

Is it permissible to omit mediastinal dissection for peripheral non-small-cell lung cancers with tumor diameters less than 1.5 cm?

Noboru NISHIUMI *, Fumio MAITANI *, Kichizo KAGA *, Masayuki IWASAKI *,
Masato NAKAMURA **, Yoshiyuki OSAMURA ** and Hiroshi INOUE *

*Departments of *Surgery and **Pathology, Tokai University School of Medicine*

(Received November 30, 1999; Accepted January 15, 2000)

Background: Recently the pros and cons of limited surgery for small-sized peripheral non-small-cell lung cancers (PNSCLCs), such as omission of mediastinal dissection, etc., have been vigorously debated. We analyzed whether hilar/mediastinal lymph node metastases were present in 30 small-sized PNSCLCs.

Material and Methods: In the nine years from 1990 to 1998, 294 lung cancer patients underwent lobectomy or pneumonectomy combined with hilar/mediastinal dissection in the Tokai University Hospital. Thirty of these patients diagnosed as having cT1N0M0 PNSCLC with tumor diameters of 1.5 cm or less by computed tomography, are evaluated in this article.

Results: The 30 PNSCLC patients consisted of 14 males and 16 females with a mean age of 61 ± 9 years. Twenty six patients (87%) had no hilar nor mediastinal lymph node metastases (pN0), one patient (3%) had a hilar lymph node metastasis (pN1), and three patients (10%) had mediastinal lymph node metastases (pN2).

Conclusions: Mediastinal lymph node metastases were histologically observed in 3 (10%) of 30 PNSCLC patients with tumor diameters of 1.5 cm or less. Our results show that mediastinal dissection is still necessary even for small-sized lung cancers.

Key words : Small-sized lung cancer, Non-small-cell lung cancer, Mediastinal lymph node dissection, Mediastinal lymph node metastasis

INTRODUCTION

Detection of small-sized peripheral lung cancers has improved as a result of widespread growth of screening examinations and advances in diagnostic imaging equipment [1]. The pros and cons of limited surgery for small-sized peripheral lung cancers, such as omission of mediastinal dissection, pulmonary wedge resection, and procedures combining extended segmentectomy with mediastinal dissection, have been vigorously debated [2-5]. We analyzed in postoperative histological examinations whether hilar/mediastinal lymph node metastases were present in 30 patients diagnosed as having peripheral non-small-cell lung cancer (PNSCLC) with tumor diameters of 1.5 cm or less as assessed by computed tomography (CT).

MATERIALS AND METHODS

In the nine years from 1990 to 1998, 294 lung cancer patients underwent lobectomy or pneumonectomy combined with hilar/mediastinal dissection in the Tokai University Hospital, Kanagawa, Japan. Thirty of these patients diagnosed as having cT1N0M0 PNSCLC with tumor diameters of 1.5 cm or less by CT and by pathological evaluation, are studied in this article. During the same period, the following patients with tumor diameters of 1.5 cm or less by CT evaluation were excluded: ① patients that had limited palliative surgery (pulmonary wedge resection or omission of mediastinal dissection) because of age or poor pulmonary function (one patient), ② patients with secondary primary lung cancers (three patients), and ③ clinical N2 (cN2) patients (two patients).

RESULTS

The 30 patients diagnosed by CT as having cT1N0M0 PNSCLC with tumor diameters of 1.5 cm or less consisted of 14 males and 16 females, with a mean age of 61 ± 9 years. The tumors in 27 patients were discovered by plain chest radiography, in 3 by

chest CT. Twenty seven patients had a trans-bronchial lung biopsy (TBLB), and 13 were diagnosed as having carcinoma by histological or cytological diagnosis. Seventeen patients in whom there was no preoperative histological diagnostic confirmation, including 3 patients who had not had TBLB, were diagnosed as having carcinoma by intraop-

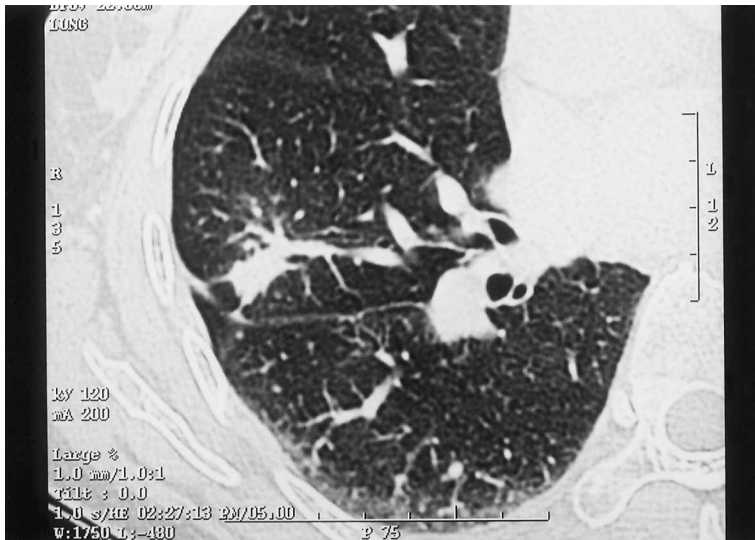


Fig. 1a HRCT image of Case 1. The tumor is localized in the periphery of right S⁴. It is a homogeneous and ill-defined tumor 1.2 × 0.8 cm in diameter. The intralobar pleural indentation and the vascular convergence of A⁴a are seen.



Fig. 1b The resected surface of the right middle lobe, which contains the tumor. The tumor is solid, and the pathologic specimen is 0.9 × 0.9 cm in diameter. The pleural indentation is seen (➡).

erative frozen histological examination from specimens harvested during thoracoscopic pulmonary wedge resection.

Histological examination of the 30 cases of cancer yielded 26 adenocarcinomas, 3 squamous cell carcinomas, and 1 adenosquamous cell carcinoma. Six patients had tumors with diameters of 1.0 cm or less by CT imaging, and 24 patients had tumors 1.1–1.5 cm in diameter. Twenty six patients (87%) had no hilar nor mediastinal lymph node metastases (pN0), 1 patient (3%) had a hilar lymph node metastasis (pN1), and 3 patients (10%) had mediastinal lymph node metastases (pN2). The tumors in the 1 pN1 and 3 pN2 patients were all adenocarcinomas with a diameter of 1.2–1.5 cm. The postoperative follow-up period for the 30 patients was 49 ± 32 months. Twenty nine patients are alive and cancer-free, and 1 pN0 patient died of pneumonia on the 70th postoperative hospital day.

Case 1

This patient was a 56-year-old female. She was informed that an abnormal shadow was detected in her chest radiograph during a routine screening examination. High-resolution CT (HRCT) revealed a 1.2×0.8 cm homogenous and ill-defined tumor in the right S⁴. A diagnosis of adenocarcinoma was made by TBLB and the clinical stage was

cT1N0M0. She underwent right middle lobectomy combined with hilar/mediastinal dissection. The histological diagnosis, with hematoxylin-eosin (HE) staining, was a moderately differentiated adenocarcinoma. Single lymph node metastases were observed in the #7 and #11 nodes, and a diagnosis of pN2 was made. At present, 15 months after surgery, she is alive and cancer-free (Fig. 1).

Case 2

This patient was a 58-year-old male. He was informed that an abnormal shadow was detected in his chest radiograph during a routine screening examination. Helical CT revealed a 1.2×0.8 cm homogenous and ill-defined tumor in the left S¹⁺². Peripheral lung cancer was suspected with a clinical stage of cT1N0M0. Intraoperative frozen histological examination of a specimen from the pulmonary wedge resection indicated a poorly differentiated adenocarcinoma. He underwent left upper lobectomy combined with hilar/mediastinal dissection. Lymph node metastases were observed in the #5, #11, and #12 nodes, and a diagnosis of pN2 was made. At present, 21 months after surgery, he is alive and cancer-free (Fig. 2).

Case 3

This patient was a 50-year-old female. She was informed that an abnormal shadow was detected in her chest radiograph during a

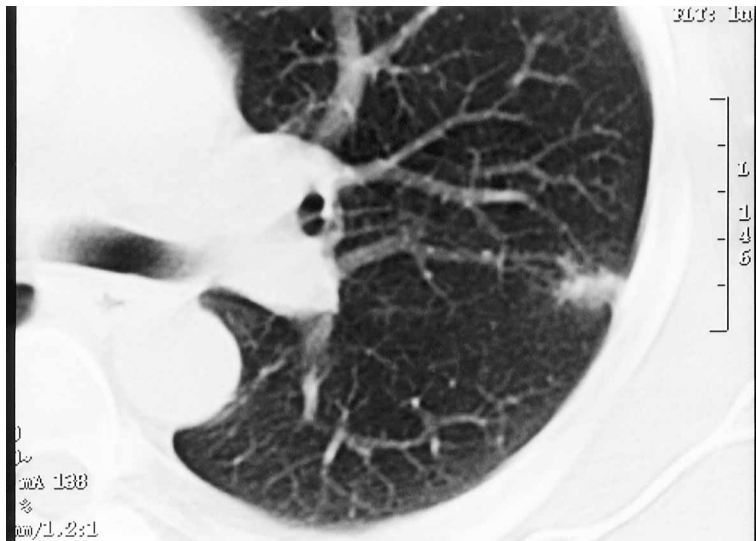


Fig. 2 Helical CT image of Case 2. The tumor is localized in the periphery of left S¹⁺². It is a homogeneous and ill-defined tumor 1.2×0.8 cm in diameter. The vascular convergence of A¹⁺²c and V^c is seen.

routine screening examination. Helical CT revealed a 1.2×1.2 cm homogenous and well-defined tumor in the left S⁴. Peripheral lung cancer was suspected with a clinical stage of cT1N0M0. Intraoperative frozen histological examination of a specimen from the pulmonary wedge resection indicated a poorly differentiated adenocarcinoma. She underwent left upper lobectomy combined with hilar/ mediastinal dissection. A solitary lymph node metastasis was observed in the #7 node, and a diagnosis of pN2 was made. At present, 18 months after surgery, she is alive and cancer-free (Fig. 3).

DISCUSSION

Recently, reports have appeared recommending limited surgery such as omission of mediastinal dissection, performing segmentectomy, and pulmonary wedge resection for cT1N0M0 PNSCLCs with 'diameters of 2.0 cm or less'. The pros and cons of limited

surgery have also been vigorously debated [2–5]. The basic policy of the Tokai University Hospital has been to perform lobectomy combined with hilar/ mediastinal dissection for all lung cancers, except in elderly patients (over 80) and those with poor pulmonary function [6]. In the nine years since 1990, 294 patients have undergone lobectomy or pneumonectomy combined with hilar/ mediastinal dissection in our hospital. Among these 294 patients there were 30 cases of cN0 PNSCLC with diameters of 1.5 cm or less by CT, who had undergone the combined procedure. Mediastinal lymph node metastases (pN2) were observed in three patients (10%).

There have been some questions as to whether mediastinal lymph node metastases were present for PNSCLCs with diameters of 2.0 cm or less [7–9]. This is the first report, however, on the presence of mediastinal lymph node metastases with diameters of 1.5



Fig. 3 Helical CT image of Case 3. The tumor is localized in the periphery of right S⁴. It is a homogeneous and well-defined tumor 1.2×1.2 cm in diameter. The pleural indentation and the vascular convergence of A⁴a are seen.

cm or less. Oda et al. [10] reported observing 9 pN1 patients (8.5%), 12 pN2 patients (11.3%), and 1 pN3 patient (1.0%), among 106 patients of clinical stage I (cN0) PNSCLCs with diameters of 1.1 cm to 2.0 cm, indicating that mediastinal dissection is necessary for PNSCLCs with tumor diameters greater than 1.0 cm. Takizawa et al. [8] discussed lymph node metastases of adenocarcinomas with tumor diameters of 2.0 cm or less (clinical lymph node swelling was not assessed). They described finding 6 mediastinal lymph node metastases (14%) in 43 adenocarcinomas with tumor diameters of 1.0–1.5 cm and 21 mediastinal lymph node metastases (18%) in 114 adenocarcinomas with diameters of 1.6–2.0 cm. These are the only two papers in the literature that state the need for aggressive mediastinal dissection for PNSCLCs with diameters of 2.0 cm or less. Many other papers report that it is possible to omit mediastinal dissection for PNSCLCs with diameters of 2.0 cm or less, because of the rarity of cases with mediastinal lymph node metastases. However, we encountered 3 pN2 patients among 30 cN0 PNSCLC patients with tumor diameters of 1.5 cm or less assessed by CT. We treated these 30 very small diameter PNSCLC patients with a procedure combining lobectomy and hilar/ mediastinal dissection. While the mean postoperative follow-up period was comparatively short, only 49 months, 29 patients at the time of writing are alive and cancer-free. One patient died of pneumonia. This means that potentially curative surgery by mediastinal dissection was highly successful. We therefore believe that mediastinal dissection is essential for PNSCLCs even with diameters of 1.5 cm or less.

On the other hand, Tsubota et al. [11] and Kodama et al. [4] described a procedure combining extended segmentectomy (bisubsegmentectomy) with mediastinal dissection. It is our opinion that procedures combining extended segmentectomy with hilar/ mediastinal dissection of hilar lymph nodes #11 and #12 in consideration of lymphatic drainage routes, can be highly effective in the treatment of PNSCLCs. Under these circumstances, we believe that mediastinal dis-

section should never be omitted for small-sized lung cancers.

CONCLUSIONS

Mediastinal lymph node metastases were histologically observed in 3 (10%) of 30 patients as having PNSCLCs with tumor diameters of 1.5 cm or less. These results show that mediastinal dissection is still necessary even for small-sized lung cancers.

REFERENCES

- 1) Seiei Yasuda, Akira Shohtsu, Kiyoshi Ohkubo et al: Lung cancer screening with spiral CT. *Jpn J Lung Cancer* 1997; 37: 433–9
- 2) Robert J. Ginsberg, Lawrence V. Rubinstein: Randomized trial of lobectomy versus limited resection for T1N0 non-small cell lung cancer. Lung Cancer Study Group. *Ann Thorac Surg* 1995; 60: 615–23
- 3) Rodney J. Landreneau, David J. Sugarbaker, Michael J. Mack et al: Wedge resection versus lobectomy for stage I (T1N0M0) non-small-cell lung cancer. *J Thorac Cardiovasc Surg* 1997; 113: 691–700
- 4) Ken Kodama, Osamu Doi, Masahiko Higashiyama et al: Intentional limited resection for selected patients with T1N0M0 non-small-cell lung cancer: a single-institution study. *J Thorac Cardiovasc Surg* 1997; 114: 347–53
- 5) Kazuro Sugi, Kouichi Nawata, Nobuhiro Fujita et al: Systematic lymph node dissection for clinically diagnosed peripheral non-small-cell lung cancer less than 2 cm in diameter. *World J Surg* 1998; 22: 290–5
- 6) Masayuki Iwasaki, Kichizo Kaga, Noboru Nishiimi et al: Experience with the two-windows method for mediastinal lymph node dissection in lung cancer. *Ann Thorac Surg* 1998; 65: 800–2
- 7) Chimori Konaka, Norihiko Ikeda, Toshimiysu Hiyoshi et al: Peripheral non-small cell lung cancers 2.0 cm or less in diameter: proposed criteria for limited pulmonary resection based upon clinicopathological presentation. *Lung Cancer* 1998; 21: 185–91
- 8) Tsuneyo Takizawa, Masanori Terashima, Teruaki Koike et al: Lymph node metastasis in small peripheral adenocarcinoma of the lung. *J Thorac Cardiovasc Surg* 1998; 116: 276–80
- 9) Teruaki Koike, Masanori Terashima, Tsuneyo Takizawa et al: Clinical analysis of small-sized peripheral lung cancer. *J Thorac Cardiovasc Surg* 1998; 115: 1015–20
- 10) Makoto Oda, Yoh Watanabe, Junzo Shimizu et al: Extent of mediastinal node metastasis in clinical stage I non-small-cell lung cancer: the role of systematic nodal dissection. *Lung Cancer* 1998; 22: 23–30
- 11) Noriaki Tsubota: Extended segmentectomy for small lung cancer. *J Jpn Surg Soc* 1997; 98:31–5