Primary Peripheral Lung Carcinoma Smaller Than 1 cm in Diameter*

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Background: Several investigators have reported on the risk of limited resection in patients with small peripheral lung cancer. Primary peripheral lung carcinomas 1 cm or less in maximum dimension were reviewed to study the feasibility of limited surgery.

Methods: Among 1,051 lung cancer patients who underwent surgical resection of the lung in the National Cancer Center Hospital East, Kashiwa, Chiba, Japan, from January 1986 through March 1997, there were 13 patients who had untreated peripheral cN0M0 tumors 1 cm or less in maximum dimension on the resected specimens who underwent systematic mediastinal dissection. Their specimens were histopathologically reviewed.

Results: There were ten adenocarcinomas, one small cell carcinoma, one poorly differentiated squamous cell carcinoma, and one typical carcinoid tumor. One adenocarcinoma showed lymphatic vessel invasion, venous invasion, and a subcarinal node metastasis. The small cell carcinoma was accompanied by a lymph node metastasis in a segmental node. The small cell carcinoma and another adenocarcinoma showed lymphatic vessel invasion. Of the ten adenocarcinomas, six were Noguchi’s type B and four were type C.

Conclusion: Even among the pulmonary peripheral cancers smaller than 1 cm in diameter, more than one third showed an invasive nature. This fact must be considered in selecting limited resection in these patients. It is evident that tumor size alone cannot be an indicator for limited resection in lung cancer patients. (CHEST 1998; 114:710–712)

Key words: limited resection; pulmonary peripheral small-sized carcinoma; thoracoscopic wedge resection

Abbreviations: TBLB = transbronchial lung biopsy; TNAC = transtunaneous needle aspiration cytology

The least invasive surgical intervention for lung cancer patients is thoracoscopic wedge resection of the lung. However, there have been several reports dealing with the risk of limited resection in these patients. In an attempt to study the feasibility of the limited resection, cN0M0 primary peripheral lung carcinomas 1 cm or less in maximum dimension, a series of tumors of the smallest diameter ever reported, were studied.

Materials and Methods

From January 1986 through March 1997, 1,051 lung cancer patients underwent surgical resection of the lung in the National Cancer Center Hospital East, Kashiwa, Chiba, Japan. Thirteen (1.2%) of them had no nodal involvement or distant metastasis clinically. They underwent systematic lymph node dissection and had untreated tumors that were distal to the fifth branches of the bronchial tree and were 1 cm or less in maximum dimension on the resected specimens. Histopathologic review based on the World Health Organization criteria was done with respect to histologic type, subtype, differentiation, pathologic staging, and vessel invasion. The typing of small adenocarcinoma of the lung also was evaluated according to guidelines of Noguchi et al.4

Results

There were 5 men and 8 women in the study. Their ages ranged from 40 to 71 and averaged 54 years. They were followed up on an outpatient basis, and the duration of follow-up ranged from 9 months to 11 years with the average being 6 years 7 months (Table 1).

In 5 of 13 patients (patients 1, 2, 3, 6, 13), a
diagnosis of malignant lesions was made by either transbronchial lung biopsy (TBLB) or CT-guided transthoracic needle aspiration cytology (TNAC). Five of the remaining 8 patients (patients 4, 5, 8, 9, and 10) underwent TBLB in vain, were informed of the difficulty in diagnosing their diseases with further conventional modalities including TNAC, and agreed to undergo open-lung biopsy directly without those examinations. One patient (patient 7) had a lesion recognizable only by a CT scan in the days when CT-guided TNAC was not available at the National Cancer Center Hospital East and underwent open-lung biopsy without preoperative cytopathologic examinations. One patient (patient 11), following unfruitful TBLB, and another (patient 12), without preoperative TBLB, underwent CT-guided TNAC but in vain.

Twelve patients underwent lobectomy, while one patient (patient 7) underwent segmentectomy because of her impaired respiratory function. All 13 patients underwent systematic lymph node dissection.

The maximum dimensions of the tumors ranged from 4 to 10 mm and averaged 8.6 mm. There were ten adenocarcinomas, one small cell carcinoma (subtype: oat cell carcinoma), one poorly differentiated squamous cell carcinoma, and one typical carcinoid tumor. One adenocarcinoma (patient 12) showed lymphatic vessel invasion, venous invasion, and a subcarinal node metastasis. The small cell carcinoma (patient 1) was preoperatively diagnosed to be squamous cell carcinoma. It was accompanied by a lymph node metastasis in a segmental node. The small cell carcinoma and a well-differentiated adenocarcinoma of type C according to Noguchi et al.4 (patient 6) showed lymphatic vessel invasion. Of the ten adenocarcinomas, eight were well differentiated and two were moderately differentiated. According to the typing of Noguchi et al.,4 six were type B and four were type C.

The patient with small cell carcinoma underwent chemoradiotherapy following a surgical operation, but the others had no treatment other than the surgical operation. All of the patients except patient 12 are alive and well without signs of recurrence. Patient 12 has developed carcinomatous lymphangitis and sciatic bone metastasis but is still alive.

**DISCUSSION**

The major concern in performing thoracoscopic wedge resection for lung cancer patients is the incidence of local recurrence at the surgical margin. Some investigators reported that segmental or wedge resection resulted in comparable or even better prognosis in comparison with lobectomy. However, these studies were nonrandomized and retrospective, and most of the patients underwent conservative resection because of their impaired respiratory function.5-7 The only prospective randomized trial ever reported was performed by the Lung Cancer Study Group.7 There was a significantly higher incidence of local recurrence in the limited resection group of this study.

In an attempt to study the feasibility of limited resection, this study evaluated untreated cN0M0
primary peripheral lung carcinomas 1 cm or less in maximum dimension. One of them was a small cell carcinoma, which had been mistakenly diagnosed as squamous cell carcinoma. Small cell carcinoma seems to be an inadequate pathologic finding for limited resection due to its known invasive and metastatic nature. Indeed, the carcinoma had lymphatic vessel invasion and segmental nodal metastasis. One well-differentiated adenocarcinoma showed lymphatic vessel invasion, venous invasion, and a subcarinal node metastasis. Although there is a question whether a limited resection would have resulted in a worse postoperative course in this patient, a limited resection evidently would have left more cancer cells in the thoracic cavity. Another well-differentiated adenocarcinoma was accompanied by lymphatic vessel invasion. Although the tumor was not accompanied by nodal involvement, the vessel invasion might have resulted in remaining tumor cells at the surgical margin if conservative resection had been performed in this patient. Noguchi et al.,4 in their report describing the pathologic characteristics of small adenocarcinomas of the lung, concluded that type A and B tumors were thought to be in situ peripheral carcinoma, whereas type C tumors appeared to be an advanced stage of types A and B (Table 2). Four of the 10 adenocarcinomas in this series were classified as type C by criteria of Noguchi et al.4 One of them was accompanied by lymphatic vessel invasion, venous invasion, and a subcarinal node metastasis. Another showed lymphatic vessel invasion. Although this patient and the other two type C patients are alive and free from recurrence, the postulated invasiveness of type C tumors might have resulted in local recurrence at the surgical margin if limited resection had been performed.

The rest of the tumors studied were six adenocarcinomas of type B according to criteria of Noguchi et al.,4 one poorly differentiated squamous cell carcinoma, and one typical carcinoid tumor. Typical carcinoid tumor is thought to be a low-grade malignant neoplasm, and the patient can be a candidate for limited resection.5 Squamous cell carcinoma or lesions 2 cm or less in diameter have been reported to be associated with improved survival following conservative resection.9 The patient in this study might have benefitted from limited resection. A prospective randomized study is necessary to prove that type B tumors according to guidelines of Noguchi et al.4 are in situ lesions and that therefore limited resection is a choice for cure. However, these six lesions showed no vessel invasion or lymph node metastasis; thus, the patients would appear to be candidates for conservative resection. Although this group of patients appears to be very small, consisting of only 0.6% of all cases in this series, such small lung cancers are found more frequently these days due to widespread CT usage in clinical practice.

CONCLUSION

Although this study was done on a group of patients with cN0M0 pulmonary peripheral cancers 1 cm or less in maximum dimension, which is the smallest tumor group detectable with current diagnostic modalities, more than one third of the tumors showed an invasive nature. This fact must be considered in selecting limited resection in patients with small peripheral lung cancers. It is evident that tumor size alone cannot be an indicator for limited resection in lung cancer patients.

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REFERENCES


Table 2—Histologic Typing of Small Adenocarcinoma of the Lung According to Criteria of Noguchi et al.4

<table>
<thead>
<tr>
<th>Type</th>
<th>Description*</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>LBAC</td>
</tr>
<tr>
<td>B</td>
<td>LBAC with foci of collapse of alveolar structure</td>
</tr>
<tr>
<td>C</td>
<td>LBAC with foci of active fibroblastic proliferation</td>
</tr>
<tr>
<td>D</td>
<td>Poorly differentiated adenocarcinoma</td>
</tr>
<tr>
<td>E</td>
<td>Tubular adenocarcinoma</td>
</tr>
<tr>
<td>F</td>
<td>Papillary adenocarcinoma with compressive and destructive growth</td>
</tr>
</tbody>
</table>

*LBAC=localized bronchioloalveolar carcinoma.