopically normal mediastinal lymph nodes, thus understaging the disease as N<sub>0</sub>/N<sub>1</sub> when only microscopic metastases affect lymph nodes; survival in this group of patients therefore would be inappropriately poor for the apparent stage of the disease. Forty per cent of the patients operated on for lung cancer in the United Kingdom fall into this category.

Accurate staging of lung cancer is mandatory for identifying subgroups of patients when the impact of surgical treatment on the disease is being analysed, and for avoiding thoracotomies that will not result in complete resection. Only then can comparisons between surgical series be made and the influence of additional treatment assessed.<sup>21 22</sup> Overall survival in patients with lung cancer treated surgically has not changed over many years and some form of effective additional treatment is urgently needed. For effects to be detected careful studies of large numbers of patients will be needed. Many British surgeons, however, according to survey, will need to abandon their present habits and begin to stage the disease accurately; otherwise the impact of any treatment will remain impossible to evaluate.

This survey shows that the disease stage of many patients treated by surgery for lung cancer in the United Kingdom is unknown even after operation. We would suggest that many surgeons must change their practices and fully stage every patient's disease so that unproductive surgery is avoided and a rational assessment of the benefit of surgery may be made.

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