

Surgery for Advanced Lung Cancer

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ABSTRACT: Twenty-one patients with advanced lung cancer who underwent surgery were clinically reviewed on the basis of clinical experience at the First Department of Surgery, Nagasaki University School of Medicine.

The surgical outcome was related to the intensity of surgical insult, which implied the grade of cancer progression. However, aggressive surgery is effective in a palliation of patient's suffering regardless its time duration.

It is emphasized that surgeons should be aware of establishment of safety operation and of elimination of the risk of cancer spreading during surgical manipulation to improve surgical outcome for advanced lung cancer.

INTRODUCTION

The prognosis of extended resection for advanced lung cancer is now still poor, and it takes it into considerations that surgical treatment is dubious value.

However, according to advances in postoperative cares and surgical techniques of surgical treatment, surgical outcome has become improved gradually even in patients with the disease stage IV.

In fact, surgical treatment is at times indicated for patients with advanced lung cancer on account of palliation from patient's suffering even though it were limited to the short-term effect.

The purpose of this study is to certify validity of an extended surgery for advanced lung cancers with involvement of the mediastinum (T₄).

PATIENTS

During the time from January 1967 to December 1990, 21 patients with lung cancer of T₄ were surgically treated at the First Department of Surgery, Nagasaki University School of Medicine.

These patients accounted for 2.8% of a total of patients, who were operated upon at the same time period.

The ages ranged from 47 to 74 years old with an average of 61.4. The sex distribution was 20: 1 of men to women.

Histologic types were distributed in squamous cell carcinoma of 13 patients (59.1%), in adenocarcinoma of six (27.3%) and large cell carcinoma of two (9.0%), respectively.

According to N factor, T₄N₀ included two patients (9.0%) and T₄N₂ 19 patients (86.4%). As for surgical curability, relative non-curative operation was performed in 20 patients although absolute non-curative operation was in one.

Surgical outcome was shown in **Table 1**. The

Table 1. Surgical outcome following surgery for T₄ lung patients

| Survival time | Cases |
|-------------------------|---|
| Death cases | |
| Operative death | 3 (14.2%) |
| ~6 months | 7 (33.3%) |
| ~1 year | 3 |
| ~2 years | 4 |
| ~3 years | 1 |
| over 3 years | 0 |
| Alived cases | |
| 7 months | pleuritis carcinomatosa |
| 8 months | thoracic wall resection and SVC replacement |
| 2 years and 4 months | tracheal bifurcation reconstruction and SVC replacement |

Table 2. Surgical procedures for involved organs

| | |
|---|---|
| 1) <i>SVC</i> | |
| circumferential resection | 5 |
| partial resection | 3 |
| 2) <i>tracheal bifurcation</i> | |
| resection and reconstruction | 2 |
| sleeve pneumonectomy | 3 |
| 3) <i>Aorta</i> | |
| circumferential resection | 2 |
| partial resection | 2 |
| using extracorporeal circulation | 1 |
| 4) <i>pleuritis carcinomatosa</i> | |
| panpleuropneumonectomy | 1 |
| 5) <i>Left atrium</i> | |
| partial resection | 3 |
| 6) <i>Esophagus</i> | |
| subtotal resection | 1 |
| segmental resection | 1 |
| resection of adventitiomucular layer | 2 |

operative deaths occurred in three patients (14.2%) and 33.3% (seven patients) died within six months following surgery. On the contrary, survivors over one year were eight patients (38.0%). In addition, three patients were still alived well from seven months to two years and four months. One of them was expected to be the longest survivor more than three years following surgery.

Surgical procedures were indicated in **Table 2**. As a rule, complete resection was attempt-

Table 3. The causes of deaths

| causes | patients (%) | | | | |
|--|---|---------|--|-----------|--|
| operative death | 3 (14.2%) | | | | |
| bronchopulmonary fistula | | | | | |
| respiratory failure+renal failure | | | | | |
| death less than 6 months after surgery | 7 (33.3%) | | | | |
| bronchial fistula with aortic rupture | | | | | |
| cerebral infarct+renal failure | | | | | |
| recurrence | <table border="0"> <tr> <td> □ local</td> <td></td> </tr> <tr> <td> □ distant</td> <td></td> </tr> </table> | □ local | | □ distant | |
| □ local | | | | | |
| □ distant | | | | | |
| death more than 6 months after surgery | 11 (52.4%) | | | | |
| recurrence | | | | | |
| other diseases | | | | | |

ed with node dissection as far as feasible. Extracorporeal circulation also was used for a resection of left atrium and aortic wall. However, the prognosis of patients with extracorporeal circulation was extremely poor, because of partly advanced cancer, partly side effects of extracorporeal circulation of inappropriate myocardial protection, prevention of air embolism and hemolysis.

The causes of deaths following surgery were summarized in **Table 3**. The operative deaths were encountered in three (14.2 %). These causes were bronchopulmonary fistula in two and respiratory failure, followed by renal failure in one respectively. The former could be avoided by meticulous and careful management during surgery. The later was based on postperfusion lung syndrome by extracorporeal circulation. The causes of death less than six months after surgery were bronchial fistula, followed by aortic rupture in one, cerebral infarction in one and recurrence of carcinomas in five respectively. After the repair of the wall of the aorta, bronchial fistula occurring at bronchial stump should be avoided.

In spite of an aggressive surgery for advanced cancer, local recurrence was noted within six months after surgery in some cases. It is a reflection of incomplete resection with the overt cancer residue and a presence of micrometastasis.

DISCUSSION

In advanced lung cancer, the indication of surgical treatment should be limited because of

poor prognosis. The commonly held view is that preoperative evaluation for the extent of cancer infiltration and the spreading of metastasis was not necessarily accurate. It is frequent that postoperatively histologic examination certify the extent of cancer extension including a presence of intrapulmonary metastasis. And/or the involvement of the adjacent organs. It is reported that the incidence of intrapulmonary metastasis by postoperatively histologic examination is 6.5%.

Kinoshita¹⁾ reported that intrapulmonary metastatic lesions existed in another pulmonary lobes in one third of patients.

The more the sizes of intrapulmonary metastases and the number of node involvement increased, the more the number of intrapulmonary metastases proportionally increased¹⁾.

It is accepted that the prognosis of patients with extensive node metastasis is extremely poor. It is believed that even aggressive surgical approaches fail to ensure oncologic radicality for advanced cancer patients. It is well known that cancer extension originates from the angle of the jugular vein and extends to the lung and the distant organ via pulmonary circulation³⁾.

In addition, advances in surgery have made it possible to undergo combined resections with the neighbouring organs by using cardiopulmonary bypass⁴⁻⁶⁾.

The use of cardiopulmonary bypass benefit surgeons from ensurement of an operative field without blood, capable for opening the trachea and bronchi under unventilated lungs and able to minimize the chance of blood-bore metastasis.

According to some investigators⁷⁻⁹⁾, it is certified that a resection of 30% to 40% of the left atrium is feasible as the resected extent. Needless to say, this procedure is mandatory for surgical treatment of patients with advanced lung cancer, in particular, directly involving the wall of the left atrium.

In this series, the prognosis for patients with advanced lung cancer is not satisfactory. On the other hand, it was confirmed that combined resection with involving organs is clinically feasible to achieve a high quality of operative radicality.

It is well recognized that tumor cells that

infiltrate into the lumen of the great vessel could induce the deposition of fibrin as a framework to support continued cancer growth. Sometimes the tumor thrombosis may extend along the vein into the heart chamber, which is sufficient to impair blood flow and cardiac action¹⁰⁾. The patients with cancer infiltration to the left atrial wall should be warned of left ventricular inflow obstruction or lethal thrombosis in systemic arteries^{11, 12)}. It is believed that aggressive surgical management using a cardiopulmonary bypass is effective in prolonging the survival time despite still unsatisfactory outcome. The reasons for poor prognosis are that there is a possibility of intraoperative dissemination during manipulation. The problem of how prevent the dissemination before and during cardiopulmonary bypass should be solved and obtain a satisfactory result in the future.

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