

Quality of Life (QOL) versus Curability for Lung Cancer Surgery

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Standard operations for lung cancer patients are generally accepted as performing lobectomy or pneumonectomy on the tumor bearing lung and ipsilateral hilar and mediastinal lymphadenectomy including subcarinal lymph nodes. Recently, minimally invasive surgery or limited resection (for example, those via VATS) has ruled our time in the field of surgery considering especially from the point of QOL. There are so many factors that cause any decline to lung cancer patients' postoperative QOL, such as operative death, postoperative cancer death, postoperative complications, long-lasting discomfort symptoms and so forth. However, a surgery, even though it is big or extensive, does not always inevitably reduce QOL for patients with lung cancer. If patients received curable resection and have got cured, it seems that they would almost all be satisfied with their postoperative QOL. Namely, at present, we do not give priority to QOL but we should give priority to curability for lung cancer surgery, if the patients have no special risk factors, which eventually would bring them almost satisfactory postoperative QOL. (Ann Thorac Cardiovasc Surg 2001; 7: 127-32)

Key words: lung cancer surgery, quality of life (QOL), curable resection, video-assisted thoracic surgery (VATS), minimally invasive surgery

Introduction

“Lung resection” is one of surgical procedures that mean literally to resect some part of the lung. Generally speaking, it results in more or less a certain reduction in the lung function. We, thoracic surgeons, have to determine a preoperative surgical indication for patients with lung cancer considering from two different inconsistent aspects. One is curability, which means we have to determine the extent of resection to accomplish curative surgery concerning by the extent of their tumor invasion. The other is patients' safety, for which we have to choose adequate surgical procedures based on thorough assessment of patients' preoperative general condition, such as lung function, cardiac function, presence of coexisting diseases, etc. to avoid postoperative complications. Ac-

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cordingly, if we pursue curability, the risk in the operation would increase. To the contrary, if we give priority to safety, the curability would be vitiated.

Recently, the concept of “quality of life (QOL)” has been widely introduced into the medical field. Nowadays, minimally invasive surgery or limited resection, for example those via video-assisted thoracic surgery (VATS), has ruled our time in the field of surgery. What does QOL really mean? Is it compatible with the curative operation? I would like to discuss this issue in this paper.

The concept of QOL

It is said that the concept of QOL was introduced by Karnofsky¹⁾ in 1940's for the first time as one of the indexes to evaluate performance status in the treatment of chemotherapy for cancer patients. In 1976, Priestman²⁾ reported that postoperative psychological disorders in patients with breast cancer had been improved with counseling. Since then, psychiatrists and specialists participating in cancer therapy began to investigate coopera-

tively to solve social, mental and behavior related problems that cancer patients had. It is said the term "QOL" has been widely referred to by the physicians since then.

Looking back to the history of the field of studying QOL for cancer patients, the main issue was how to establish reliable measurement tools for QOL. Up to now, many proposals for measuring QOL of cancer patients have been reported.³⁻⁵⁾ Recently, a psychiatrist group proposed an interesting method called cancer rehabilitation evaluation system (CARES), which consists of 139 items to be analyzed with the computer.³⁾

According to a recent textbook, it is said that QOL has at least two implications in terms of definition of QOL.⁴⁾ One is related to psychological or ethical issues; for example, issues related to living to some purpose in one's daily and social life, maintaining good relationship with one's family and friends, and so forth. Another is related to physical issues such as physical function, working capability or physical sensation, namely, issues related to pain, sleep, walking, appetite, excretions, etc. Schipper⁵⁾ defined that QOL was composed of four elements; those were 1) working capability in one's daily life, 2) psychological status, 3) ability to maintain human relations, and 4) degree of comfort or discomfort in physical sensation.

Anyway, when we consider QOL for surgical patients, we should take into account both psychological and physical issues.

Factors that cause any decline to lung cancer patients' postoperative QOL

Items that cause any decline to QOL for patients with lung cancer after surgery are listed in Table 1. Firstly, death related to the operation, and secondly, postoperative death from cancer are listed. As long as the surgical resection aims to cure cancer patients, death or to terminate one's life is out of the question in terms of QOL. Thirdly, cases causing any kinds of postoperative complications are listed. For example, postoperative bleeding, broncho-pleural fistula, empyema, pneumonia, atelectasis, difficulties in expectorating sputa, wound infection, recurrent nerve paralysis, pulmonary infarction, cardiac troubles, and so on. These complications causing a decline to QOL not only in an early postoperative period but also over a long period after the surgery. As the fourth item, there are cases in which postoperative invasive procedures or re-operations, such as drainage, tracheostomy, long-term mechanical ventilation,

additional resections, closure of the bronchial fistula, thoracoplasty, wound opening, etc. are required. Moreover, in many cases the patients should suffer from long-lasting discomfort symptoms, such as wound pain, numbness, shortness of breath, cough, sputum, hoarseness, dysphagia, motion disorder of the upper extremities, etc. And there also may be cases where the patients inevitably lose or have to change jobs after the surgery. As stated above, there are so many and various factors that relate to QOL.

Operative procedures and QOL

Standard operations for lung cancer patients are generally accepted as performing lobectomy or pneumonectomy on the tumor bearing lung and ipsilateral hilar and mediastinal lymphadenectomy including subcarinal lymph nodes. However, for high risk groups of patients such as elderly patients and patients with coexisting serious diseases such as uncontrolled diabetes mellitus and pulmonary or circulatory disorders, a less invasive surgery for reducing the extent of lung resection or omitting some part of lymphadenectomy, may be indicated inevitably. On the other hand, for patients with apparently early stage lung cancer, the same kinds of less invasive surgery as mentioned above may be indicated.

Table 2 shows the distribution of the 50 cases of adenocarcinoma less than 2 cm. in diameter, resected in our institution, according to nodal status (presence of

Table 1. Factors cause to decline QOL

1. Operative death (within 30-days and in hospital)
2. Late death (cancer related death, other cause of death)
3. Postoperative events Broncho-plural fistula, empyema, pneumonia, atelectasis, difficulty in expectorating sputa, wound infection, recurrent nerve palsy, cardiovascular event, pulmonary infarction, etc.
4. Need some treatment or additional surgery Wound opening, drainage, additional resection, thoracoplasty, omentopexy, tracheostomy, mechanical ventilation, stenting, etc.
5. Prolonged symptoms Wound pain, numbness, dyspnea, shortness of breath, cough, sputum, hoarsness, dysphagia, motion disorder of the upper extremities, etc.
6. Disturbance of social life Delay for returning to job, impediment in family life, decline of activity of daily living (ADL) or performance status (PS), etc.

Table 2. Cases of tiny adenocarcinoma (less than 2 cm) according to N status and Noguchi's classification

Noguchi's classification*	Total	N0	N1	N2	unknown	N1 + N2
A	12	9	0	0	3	0
B	7	7	0	0	0	0
C	25	16	6	1	2	7/25 (28%)
D, E, F	6	3	0	3	0	3/ 6 (50%)

*A: Localized bronchioalveolar carcinoma (LBAC),
 B: LBAC with foci on collapse of alveolar structure,
 C: LBAC with foci on active fibroblastic proliferation,
 D: Poorly differentiated adenocarcinoma,
 E: Tubular adenocarcinoma,
 F: Papillary adenocarcinoma with compressive and destructive growth.

lymph node metastasis) and Noguchi's classification.⁶⁾ None of the 12 cases of Noguchi's type A or B showed any lymph node metastasis. However, 7 (28%) out of the 25 cases of type C and 3 (50%) out of the 6 cases of type D, E or F revealed some kind of hilar or mediastinal lymph node metastasis. It means that patients with an adenocarcinoma less than 2 cm in diameter and a histology of which supposed to be type A or B of Noguchi's classification, may be good candidates for undergoing limited resection without mediastinal lymph node dissection. However, any patients, even if revealed to have an adenocarcinoma less than 2 cm in diameter, must get standard surgical operations including mediastinal lymph

nodes dissection so long as their tumors were found to be of Noguchi's type C, D or E, as in many cases a considerable percentage of patients suffer from hilar or mediastinal lymph nodes metastasis.

QOL for postoperative patients with lung cancer

A surgery, even though it may be big or extensive, does not always inevitably reduce QOL for patients with lung cancer. For example, we have experienced at times in our institution such patients as hospitalized urgently; each with severe respiratory distress because of having a tumor that obstructed almost completely the lumen of the trachea or main bronchus, who received tracheal or bronchial sleeve resection, and thereafter, got recovered into normal lung function and returned to society. Moreover, most patients with hilar type lung cancer complain of some kinds of respiratory or general symptoms such as cough, sputum, bloody sputum, hemoptysis, fever, general fatigue, stridor, and some other symptoms related to pneumonia. As a result of surgical resection, those patients would be relieved from these unpleasant symptoms and even would be able to get a chance to be cured from cancer.

I will present herewith three cases of pneumonectomy of the patients, whose preoperative situations were somewhat different from one another. Figures 1 to 3 are their pre- and postoperative chest X-ray films and Table 3 shows changes in their vital capacities and PaO₂ before



a



b

Fig. 1. Case 1. Chest X-rays (a: preoperative view, b: postoperative view) for a patient with peripheral type lung cancer who underwent right pneumonectomy (51-year-old man, with small cell carcinoma. y-T1N2M0).

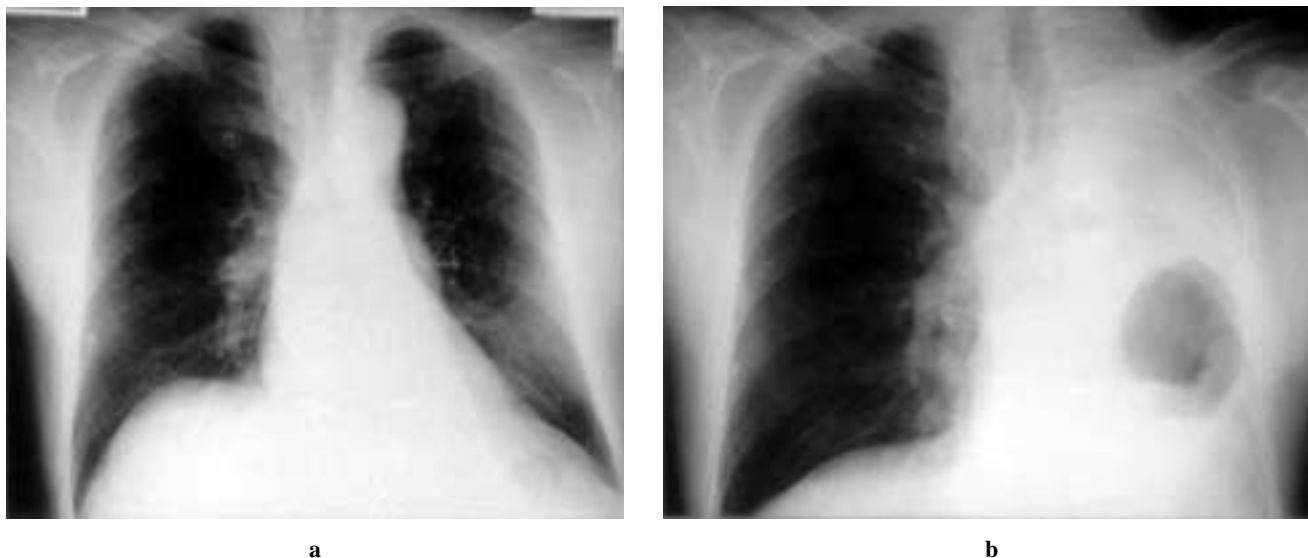


Fig. 2. Case 2. Chest X-rays (a: preoperative view, b: postoperative view) for a patient with left lower lobe atelectasis who underwent left pneumonectomy (73-year-old man, with squamous cell carcinoma. p-T2N0M0).

and after pneumonectomy.

Case 1 is a 51-year-old man who had a peripheral type small cell lung cancer with hilar lymph adenopathy. He received two cycles of preoperative chemotherapy followed by pneumonectomy. As shown in his preoperative chest X-ray film (Fig. 1a), a nodular lesion is seen in the peripheral part of his right lower lung field. In this patient, pneumonectomy resulted in nearly half of his normal lung tissue except for the tumor being removed. His postoperative vital capacity decreased down more than half of his preoperative value. However, his PaO₂ value, which was 70.2 mmHg preoperatively, did not change nearly at all. At present, 12 years after the surgery, he is quite well and is still engaging in farming.

Case 2 is a 73-year-old man who had developed left lower lobe atelectasis, as shown in his preoperative chest X-ray film (Fig. 2a). Bronchoscopy revealed he had a tumor totally obstructing the orifice of the left lower lobe bronchus. Biopsy of the tumor showed squamous cell carcinoma. He was complaining of severe dyspnea on exertion and his PaO₂ before surgery was 55.9 mmHg attributed to right to left shunt of the pulmonary blood flow. During his operation, we attempted to place a cross clamp to his left main pulmonary artery, and then, his PaO₂, under FiO₂ being 0.8, rose from 192 mmHg to 341 mmHg. We performed left pneumonectomy with the atelectatic left lower lobe. Postoperatively, his vital capacity decreased by the amount of his left upper lobe, however, his PaO₂ rose from 55.9 mmHg to 79.1 mmHg.

His preoperative symptoms completely disappeared and presently, 10 years after the surgery, he is still alive and well with no complaints.

Case 3 is a 55-year-old man who was complaining of shortness of breath, persistent cough, bloody sputum and symptoms related to recurrent airway infection. His chest X-ray film revealed a large mass in his left upper lung field (Fig. 3a). Bronchoscopy revealed that he had an irregular mass obstructing almost completely the left main bronchus and subsequent biopsy from the tumor revealed squamous cell carcinoma. Left pneumonectomy with intrapericardial dissection of the left main pulmonary artery was successfully performed on this patient. The resected specimen revealed that his left main pulmonary artery was totally obstructed with the tumor. Hence, he had his left lung removed which had already been incompetent from the beginning. His vital capacity decreased only slightly as his residual left lung volume had already been restricted and the value of his PaO₂ hardly changed at all as we removed his lung without any pulmonary blood flow. His preoperative complaints disappeared and he has been quite well for 10 years since the surgery.

As shown in Table 3, each and all cases show various changes, different from one another, in lung function and PaO₂ before and after pneumonectomy. And we can see that pneumonectomy does not always reduce patients' QOL.

Table 4 shows the results of a questionnaire on postoperative QOL handed over at our outpatient clinic on

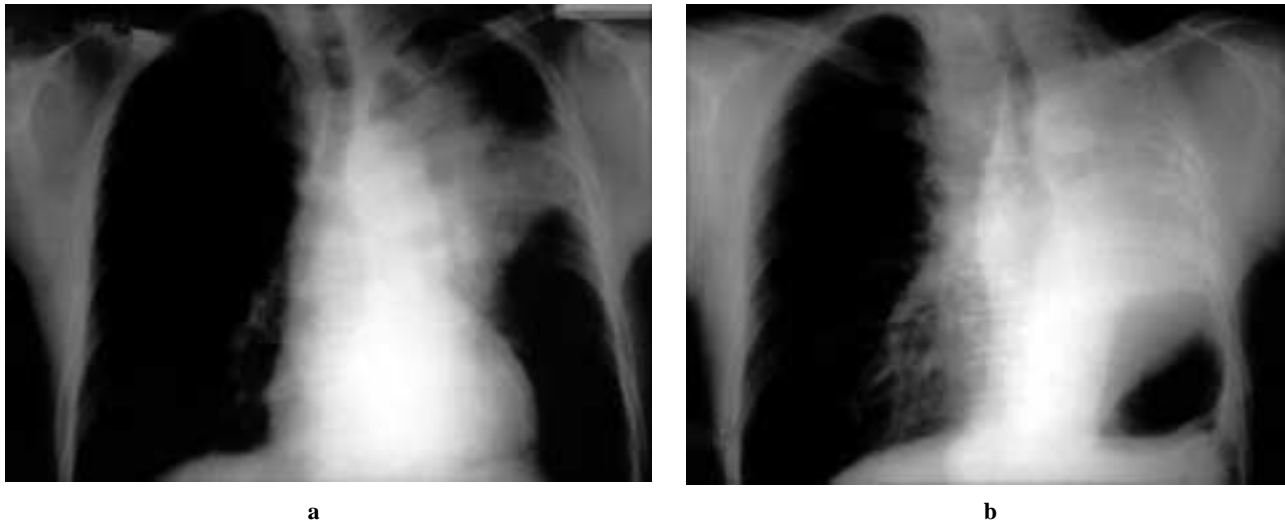


Fig. 3. Case 3. Chest X-rays (a: preoperative view, b: postoperative view) for a patient with huge left hilar mass who underwent left pneumonectomy with intra-pericardial dissection for the left main pulmonary artery (55-year-old-man with squamous cell carcinoma. p-T4N1M0).

some unspecified days to the patients who had received lobectomy for lung cancer with or without relapse. QOL for patients with relapse tend to be inferior to those for patients without relapse in all items, such as performance status, shortness of breath, wound pain, sputum, social recovery and daily life activities.

Conclusion

There are many complicated factors that define QOL as

described above. Moreover, the meanings of QOL vary depending on each and all patients’ status of diseases, stages of diseases, types of treatments, surgical procedures, prognosis, and courses of diseases. It is said that QOL is an issue of patient’s feeling of satisfaction. What the doctors think to be preferable for the sake of patients is not necessarily desirable by them. To the contrary, patients might not be concerned at all about what the doctors assume to be bad for them.

VATS, which I mentioned in the beginning of this ar-

Table 3. Changes of VC and PaO₂ before and after pneumonectomy in three patients with different preoperative features

		Preoperative	Postoperative	change
Case 1 peripheral Nodule	VC	3950 ml	1800 ml	↓↓
	PaO ₂	70.2 mmHg	70.0 mmHg	→
Case 2 lower lobe atelectasis	VC	3430 ml	2000 ml	↓
	PaO ₂	55.9 mmHg	79.1 mmHg	↑
Case 3 huge hilar mass	VC	2860 ml	2100 ml	↓
	PaO ₂	64.6 mmHg	64.2 mmHg	→

- Case 1: 50-year-old man with small cell carcinoma. Pneumonectomy was performed for his right lung bearing a peripheral nodule (VC: decreased much, PaO₂: stable).
- Case 2: 73-year-old man with squamous cell carcinoma. Pneumonectomy was performed for his left lung presenting a lower lobe atelectasis (VC: decreased moderately, PaO₂: increased).
- Case 3: 55-year-old man with squamous cell carcinoma. Pneumonectomy was performed for his left lung with a huge hilar mass, which had totally obstructed the left main pulmonary artery (VC: decreased slightly, PaO₂: stable).

Table 4. Items related to QOL in 37 lung cancer patients who received lobectomy according to with or without relapse

		without relapse* (N=31)	with relapse** (N=7)
P. S.	1	94 %	57 %
	2	3 %	29 %
	3	6 %	14 %
Shortness of breath	–	52 %	14 %
	+	42 %	43 %
	++	6 %	43 %
Wound pain	–	52 %	29 %
	+	45 %	14 %
	++	3 %	57 %
Sputum	–	81 %	57 %
	+	16 %	14 %
	++	3 %	29 %
Social life	unchanging	55 %	29 %
	slightly worse	32 %	14 %
	bad	13 %	57 %
ADL	a walk, a trip	84 %	57 %
	gardening	16 %	43 %

*Patients without relapse; M:16, F:15, ranging 45–81 years.

**Patients with relapse; M:3, F:4, ranging 57–78 years, 3 local recurrence, 1 bone metastasis and 1 brain metastasis.

ticle, is a typical minimally invasive surgery, has been highly appraised at because of its less invasiveness in terms of patients' postoperative pain, period of postoperative drainage, length of hospital stay, size of wound and so forth,⁷⁾ all of which are definitely unrelated to curability. Recently, not a few doctors have become to apply VATS for patients with lung cancer. There may be little objection to apply VATS to patients with peripheral tiny lung nodules, especially for the purpose of diagnosis. However, I think there are still not a few problems for us to solve in the application of VATS for patients with non-early stage lung cancer if the patients have no special risk factors for undergoing standard operation.

The greatest problem on VATS is whether thorough mediastinal lymph nodes dissection with the same quality as that of standard operation can be possible. Talking of mortality and morbidity as the events of the surgical operation, there seems to be little difference between the standard surgery and the VATS.⁸⁾ Moreover, if the patients have received curable resection and have got cured, it seems that they would almost all be satisfied with their postoperative QOL. Namely, at present, we should rather give priority to curability over QOL for lung cancer surgery, which eventually would bring almost satisfactory postoperative QOL to the patients.

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