In 2003, Gharagozloo and colleagues[16] reported their experience with complete VATS in 179 patients with clinical stage I disease. They admitted that the most significant reason why their VATS approach resulted in many cases of right upper and middle bilobectomies was a technical problem, leading to unnecessary removal of potentially healthy tissue. Kirby and associates[9] reported that in their randomized trial 11% of all patients enrolled in the study were converted from VATS to thoracotomy due to incomplete fissures, although McKenna and coworkers[17] reported no conversions to thoracotomy because of fused fissures. We consider access minithoracotomy important because one can look through the incision under direct vision and divide the fissure if it were largely fused or had severe adhesions. Additionally, this hybrid approach may decrease the incidence of superfluous stapling, thereby leading to full expansion of the preserved lobe. In particular, when the tumor is located closer to a fissure or in cases of patients with lung emphysema, the three-dimensional view of the anatomy given by this hybrid integrated approach can be very useful.

The key to effective and successful maneuvering within the thoracic cavity is an optimal port placement as well as a 30° video thoracoscope. In addition, we have preferred the use of an upside-down backhand grip on 30-cm-long scissors for incisive dissection, and on a long needle holder for bronchoplasty and angioplasty (R. Belsey, MD; Frenchay Hospital; Bristol, UK; and F.G. Pearson, MD; Toronto General Hospital; Toronto, ON, Canada; personal communication, 1974) to facilitate deep maneuvering in many instances in which the location of the lesion and the surgical circumstance make procedures by standard instruments difficult or impossible to perform. Dr. Pearson emphasized the importance of the sharp angle between the scissors and the surgeon's wrist for greater control. The handling of the scissors had been developed before VATS was introduced, and we consider it suitable for maneuvering through an access opening in the era of VATS. In our series, survival of the patient after undergoing hybrid VATS was comparable to or better than that after undergoing open thoracotomy. The result suggests that lung cancer surgery can be completed by hybrid VATS without compromising the patients' prognosis.

Current advances in radiology, especially with the introduction of helical high-resolution CT scanning for the diagnosis of lung cancer have resulted in an increased detection of small lung tumors.[18,19] The treatment for small-sized, deep-seated lesions that have not been pathologically diagnosed as malignancies preoperatively, which are encountered more frequently, can make the procedure a trial of the surgeon's skill. Without confirming the malignancy, thoughtlessly adopting lobectomy to ensure complete removal of a potential underlying malignancy must be avoided regardless of the surgical access that can be chosen. It is very unusual for lobectomy to be required for a benign tumor. When a benign nodule is completely excised, what is the rationale for resecting the remaining lobe? This is a difficult issue even when performing open thoracotomy. In this regard, Kirby[20] indicated that one of the major drawbacks of complete VATS lobectomy for an undiagnosed disease was that the surgeon would lose his/her ability to accurately assess intrathoracic pathology and to decide on the most appropriate resection. We should realize again that the primary target of minimally invasive surgery is the preservation of the pulmonary parenchyma, and that the second target is to reduce trauma by selection of the surgical approach. In our experience, segmentectomy has allowed the optimal resection of suspicious lesions with a deep location with safe surgical margins using hybrid VATS, although the application of a complete VATS lobectomy must not be an option in any case. The three-dimensional view provided by hybrid VATS enables us to observe the appropriate margins, otherwise diseased lung tissue could be left or a larger volume of healthy tissue could be removed. Indeed, we wonder whether there are any patients among those who have undergone complete VATS who would have undergone an exclusively different procedure had open thoracotomy been performed. For instance, the adequacy of an intraoperative assessment of the diseased bronchus has to be questioned in cases in which the only visualization of the operative field is through a television monitor, and thus we fear that VATS pneumonectomy would normally be performed when bronchoplasty instead would help to protect any part of the lung parenchyma that has no disease.

It is desirable that the trauma caused by the surgical approach is minimal regardless of the visualization of the operative field. Whether a direct view or visualization through a television monitor is used is, in essence, only a peripheral issue. Thoracic surgeons will have to balance the benefits of complete VATS with its disadvantages; for example, an ill-advised lobectomy for an undiagnosed disease. After long consideration, our attempts to reach an integrated harmony for performing such surgery have led us to the introduction of hybrid VATS. The most important aspect of cancer surgery must be its radicality, that is, to cure the disease. One should keep in mind that the surgical access should be changed very flexibly whenever curative resection is hard to perform for any reason, including the operative skills of the surgeon. For instance, in hybrid

VATS, extending the incision from 5 to 8 cm and enlarging the access thoracotomy provides a quite different view of the surgical field and facilitates our maneuvers.

What is the advantage of performing VATS for the treatment of a lung malignancy only with visualization through a television monitor? Would some advantages thereby accrue to the patient or the surgeon? The hybrid VATS approach is useful regarding education for residents in the sense that it allows a direct view of the surgical field and visualization of the field through a television monitor. Although we should acknowledge the nature of a retrospective study, we think that this accentuates the merits and can conclusively lessen some drawbacks of complete VATS access.

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Functional Advantage After Radical Segmentectomy Versus Lobectomy for Lung Cancer

Hiroaki Harada, MD, Morihito Okada, MD, PhD, Toshihiko Sakamoto, MD, PhD, Hidehito Matsuoka, MD, PhD, and Noriaki Tsubota, MD, PhD

Department of Thoracic Surgery, Hyogo Medical Center for Adults, Akashi, Japan

Background. Although several reports have recently demonstrated that segmentectomy for small-sized N0 lung cancer leads to recurrence and survival rates equivalent to those associated with lobectomy, controversy regarding the postoperative functional advantage in the former over the latter still persists. The purpose of this study was to evaluate the degree of postoperative functional loss in patients undergoing segmentectomy or lobectomy for lung cancer.

Methods. We analyzed patients able to tolerate lobectomy, who underwent radical segmentectomy (n = 38) or lobectomy (n = 45) for non–small-cell lung cancer. Functional testing included forced vital capacity, forced expiratory volume in 1 second, and anaerobic threshold measured preoperatively and at 2 and 6 months after surgery.

Results. Preoperative function tests showed no differences between segmentectomy and lobectomy patients. A positive and significant correlation was found between the number of resected segments versus loss of forced vital capacity ($r = 0.518$, $p < 0.0001$ at 2 months; $r = 0.604$, $p < 0.0001$ at 6 months) and loss of forced expiratory volume in 1 second ($r = 0.492$, $p < 0.0001$ at 2 months; $r = 0.512$, $p < 0.0001$ at 6 months). The postoperative reduction of forced vital capacity ($p = 0.0006$) and forced expiratory volume in 1 second ($p = 0.0007$) was significantly less in the segmentectomy group; however, a marginally significant benefit was observed in this group for anaerobic threshold ($p = 0.0616$).

Conclusions. The extent of removed lung parenchyma directly affected that of postoperative functional loss even at 6 months after surgery, and segmentectomy offered significantly better functional preservation compared with lobectomy. These results indicate the importance of segmentectomy for early staged lung cancer.

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As a result of the development of imaging tools such as high-resolution computed tomography, small-sized lung tumors are being detected with increasing frequency. Although lobectomy is still considered as the standard surgical procedure for any primary non–small-cell lung cancer, an increasing number of surgeons have doubts as to whether lobectomy is a must for such small lesions. The only randomized trial done so far comparing lobectomy with limited resection indicated an increased risk of local recurrence and reduced prognosis for patients undergoing the latter, and has led to greater general support for the former as the procedure of choice [1]. Recently, these results have been inspected, and there is an increasing body of evidence demonstrating that segmentectomy for small-sized stage I lung cancers can yield outcomes equivalent to lobectomy even in noncompromised patients [2–7]. Also, several studies demonstrated that the frequency of local recurrence after sublobar resection was the same as that after lobectomy when the indication was limited to stage IA tumors up to 2 cm, and segmentectomy not wedge resection was predominantly used as the lesser resection [4–6].

Theoretically, segmentectomy has an anatomic functional advantage over lobectomy as some segments of lung tissue that would be removed by the latter could be preserved. However, the above-mentioned randomized trial concluded that there were no significant differences in postoperative pulmonary function between lobectomy and limited resection patients. We therefore conducted the present study to assess the extent of postoperative functional loss including exercise tests useful in measuring quality of life [8] in patients who underwent segmentectomy or lobectomy.

Patients and Methods

The study group consisted of 83 patients: 45 of them underwent lobectomy and the other 38 underwent segmentectomy. This study was conducted with the approval of the institutional ethics board and informed consent was obtained from all patients. No specific preoperative and postoperative rehabilitation programs were established.

The eligibility criteria for segmentectomy in this study were as follows: patients who had a cT1N0M0 non–small-cell lung cancer 2 cm or smaller in all dimensions on thin-sliced computed tomography and were considered to be able to tolerate a lobectomy through preoperative

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Address correspondence to Dr Okada, Department of Thoracic Surgery, Hyogo Medical Center for Adults, Kitaohji-cho 13-70, Akashi City 673-8558, Hyogo, Japan; e-mail: morihito1217jp@aol.com.

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Table 1. Preoperative Demographic, Function, and Number of Resected Segments

Variable	Segmentectomy	Lobectomy	*p* Value
No.	38	45	
Male/Female	28/18	28/10	0.5041
Age (y)	62.7 ± 9.2	64.6 ± 8.2	0.3369
BW (kg)	59.2 ± 1.4	55.7 ± 9.2	0.0846
FVC (L)	3.13 ± 0.67	3.16 ± 0.74	0.8858
$FEV_{1.0}$ (L)	2.30 ± 0.58	2.30 ± 0.55	0.9904
$FEV_{1.0}$% (%)	75.0 ± 3.8	74.3 ± 4.5	0.9845
AT (mL/min)	894.6 ± 288.6	833.0 ± 221.2	0.2779
$\dot{V}O_{2max}$/BW (mL/min per kg)	23.5 ± 4.3	22.6 ± 4.2	0.2890
Number of resected segments	1.9 ± 0.9	3.9 ± 1.1	< 0.0001

AT = anaerobic threshold; BW = body weight; $FEV_{1.0}$ = forced expiratory volume in 1 second; FVC = forced vital capacity; $\dot{V}O_{2max}$ = maximum oxygen consumption.

general examinations [2–4]. Patients were prospectively (not randomly) chosen, and when informed consent for lesser resection was obtained from the patients, we performed anatomic segmentectomy through video-assisted approach with minithoracotomy. The essential points of the surgical technique were to remove the adjacent segment or subsegment together with the affected segments to keep an adequate surgical margin, and to explore hilar and segmental lymph nodes as well as mediastinal lymph nodes to intraoperatively confirm N0 disease. We performed segmentectomy if the patient consented to the sublobar resection, and lobectomy if the consent to sublobar resection was not obtained.

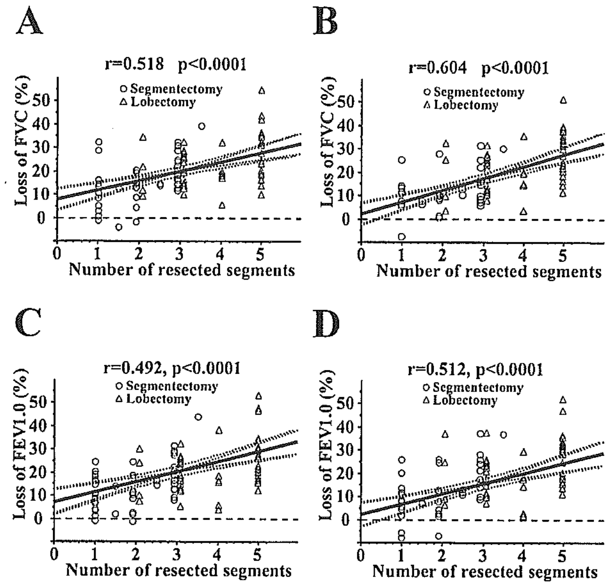

Fig 1. Logistic regression analyses showing the correlation between the extent of segments removed by segmentectomy (n = 38, circle) or lobectomy (n = 45, triangle) and pulmonary function loss. (A) Loss of forced vital capacity (FVC) at 2 months after surgery. (B) Loss of forced vital capacity at 6 months after surgery. (C) Loss of forced expiratory volume in 1 second ($FEV_{1.0}$) at 2 months after surgery. (D) Loss of forced expiratory volume in 1 second at 6 months after surgery.

Table 2. Locations for Resection

Location	Segmentectomy n = 38	Lobectomy n = 45
Right upper	6	16
S1 + 2	1	
S2	2	
S3	1	
S2 + 3a	1	
S2b + 3a	1	
Right middle		4
Right lower	9	6
S6	4	
S6 + 8a	1	
S7 + 8	4	
Left upper	15	13
S1 + 2	1	
S1 + 2 + 3	10	
S1 + 2 + 3 + 4a	1	
S3b + 4 + 5	2	
S4 + 5	1	
Left lower	8	6
S6	5	
S9	1	
S9 + 10	2	

a = posterior subsegment; b = anterior subsegment; S1 = apical; S2 = posterior; S3 = anterior; S4 = lateral; S5 = medical; S6 = superior; S7 = medial basal; S8 = anterior basal; S9 = lateral basal; S10 = posterior basal.

All the study patients were subjected to spirometry and a standard Bruce protocol [9] treadmill (MAT-6000C; Fukuda Electron, Osaka, Japan) test before surgery, and 2 and 6 months after surgery. The patients' heart rate and electrocardiographic findings were monitored during the exercise study. Inspired and expired gases were analyzed by a computerized online breath-by-breath system (Aeromonitor AE-300S; Minato Medical Science, Osaka, Japan). Maximum oxygen consumption was defined as the highest oxygen consumption achieved during the exercise test. Subsequently, the anaerobic threshold was determined by the V-slope method [10]. The exercise test was continued until development of limiting symptoms (dyspnea, chest pain, general fatigue, or leg fatigue), achievement of maximal predicted heart rate defined by the formula 220 − age [11], or presentation of marked and progressive abnormalities on the electrocardiogram. In this study, about half of the studied patients could not continue the exercise tests until the maximal predicted heart rate; therefore, we placed great importance on the anaerobic threshold value, generally considered to be a more objective determinant than maximum oxygen consumption [12].

The statistical significance of differences among clinical

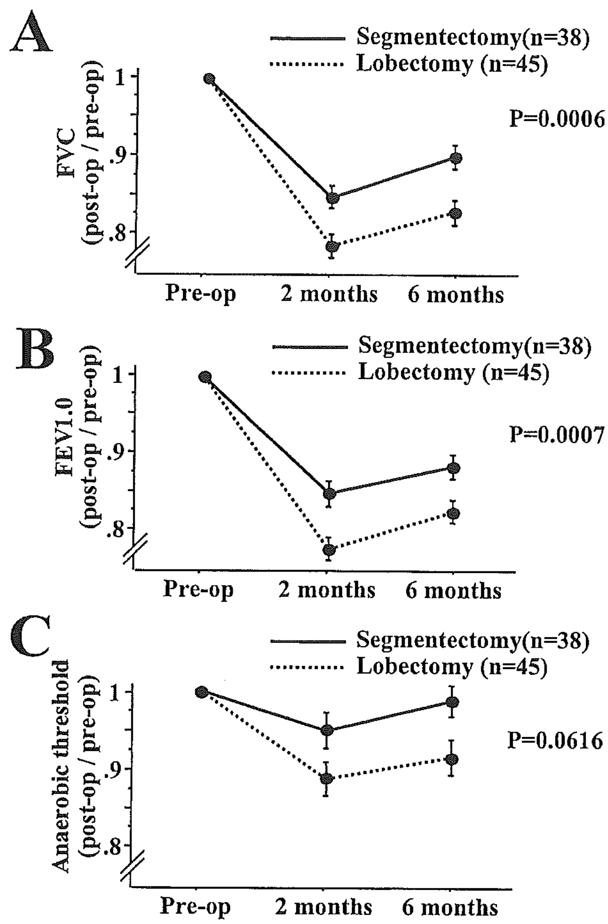

Fig 2. Forced vital capacity (FVC; A), forced expiratory volume in 1 second ($FEV_{1.0}$; B), and anaerobic threshold (C) before surgery, and at 2 and 6 months after surgery in patients undergoing segmentectomy (n = 38) and lobectomy (n = 45). The y axis shows the ratio of the postoperative value to the preoperative one (post-op/pre-op)*. Values are presented as the mean ± standard error of the mean.*

preoperative variables was analyzed by Mann-Whitney *U* test. Also we examined the correlation of the number of removed lung segments with postoperative functional loss on the basis of the correlation coefficient. Comparison of functional changes after segmentectomy or lobectomy was made by repeated-measures analysis of variance.

Results

The clinical preoperative characteristics and average number of resected segments in the lobectomy and the segmentectomy groups are shown in Table 1. There were no significant differences in preoperative functional factors between the two groups, confirming that the patients with segmentectomy included in this study could tolerate a lobectomy. The number of segments actually removed was halved in the case of segmentectomy (1.9 ± 0.9 versus 3.9 ± 1.1). The cell type of the tumor was adenocarcinoma in all patients, 70% of which contained bronchioloalveolar features. The locations of burdened lung are demonstrated in Table 2. No major postoperative complications occurred, and all patients made a quick recovery.

We performed logistic regression analyses to investigate whether the degree of segments lost by segmentectomy or lobectomy correlated with reduction of pulmonary function (Fig 1). At 2 and 6 months after surgery, positive and significant correlations were found between the number of removed segments versus loss of forced vital capacity (FVC; $p < 0.0001$) and forced expiratory volume in 1 second ($FEV_{1.0}$; $p < 0.0001$). In addition, the functional data obtained at 6 months ($r = 0.604$ for FVC; $r = 0.512$ for $FEV_{1.0}$) showed a stronger correlation with the extent of removed lung parenchyma compared with those at 2 months ($r = 0.518$ for FVC; $r = 0.492$ for $FEV_{1.0}$).

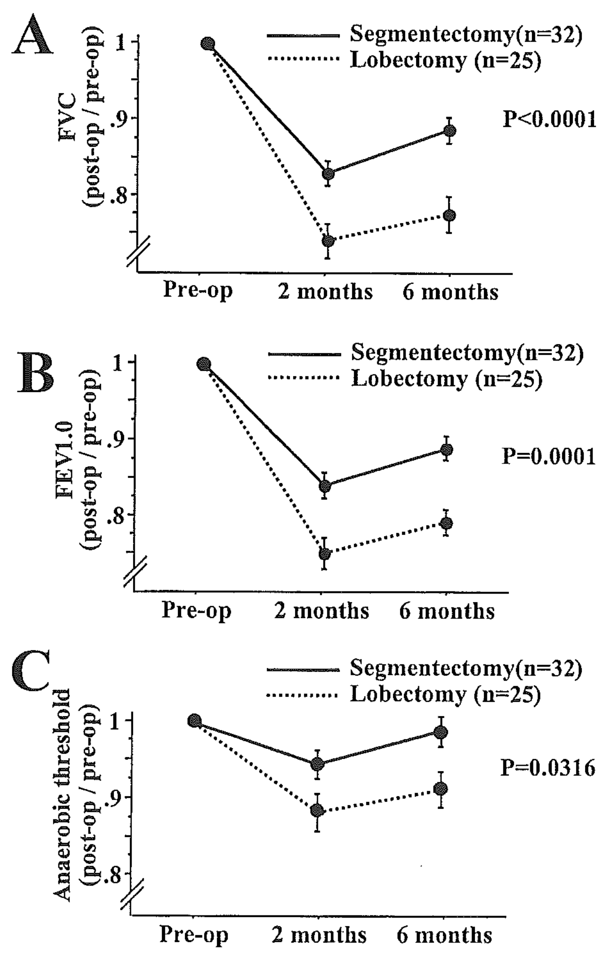

Fig 3. Forced vital capacity (FVC; A), forced expiratory volume in 1 second ($FEV_{1.0}$; B), and anaerobic threshold (C) before surgery, and at 2 and 6 months after surgery in patients undergoing segmentectomy (n = 32) and lobectomy (n = 25) for lower lobe or left upper lobe tumors. The y axis shows the ratio of the postoperative value to the preoperative one (post-op/pre-op)*. Values are presented as the mean ± standard error of the mean.*

These data demonstrated that the degree of anatomically resected lung directly affected long-term loss of pulmonary function and that segmentectomy contributed to the preservation of lung function.

Next, we essentially compared the functional changes in the segmentectomy and lobectomy groups (Fig 2). During the postoperative course, statistically significant differences were observed between the two groups in the ratio of postoperative to preoperative FVC ($p = 0.0006$) and $FEV_{1.0}$ ($p = 0.0007$), whereas a marginal difference was seen in the ratio of postoperative to preoperative anaerobic threshold ($p = 0.0616$). These results demonstrated a greater impact of the operative procedure on spirometric lung function but a lower impact on the exercise capacity. Subsequently, we addressed patients with a primary lesion originating from the lower lobes or the left upper lobe, the volume of which was relatively large (Fig 3). This was because segmentectomy in the right upper or middle lobe is generally uncommon, although we have taken a positive attitude toward segmentectomy in the right upper lobe. Not only FVC ($p < 0.0001$) and $FEV_{1.0}$ ($p = 0.0001$) but also anaerobic threshold ($p = 0.0361$) data showed the postoperative functional reduction was significantly less in the segmentectomy group than in the lobectomy group.

Comment

One of the controversies regarding lesser resection is whether the procedure itself can provide postsurgical functional benefit or not. There have been two reports suggesting that limited resection, including segmentectomy, could provide little functional advantage over lobectomy [1, 13]. In 1995, the Lung Cancer Study Group showed no significant differences in FVC between patients undergoing lobectomy and those undergoing limited resection [1]. Despite the fact that their data demonstrated a significant advantage of limited resection in maintaining $FEV_{1.0}$, their conclusion was somehow that there was no functional benefit of limited resection compared with lobectomy. Also, Takizawa and colleagues [13] evaluated postoperative lung function in patients having segmentectomy or lobectomy and revealed that segmentectomy had a significant benefit in $FEV_{1.0}$, but not in FVC. Nevertheless, the authors reached the same conclusion as the Lung Cancer Study Group, namely that lobectomy should remain the procedure of choice for a good-risk patient. We think their interpretation was not entirely satisfactory.

The present study demonstrated that segmentectomy offers a functional advantage over lobectomy. Recently, some other authors reached a similar conclusion [3, 7]. Yoshikawa and coworkers [3] in a prospective multiinstitution study showed postoperative functional loss, measured 1 year after surgery, was 11.3% in FVC and 13.4% in $FEV_{1.0}$, the values of which were equivalent to those of removing two segments according to the formula for predicting postoperative pulmonary function. In our series, a significantly positive association was clearly found between the extent of the removed segment and the postoperative reduction of FVC and $FEV_{1.0}$.

We added an exercise test to the present study because it has been shown to be important in measuring quality of life in a practical way [8]. Treadmill data as well as spirometric data in our series demonstrated that segmentectomy had a postoperative functional advantage over lobectomy. Exercise capacity was regained 6 months after segmentectomy in contrast to approximately a 10% loss after lobectomy.

Why should it be necessary to take away a large part of unaffected healthy lung parenchyma for a small-sized peripheral tumor when trained surgeons can judge N0 disease after sufficient intraoperative pathologic examination? We have advocated that segmentectomy be considered the procedure of choice for patients with a clinical and surgical N0 lesion of 2 cm in diameter or smaller, which has been supported by a large body of current evidence [2–7]. Furthermore, the lesser resection can provide another surgical chance in the future for metachronous lung tumor, which may be much more frequently detected thanks to the continuous development of imaging tools [14], because surgical outcome for lung cancer is improving [15] and the patients after surviving a first disease have a higher risk of a second disease. The present debate concerning the optimal resection for such a disease could be resolved by a prospective randomized trial. Such a trial must be appropriately constructed. The Lung Cancer Study Group trial was very influential, but actually it had several flaws, the most important of which was that wedge resection was chosen for approximately 30% of the enrolled patients. Future trials should be limited to segmentectomy as the only lesser resection. Also, the margin from the tumor that is secured by resecting the adjacent segment or subsegment, if needed, should concentrate our attention to avoid local recurrence, and intraoperative lymph node evaluation would be needed to randomize patients with N0 disease.

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Requirements for Recertification/Maintenance of Certification in 2006

Diplomates of the American Board of Thoracic Surgery who plan to participate in the Recertification/Maintenance of Certification process in 2006 must hold an active medical license and must hold clinical privileges in thoracic surgery. In addition, a valid certificate is an absolute requirement for entrance into the recertification/maintenance of certification process. if your certificate has expired, the only pathway for renewal of a certificate is to take and pass the Part I (written) and the Part II (oral) certifying examinations.

The American Board of Thoracic Surgery will no longer publish the names of individuals who have not recertified in the American Board of Medical Specialties directories. The Diplomate's name will be published upon successful completion of the recertification/maintenance of certification process.

The CME requirements are 70 Category I credits in either cardiothoracic surgery or general surgery earned during the 2 years prior to application. SESATS and SESAPS are the only self-instructional materials allowed for credit. Category II credits are not allowed. The Physicians Recognition Award for recertifying in general surgery is not allowed in fulfillment of the CME requirements. Interested individuals should refer to the *Booklet of Information* for a complete description of acceptable CME credits.

Diplomates should maintain a documented list of their major cases performed during the year prior to application for recertification. This practice review should consist of 1 year's consecutive major operative experiences. If more than 100 cases occur in 1 year, only 100 should be listed.

Candidates for recertification/maintenance of certification will be required to complete all sections of the SESATS self-assessment examination. It is not necessary for candidates to purchase SESATS individually because it will be sent to candidates after their application has been approved.

Diplomates may recertify the year their certificate expires, or if they wish to do so, they may recertify up to two years before it expires. However, the new certificate will be dated 10 years from the date of expiration of their original certificate or most recent recertification certificate. In other words, recertifying early does not alter the 10-year validation.

Recertification/maintenance of certification is also open to Diplomates with an unlimited certificate and will in no way affect the validity of their original certificate.

The deadline for submission of applications for the recertification/maintenance of certification process is May 10 each year. A brochure outlining the rules and requirements for recertification/maintenance of certification in thoracic surgery is available upon request from the American Board of Thoracic Surgery, 633 N St. Clair St, Suite 2320, Chicago, IL 60611; telephone: (312) 202-5900; fax: (312) 202-5960; e-mail: info@abts.org. This booklet is also published on the website: www.abts.org.

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Complications and outcomes after pulmonary resection for cancer in patients 80 to 89 years of age

Hidehito Matsuoka[a,*], Morihito Okada[b], Toshihiko Sakamoto[b], Noriaki Tsubota[b]

[a]Department of Surgery, Hyogo Prefectural Kaibara Hospital, Kaibara 5208-1, Kaibara-cho, Tanba city, Hyogo 669-3395, Japan
[b]Department of Thoracic Surgery, Hyogo Medical Center for Adults, Akashi city, Hyogo, Japan

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Abstract

Objective: Patients 80 years or older often present with potentially resectable cases of non-small cell lung cancer. Whether such patients should undergo surgical treatment is becoming increasingly important in this rapidly aging society. **Methods:** From April 1997 through March 2004, 40 consecutive patients with non-small cell lung cancer who were 80-88 years of age underwent complete resection of their tumors, as confirmed pathologically. We reviewed preoperative data including gender, age, history of smoking, pulmonary function, co-morbidity, and induction/adjuvant therapy. Perioperative data consisted of surgical procedure, operative morbidity and mortality, histopathologic type, pathologic stage, and outcome. **Results:** The procedures comprised 16 lobectomies (40%), 12 segmentectomies (30%), and 12 wedge resections (30%). The histopathologic diagnosis was adenocarcinoma in 22 patients, squamous cell carcinomas in 11, large cell carcinomas in 4, adenosquamous cell carcinomas in 2, and neuro-endocrine cell carcinoma in 1. The disease stage was IA in 21 patients, IB in 14, IIB in 3, and IIIA in 2. There was no perioperative mortality. Eight patients had non-lethal complications (20%), including five with cardiopulmonary complications (parenchymal air leaks persisting for more than 7 days in two patients, interstitial pneumonia in one, bacterial pneumonia in one, and moderate arrhythmias in one) and three with minor complications (depression or confusion). The actuarial survival rates of the 40 patients, including deaths from all causes, were 92.4, 71.6, and 56.9% at 1, 3, and 5 years, respectively. In patients with stage I disease, the respective survival rates were 94.3, 74.3, and 57.3%. **Conclusions:** Advanced age is not a contraindication to curative resection in patients 80-89 years of age with stage I non-small cell lung cancer.

Keywords: Lung cancer; Elderly patients; Operation

1. Introduction

The life expectancy in Japan in 2003 is 7.95 years in 85 years old woman and 8.26 years in 85 years old man. The population of Japan is rapidly aging like this, resulting in increased numbers of elderly patients with lung cancer. Complete resection remains the treatment of choice for early non-small cell lung cancer, but the risks of surgery in elderly patients are higher than those in younger patients because of the increased prevalence of coexisting cardiopulmonary or cerebrovascular disease. Surgeons are often faced with the critical decision of whether or not to perform surgery. To determine whether curative resection is feasible in elderly patients with non-small cell lung cancer, we reviewed the early morbidity and mortality and the late survival of patients 80 years or older who underwent surgery for this indication.

Abbreviations: FEV1, Forced expiratory volume per one second.

* Corresponding author. Tel.: +81 795 72 0524; fax: +81 795 72 1276.
E-mail address: hmatsuoka1@mac.com (H. Matsuoka).

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2. Materials and methods

Data were obtained from the medical records of patients with non-small cell lung cancer 80 years or older who underwent pathologically complete resection between April 1997 and March 2004 at Hyogo Prefectural Kaibara Hospital and Hyogo Medical Center for Adults. We reviewed demographic and clinical data, including gender, age, smoking history, pulmonary function, concomitant disease, and induction/adjuvant therapy, as well as perioperative data, consisting of surgical procedure, histopathologic type, pathologic stage, and operative morbidity and mortality, occurring within 30 days or before discharge. Follow-up information was obtained at the time of office visits or by contacting the patients or their relatives or physicians by mail.

3. Statistical analysis

Actuarial survival curves were constructed by the Kaplan-Meier method, using Statview 5.0 software (SAS Institute; Cary, NC, USA).

4. Results

4.1. Preoperative characteristics of patients

Among 1212 patients with primary non-small cell carcinoma who underwent pathologically complete pulmonary resection during the study period, 40 (3.3%) were 80 years or older. They comprised 30 men and 10 women 80-88 years of age (mean, 82.0 ± 2.0 years). Twenty-two patients (55%) had a documented history of smoking (mean Brinkmann index, 1176 ± 594). Pulmonary function as measured by vital capacity ranged 1.82-3.97 L, averaging 2.62 ± 0.59 L (predicted%, 100.0 ± 16.3). Forced expiratory volume per second (FEV1) ranged from 0.97 to 2.78 L, averaging 1.76 ± 0.45 L (mean FEV1/forced vital capacity, 0.694 ± 0.13). Preoperative mediastinoscopy was not performed in any patient. No patient received induction or postoperative adjuvant chemotherapy or radiation (Table 1).

4.2. Co-morbidity

Thirteen patients (32.5%) had a diagnosis of chronic obstructive lung disease, but only six (15%) were receiving oral bronchodilators or inhaled medications. One patient was receiving long-term treatment with oral corticosteroids for emphysema at the time of operation. Six (15%) patients had a history of angina pectoris or myocardial infarction, and one (2.5%) had cardiac arrhythmias requiring treatment. One man underwent percutaneous transluminal coronary angioplasty before operation. All patients met standard cardiopulmonary criteria for the proposed resections. Nine patients (22.5%) had been previously treated for malignant disease, including three gastric cancers, two colon cancers, two renal cancers, one asynchronous lung cancer, and one bladder cancer. None of these patients had evidence of recurrence of these neoplasms at the time of operation for lung cancer (Table 1).

Table 1
Preoperative characteristics of patients

Gender	
Male	30 (75%)
Female	10 (25%)
Age (years)	82.0 ± 2.0 (80-88)
Smoking (current or former)	22 (55%)
Brinkmann index	1176 ± 594
Preoperative pulmonary function	
VC (L)	2.62 ± 0.59(1.82-3.97)
VC predicted (%)	100.0 ± 16.3 (63.2-125.1)
FEV1 (L)	1.76 ± 0.45(0.97-2.78)
FEV1/FVC	0.694 ± 0.13 (0.35-0.893)
Co-morbidity	
COPD	13 (32.5%)
Ischemic heart disease	6 (15.0%)
Arrhythmia	1 (2.5%)
Previous treatment for malignant disease	9 (22.5%)
Gastric cancer	3 (7.5%)
Colon cancer	2 (5.0%)
Renal cancer	2 (5.0%)
Lung cancer	1 (2.5%)
Bladder cancer	1 (2.5%)

VC, vital capacity; FEV1, forced expiratory volume per second; FVC, forced vital capacity; COPD, chronic obstructive pulmonary disease.

4.3. Surgical procedure

We performed muscle sparing posterolateral thoracotomy/VATS for 34 cases (85% of all cases). The others were standard posterolateral thoracotomies.

Sixteen patients (40%) underwent standard lobectomies with lymph node sampling or systematic dissection. Segmentectomies were done in 12 patients (30%) with peripherally located small lung cancers who had a diagnosis of N0 on frozen-section examination. The other 12 patients (30%) underwent wedge resection because their pulmonary function was evaluated to be severely impaired by their physicians (Table 2).

For the majority of cases including these patients underwent standard thoracotomy, we performed epidural anesthesia with fentanyl for 3-7 days after operation.

4.4. Histopathologic type and pathologic stage

The histopathologic diagnosis was adenocarcinoma in 22 patients, squamous cell carcinoma in 11, large cell carcinoma in four, adenosquamous cell carcinoma in two, and neuro-endocrine cell carcinoma in one. The disease stage was IA in 21 patients (52.5%), IB in 14 (35.0%), IIB in three (7.5%), and IIIA in two. The two patients with stage IIIA disease had malignant N2 lymphadenopathy (Table 2).

4.5. Morbidity and mortality

Blood loss was 170 ± 195 ml (ranged 20-860 ml). Two patients were given blood transfusion (0.5% of all cases).

There were no perioperative deaths. Eight patients had non-lethal complications (20%), including five with cardiopulmonary complications (parenchymal air leaks persisting for more than 7 days in two patients, interstitial pneumonia in one, bacterial pneumonia in one, and moderate arrhythmia in one) and three with minor complications (depression or confusion) (Table 2).

Table 2
Perioperative characteristics of patients

Surgical procedure	
Lobectomy	16 (40%)
Segmentectomy	12 (30%)
Wedge resection	12 (30%)
Histologic type	
Adenocarcinoma	22 (55%)
Squamous cell carcinoma	11 (27.5%)
Large cell carcinoma	4 (10.0%)
Adenosquamous cell carcinoma	2 (5.0%)
Neuro-endocrine tumor	1 (2.5%)
Pathologic stage	
IA	21 (52.5%)
IB	14 (35.0%)
IIB	3 (7.5%)
IIIA	2 (5.0%)
Complications	
Cardiopulmonary problems	5 (12.5%)
Prolonged air leak	2
Interstitial pneumonia	1
Bacterial pneumonia	1
Mild arrhythmia	1
Depression or confusion	3 (7.5%)

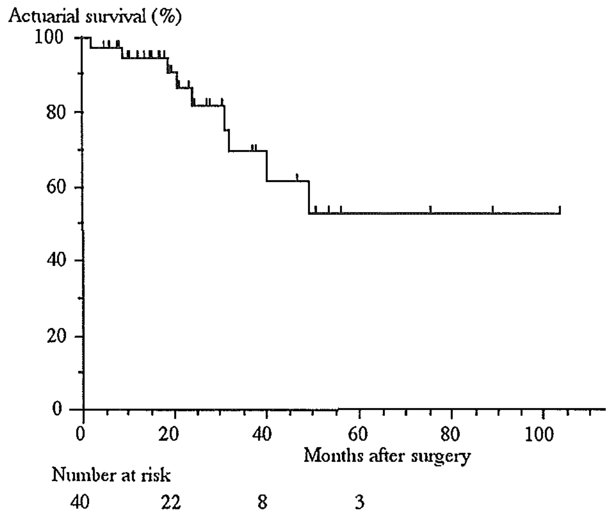

Fig. 1. Overall postoperative survival of patients 80 years or older with non-small cell lung cancer.

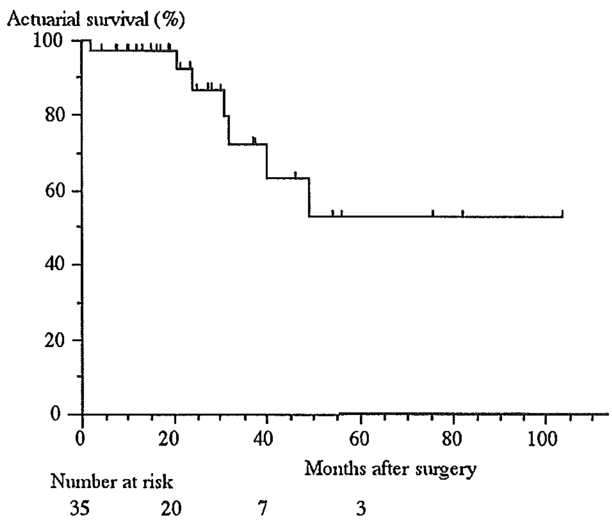

Fig. 2. Overall postoperative survival of patients 80 years or older with stage I non-small cell lung cancer.

4.6. Long-term survival

Mean and median follow-up periods for the survivors were 35.4 and 28.3 months, respectively. The actuarial survival rates of the 40 patients, including deaths from all causes, were 92.4, 71.6, and 56.9% at 1, 3, and 5 years, respectively (Fig. 1). The respective survival rates in patients with stage I disease were 94.3, 74.3, and 57.3% (Fig. 2). Patients with more advanced lung cancer had poorer outcomes. Of the five with stage II or III disease, only two were alive as of 8 and 28 months after operation. The three other patients had disease recurrence 6, 9, and 27 months after operation and died at 9, 19, and 69 months, respectively.

5. Comments

Elderly patients generally have more underlying co-morbidities than younger patients, increasing the risks associated with surgery. The mortality rate of patients 80 years or older who underwent surgical resection for lung cancer ranged from 8.1 to 21% in reports published before 1995 [1-5]. Harvey and co-authors reported that operative mortality did not significantly increase until 80 years of age in patients surgically treated for non-small cell lung cancer. In that report, operative mortality was 1.4% for patients younger than 70 years, 1.6% for patients 70-79 years old, and 17.6% for patients 80 years or older [5]. However, more encouraging results have been obtained during the past 10 years [6-10] (Table 3). In our series, surgical resection of non-small cell lung cancer in patients 80-88 years of age was not associated with an excessive increase in complications or mortality. Most complications were predictable and did not lead to mortality because they were effectively managed according to previously reported recommendations.

Pulmonary complications caused by increased bronchial secretion and difficulty in expectoration directly increase mortality, making the prevention of such complications essential. Wound pain and drainage tubes cause elderly patients to restrict their movement and suppress coughing, increasing the risk of coexisting illness after operation. Pain control is mandatory after thoracotomy, particularly in elderly patients. We recommend postoperative epidural anesthesia with fentanyl for several days [11]. This treatment is thought to contribute to very low rates of pulmonary complications and mortality. In addition, patients should be instructed not to smoke and to perform deep respirations before operation; early arising from bed after operation is particularly important for elderly patients.

Table 3
Surgical resection for lung cancer in patients 80 years or older

Reported	Author	Covered year	No. of patients	Morbidity (%)	Mortality[a] (%)	5-year survival	
						Overall (%)	Stage I (%)
1997	Pagni S [6]	1980-1995	54	42	3.7	43	57
1999	Hanagiri T [7]	1992-1995	18	50	0	42	ND
2000	Aoki T [8]	1981-1998	35	60	0	40	ND
2004	Brock M [9]	1980-2002	68	44	8.8	34	34[b]
2004	Port JL [10]	1990-2003	61	38	1.6	38	46
2005	Present	1997-2004	40	20	0	56.9	57.3

ND, not described.
[a] Death within 30 days or same hospitalization.
[b] All patients had with stage I disease.

In addition to routine measures of pulmonary function, e.g. vital capacity or forced expiratory volume per second, cardiopulmonary function should be comprehensively evaluated in patients at risk for cardiovascular complications. Cardiac catheterization has been found to be useful for cardiopulmonary evaluation to assess the risk of postoperative complications [12]. However, cardiac catheterization is not commonly performed because of its invasive nature. Brunelli and associates reported that a symptom-limited stair-climbing test was a safe and simple procedure for predicting the risk of cardiopulmonary complications in elderly patients after lung resection [13]. We previously reported that the treadmill exercise test can simply and effectively assess the degree of operative invasion [14]. Modified procedures for wedge resection or segmentectomy are recommended in patients in whom exercise consistently decreases the arterial blood oxygen concentration.

Video-assisted thoracoscopic surgery has become popular for the treatment of lung cancer. Jaklitsch and associates reported that one case of pneumonia and three minor morbid events, including supraventricular dysrhythmia, confusion, and other symptoms, developed among 33 patients 80 years or older who underwent video-assisted thoracic surgery [15]. There was no operative death. Asamura and associates reported that only two prolonged air leaks and no serious complications occurred among six patients 78-85 years of age who underwent video-assisted lobectomy [16]. This minimally invasive procedure, which we also have used, is believed to substantially reduce morbidity and mortality in elderly patients.

Some reports concluded that standard lobectomy is the procedure of choice even in elderly patients, because the risk of major complications or operative death is not necessarily related to age [10,17,18]. In our study, 40% of the patients underwent standard lobectomy and 60% limited resection. Extended segmentectomy for low-risk patients might strike a balance between curability and a low rate of complications. Pneumonectomy, especially right-sided, is strongly associated with an increased risk of complications as compared with standard lobectomy or limited resection [19-21]. Mizushima and associates reported that operative mortality after pneumonectomy was 22.2% in patients 70 years or older and significantly differ from with that in patients younger than 70 years (3.2%) [22]. Bronchoplasty should be performed whenever possible even in elderly patients to avoid pneumonectomy [23].

Pathologic stage has proven to be the most important prognostic factor for long-term survival. In our study, patients with stages IA and IB disease had good outcomes.

In conclusion, advanced age is not a contraindication to curative resection in patients 80-89 years of age with stage I non-small cell lung cancer. Most serious complications and operative deaths can be avoided by careful evaluation of cardiopulmonary function, careful selection of the surgical procedure, and meticulous postoperative management.

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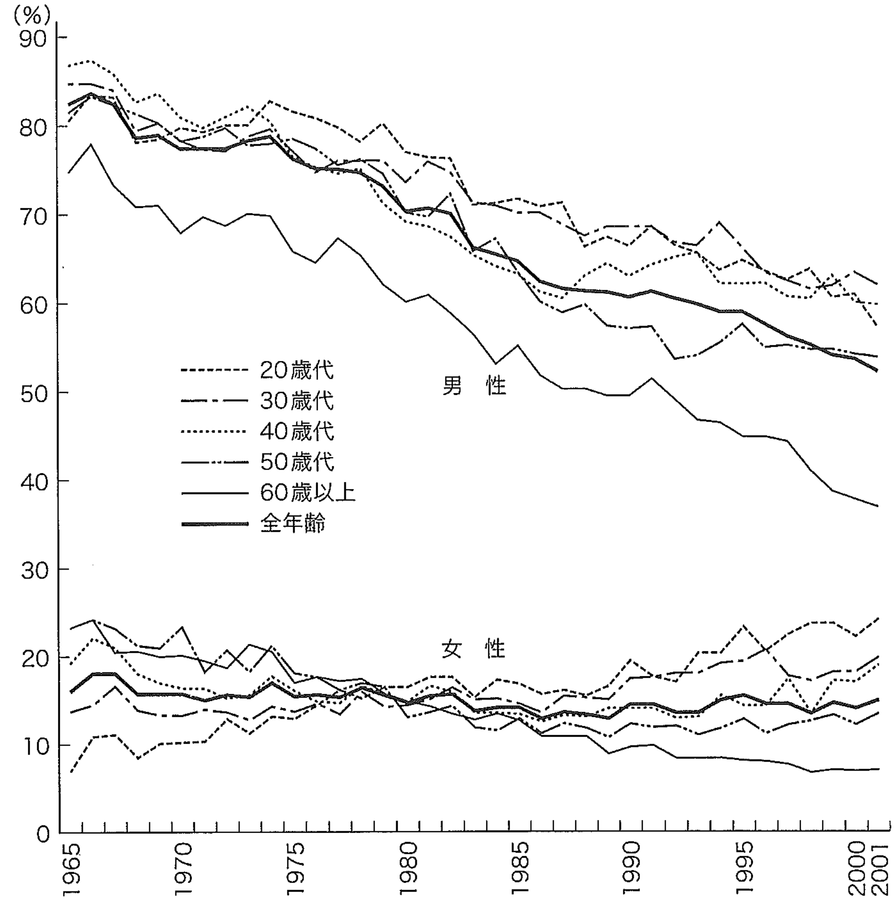

Fig. 3. 性別・年代別喫煙率の推移
(日本たばこ産業の調査結果より)

日本もようやくWHO「たばこ規制枠組み条約」の19番目の批准国となった．今後は未成年者を含めた若年者に対する喫煙開始の予防が大きな課題となる．

喫煙以外の危険因子として，慢性閉塞性肺疾患，気管支喘息，硅肺，アスベスト症などの肺疾患がある．異論はあるが，間質性肺炎も危険因子とされる．大気汚染も肺癌の危険を高めると報告されている．逆に肺癌の予防には，野菜と果物の摂取がよいとされている．しかし，サプリメントとしてβカロチンを投与すると，むしろ肺癌の危険を増加させる．

おわりに

肺癌の臨床は進歩し続けている．2004年にはI期腺癌の術後化学療法としてtegafur-uracil合剤内服の有効性が報告され，今後普及する可能性がある．同年には癌組織の遺伝子解析によりgefitinibの有効性を予測できることが報告され，テーラーメイド医療も可能となりつつある．gefitinib以外の分子標的治療薬も多数開発中である．

しかし，これらの進歩がすぐに飛躍的な予後の改善につながるわけではない．当面は肺癌の罹患数・死亡数ともに増え続けることになるだろう．根治手術以外に治癒を望みにくい現状では，早期発見がきわめて重要である．胸部X線を読む機会の多い内科医は，肺癌を見逃さない読影技術を身につけておく必要がある．

<Special Article>
「EBM の手法による肺癌診療ガイドライン」について

桜田　晃　近藤　丘*

要旨

- 厚生労働省研究班「EBM の手法による肺癌の診療ガイドライン策定に関する研究」事業の成果として，2003 年 11 月に肺癌の診療ガイドラインが出版された．
- ガイドラインの編集にあたって，4 万編を超える文献の中から 1,142 編のエビデンスレベルが比較的高い文献が採用され，それぞれの文献について専門家による吟味が加えられた．
- ガイドラインでは，診療項目ごとに推奨が述べられている．関連する文献情報から，診療行為の推奨の強さを A，B，C，D の 4 段階に分類している．
- ガイドラインの使用にあたっては，推奨グレード C に対する正しい理解が必要である．

はじめに

「Evidence-based Medicine(EBM)の手法による肺癌の診療ガイドライン策定に関する研究」(主任研究者：藤村重文)は，平成 13 年(2001 年)厚生労働省 科学研究補助金 21 世紀型医療開拓推進事業として開始され，翌年に厚生労働省科学研究補助金医療技術評価総合研究事業に引き継がれ，2 年間の研究を終了した．その報告書を要約したものが，「EBM の手法による肺癌診療ガイドライン」として，平成 15 年(2003 年)11 月に出版された[1)]．

本稿では，本ガイドライン作成の手順について解説し，その使用方法に関する注意点，今後の課題などについて述べる．

ガイドライン作成手順

研究班は，呼吸器内科，呼吸器外科，放射線科を含む肺癌診療の専門家と疫学の専門家合計 50 名により組織され，日本肺癌学会，日本呼吸器学会，日本呼吸器外科学会，日本外科学会，日本胸部外科学会，日本癌治療学会，日本放射線学会，日本呼吸器内視鏡学会(旧日本気管支学会)と連携して作成を進める体制をとった．

作成の手順としては，厚生労働省より示された指針(診療ガイドラインの作成の手順(Table 1))に則って行った．初年度は各専門分野別に分担してガイドラインを作成し，翌年には，使用する場合の利便性を考慮し，非小細胞肺癌，小細胞肺癌それぞれについての病期別ガイドラインの作成を

Table 1.　診療ガイドライン作成手順

・臨床上の疑問点の抽出
・各疑問点に対する文献検索
・採用文献の批判的吟味
・各疑問点に対するエビデンスとそのレベルの決定
・各疑問点に対する勧告(推奨)とその強さの決定
・すべての疑問点に関するエビデンスや勧告を網羅した診療ガイドラインのまとめ
・ガイドラインの内容の第三者評価
・3 年を目途に改訂必要性の検討

* A. Sakurada，T. Kondo(教授)：東北大学加齢医学研究所呼吸器再建研究分野．

Table 2. 診療・治療法別ガイドライン

肺癌診断
肺癌化学療法
肺癌放射線治療
肺癌外科治療
肺癌術前・術後治療
肺門部早期癌診断・治療
肺癌胸腔鏡下手術

Table 3. 組織型・病期別ガイドライン

非小細胞癌	小細胞癌
・Ⅰ期	・LD
・Ⅱ期	・ED
・Ⅲ期	・Ⅰ期
・Ⅳ期	

LD：限局型，ED：進展型

Table 4. エビデンスのレベル分類

Ⅰ	システマティックレビュー/メタ分析
Ⅱ	1つ以上のランダム化比較試験による
Ⅲ	非ランダム化比較試験による
Ⅳ	分析疫学的研究(コホート研究や症例対照研究)による
Ⅴ	記述研究(症例報告やケース・シリーズ)による
Ⅵ	患者データに基づかない，専門委員会や専門家個人の意見

Table 5. 推奨(勧告)グレードの分類

A	行うよう強く勧められる
B	行うよう勧められる
C	行うよう勧めるだけの根拠が明確でない
D	行わないよう勧められる

行った．ガイドラインの章立てについては，Table 2, 3のごとくである．章ごとの分担を決定し，まず，その分野に特有な臨床的疑問点の抽出を行った．それら疑問点の妥当性について全体で審議したあと，疑問点に関連する文献の検索を行った．文献の検索にあたっては，用いたデータベース，検索を行った年代の範囲，検索を行った年月日，検索に用いたキーワード，文献の取捨選択方法を明記することを原則とした．

本ガイドラインの作成にあたっては，4万編を超える論文が吟味され，その中から1,142編が採択された．採択にあたっては，Table 4に示すように論文のデザインに基づくエビデンスレベルを勘案して，なるべくエビデンスレベルの高いものを採用することを原則とした．そうした論文が存在しない場合は，エビデンスレベルⅢ，Ⅳのものも採用した．これら採択した論文についてFig. 1に示すようなアブストラクトテーブルを作成し，原則として複数のレビュアーによるコメントを加えた．そのうえで，個々の疑問点についての推奨を決定し，グレードを定めた．推奨のグレードは，厚生労働省より示された指針(Table 5)に従ってA～Dの4段階の中から該当するものを選択した．

ここまでの作業はEBMの手法に則って淡々と進め，最終的にすべての推奨について全体で討議を行い，推奨のグレードや文言についての決定を行った．エビデンスが存在しない，あるいは少数であるが有効性が自明なものについては，この段階で推奨の強さを適切と考えられるものに変更した．本ガイドラインでは，グレードAが56，グレードBが60，グレードCが48，グレードDが11で合計175の推奨を行う結果となった．これら推奨の記載と同時に，それぞれの推奨を導く根拠となったエビデンスを併記した．推奨を記載するのがふさわしくないと考えられる項目については，エビデンスの記載のみにとどめた．

非小細胞肺癌Ⅰ期の項を例にとって述べたい．非小細胞肺癌Ⅰ期に関しては，Table 6に示すように，自然史と治療とに項目を分けた．さらに，治療については外科治療，術前術後治療，放射線治療という項目を設けた．非小細胞肺癌Ⅰ期に関連のある文献を，Table 7に示すような基準で検索した．610編に及ぶ文献を検索し，その中から，重要なものとして163編を採択した．自然史については，推奨を述べることがそぐわないと判断し，エビデンスのみの記載とした．治療については，

ガイドライン項目	鏡視下手術(VATS)
作成者	分担者A
疑問点	VATSは開胸と比較して出血量に差があるか，手術時間に差があるか，在院日数に差があるか，疼痛に差があるか，術後肺機能に差があるか，術後合併症に差があるか，術後死亡率に差があるか

日本語表題		
英語表題	Video-assisted minithoracotomy versus muscle-sparing thoracotomy for performing lobectomy	
著　者	Giudicelli Rほか(文献　Ann Thorac Surg 58：712～718, 1994)	
研究施設	Sainte-Marguerite University Hospital	
研究デザイン	非ランダム化比較研究	
研究目的	VATS下の肺癌手術が筋温存開胸に比較して出血量，手術時間，在院日数，疼痛，術後肺機能，術後合併症，術後死亡率に差があるか	
対　象	67名の肺葉切除手術例(原発性肺癌50例)	
介　入 (研究方法)	67名を医師の決定で２群に分けた．筋温存手術23例，VATS 44例で比較した．性・年齢・肺機能・切除葉・病名・病期・組織型に差はなかったが，腫瘍径には有意差があった(2.9cm対4.2cm)．VATSの方法は開胸器を用いるもの．両群とも肺癌例は縦隔郭清を施行	
主要評価項目とそれに用いた統計学的手法	primary end point：出血量，手術時間，ドレナージ期間，在院日数，疼痛，術後肺機能，術後合併症，死亡率，統計学的手法はt検定とχ^2乗検定	
結　果	手術時間はVATS群が有意に長かった．出血量には２群間で有意差はなかった．術後死亡例は３例ですべてVATS群であったが有意差はなく，また，内２例は落ち着いてからの心臓発作によるものであった．疼痛に関連する術後合併症の頻度はVATS群のほうが少なかったが有意差はなく，また，全術後合併症の頻度には差はなかった．術後８日目までの疼痛はVATS群のほうが少なかった．術後８日目までの肺機能には有意差はなかった．気漏の期間，ドレナージ期間，在院日数はいずれもVATS群が少なかったが有意ではなかった	
アブストラクターコメント	前向き研究だが,無作為化しておらず比較性に疑問が残る．肺癌以外も少なくない．サンプルサイズが小さいため検出力が低かった可能性がある	
レビュアーコメント	reviewer A	アブストラクターのコメントは妥当と思われます
	reviewer B	エビデンス　レベル4
	reviewer C	比較試験の方法に問題あり
	reviewer D	非ランダム化比較であるので，両群の背景因子が若干異なりconclusiveなことがいえない．また，術後早期の肺機能の点ではVATSのほうが優れているという報告もあるので，このstudyでは何か背景因子が異なっていてそのような結果となったのか，肺機能の差は本当にないのかが不明．44例のVATS中に術後死亡が３例もあるのは,たまたまかもしれないが，studyの質の問題がある可能性がある．少なくともVATSが術後morbidityを減らすことにはならなかったという結果ともとれる

Fig. 1.　アブストラクトテーブルの１例

全体についての推奨およびそれを導くにいたったエビデンスをTable 8に示すように記載した．エビデンスは少ないものの，手術の有効性が自明であるという理由から，グレードAとしている．

このように，本ガイドラインを完成させるにあたっては，純粋なEBMの手法による作業と，現実的に適応可能なものにするための作業の組み合わせを行っており，こうした全体としての作業が，EBMの実践であると認識している．

ガイドラインを利用する場合の注意

1．グレードＣの扱い

先に述べたように，今回のガイドラインでは推奨のグレードが４段階に分けられている．グレードA，グレードB，グレードDについては，解釈の問題が生じることはないものと考えられるが，解釈によって誤解を招く可能性があるのがグレードCである．

グレードCは，まだ結論を出すだけのエビデンスが十分揃っていないという現状を示すものであることは，EBMの手法に関して知識のある者で

Table 6. 非小細胞肺癌 I 期の検討項目

自然史
治療
・外科治療
臨床病期 I 期と病理病期 I 期
予後因子
T 因子，腫瘍径
組織型
分化度，脈管侵襲
手術
標準術式
リンパ節郭清
縮小手術（肺切除量縮小）
胸腔鏡下手術
再発
術後経過観察
・術前・術後治療
術後免疫療法
術後放射線療法
術後化学療法
術後 chemoprevention
・放射線単独治療

Table 7. 非小細胞肺癌 I 期の文献検索方法

・Ovid medline を用い，検索年代を 2002 年 7 月までとし，検索は 2002 年 9 月 24 日に行った．
・検索語としては，carcinoma，non-small-cell lung [Mesh] AND stage I [text] により 610 編に絞り，その抄録より診断，予後，治療に関連する，comparative study，prospective study，retrospective study を抽出した．

Table 8. 非小細胞肺癌 I 期治療の推奨とエビデンス

推奨
機能的に耐術可能な場合，I 期非小細胞肺癌には外科治療が第一選択である（グレード A）．
エビデンス
I 期非小細胞肺癌の術後 5 年生存率は下記に記すように，臨床病期で 50%，病理病期で 65%程度であり（IV），手術以外の治療法との直接の比較試験は存在しないが，他の治療法との差異は明らかである．

あれば当然理解していることである．しかし，そうした知識をもたない読者がグレード C とされた診療行為は無効であるという誤った捉え方をすることが危惧される．決定された推奨の中には，経験的に有効であるとみなされ定着している医療行為であるにもかかわらず，エビデンスがあまり存在しないために推奨のレベルがグレード C に分類されたものも含まれている．そうした場合，誤った解釈をされると，あたかも有効でない治療が流布しているような誤解を生じることになる．また，新たな治療法でその効果が有望視されているものの，ガイドラインを作成した時点においては，臨床試験が進行中であるといったものもグレード C に含まれる．したがって，分子標的薬剤についても，ガイドライン作成当時のエビデンスに基づいてグレード C とされている．こうしたグレード C の性質を正しく理解してガイドラインを用いる必要がある．

2．ガイドラインの改訂

ガイドラインの一般的な性質として，最新の医療状況に即したものであることが求められる．本ガイドラインも同様の性質を有していることはいうまでもなく，3 年後を目途に改訂を行うことを前提として作成されている．ガイドラインは検索を行った時点のエビデンスをもとに作成されているため，編集作業のあとに報告された最新のエビデンスは含まれていない．たとえば，先に述べた分子標的薬や，2003 年と 2004 年の American Society of Clinical Oncology（ASCO）で報告された肺癌の術後化学療法に関する最新の知見は含まれておらず，今後，新たに蓄積されたエビデンスを加えて再検討し，改訂を行っていく必要がある．

ガイドラインの今後

本ガイドラインは肺癌診療を網羅するガイドラインとしてはわが国はじめてのものであり，多数の専門家の多大な労力の賜である．これを礎にして今後のわが国における EBM に基づく肺癌診療が進められることで，多くの患者に利益がもたらされるものと信じるが，現在のガイドラインの形態が最善というわけではない．今後，ガイドライ

ンの利用者からの意見および最新の知見を集約して改訂を行い，また，今回は時間的制約から取り組むことができなかった患者向けのガイドラインを整備する必要があろう．膨大な情報量をもつガイドラインを患者にとって理解しやすく，かつ誤解を受けない形にまとめるには，十分な審議を尽くす必要があるが，情報化の進む現代社会においては，可能な限り迅速にそうした作業を進めることが求められているといえよう．厚生労働省によるガイドライン事業の方向性として，最新の医学情報を蓄積し，インターネットを通じて，全国の医療者，国民，研究者への医療情報サービスを提供することが示されており，日本医療機能評価機構が実際の作業を推進している．すでに，いくつかの疾患については，同機構のホームページに公開されており，現在，肺癌の診療ガイドラインも，公開に向けて準備が進められている．

一方，ガイドラインの作成は従来専門家を中心に作業が進められることが多かったが，患者参加型の診療ガイドラインの作成を推進する活動やその成果が英国より報告され[2]，わが国においてもこうした取り組みを行う市民団体の活動が活発化してきている．患者が医療に参加するということはインフォームドコンセントを基本として進められている従来の医療から，一歩踏み出して，より患者の満足度の高い医療を目指すことであるが，そのためには参加する患者自身の努力とそれを支援するための仕組みが必要であると指摘されている．こうした体制の整備は，わが国においては，端緒に付いたばかりであるが，今後，こうした流れが普及してくるであろうことを認識しておく必要があるものと考える．

おわりに

肺癌診療ガイドラインの作成の過程と，使用するにあたっての注意点を解説した．本ガイドラインが，今後の肺癌診療の質の向上に貢献することを願って稿を終える．

文　献

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27．高齢者における胸腔鏡下手術

岡田克典
近藤　丘*

I．基本的な考え方

本邦における平均寿命は年を追うごとに長くなっており，2002 年の集計では男性 78 歳，女性 85 歳と世界最長である．外科療法の対象となる呼吸器疾患のうち，肺癌や肺気腫，肺気腫に伴う気胸などは，発症年齢のピークが 60〜70 歳台にあると考えられ，平均寿命が上記のような今日では，80 歳を超える高齢者がこれらの疾患に罹患することも珍しくない．高齢者に対する呼吸器外科手術，とりわけ低侵襲性を利点とする胸腔鏡下手術は，人口の高齢化に伴い今後ますます重要性を増す可能性がある．

肺癌に対する肺切除術において，加齢は明確な危険因子とされている．1983 年に Ginsberg らによって報告された Lung Cancer Study Group のデータによると，肺切除術に伴う 30 日以内の死亡は 60 歳未満で 1.3% であったのに対し，60〜69 歳で 4.1%，70〜79 歳で 7.1%，80 歳以上になると 8.1% であった[1]．このような数字をみるまでもなく加齢に伴い肺機能は低下し，高血圧，脳血管障害，冠状動脈疾患，腎機能障害などの術前合併疾患の頻度は増大することから，75〜80 歳を超える高齢者肺癌患者に対しては，手術ではなく放射線療法や経口抗癌薬投与などが治療の第一選択として提示されることが少なくなく，また患者自身や家族も手術以外の治療を希望することも多い．しかし一方で，重篤な合併疾患がなく performance status（PS）が良好な高齢者肺癌患者が存在することも事実であり，80 歳以上の患者に対して根治手術あるいは縮小手術が行われることもある．

1990 年前後に世界的に臨床導入された胸腔鏡下手術の最大の利点は，一般に手術の低侵襲性と認識されている．たとえば，当施設における肺癌に対する肺切除時の標準的な開胸法は，従来 25〜30 cm の皮切を加え，広背筋，前鋸筋を切離し，後方で肋骨を 2 本切断して広く肋間筋を切離するものであった．胸腔鏡ならびにエンドステープラーなどの胸腔鏡用手術器具の導入に伴って次第に手術創は小さくなり，今日では 10〜20 cm 程度の皮切で前鋸筋は温存し，肋骨は切断しないか 1 本切断して開胸する手術が標準的な手術となりつつある．さらに 1997 年以降は，cT1N0M0 の症例に対しては 7〜10 cm 程度の皮切で聴診三角あるいは側方小切開で開胸する，いわゆる胸腔鏡補助下手術（VATS）肺葉切除を適用するようになった[2]．

本稿では，1997〜2004 年末の 8 年間に当施設で行った肺癌に対する肺切除術のうち，80 歳以上の症例を対象としたものを retrospective にレビューし，高齢者肺癌患者に対する肺切除術，とくに胸腔鏡下手術の位置づけについて検討した．

キーワード：高齢者，肺癌，胸腔鏡下手術，胸腔鏡補助下肺葉切除

* Y. Okada，T. Kondo（教授）：東北大学加齢医学研究所呼吸器再建研究分野．

表 1．80 歳以上の肺癌肺切除術例

症例	年齢(歳)・性	PS	術前合併症	臨床病期	病理病期	組織型
1	83・女	0	HT	T2N0M0	T2N0M0	腺癌
2	83・女	0	なし	T1N0M0	T1NxM0	腺癌
3	80・男	0	DM	T1N0M0	T2NxM0	扁平上皮癌
4	81・男	0	なし	T2N0M0	T2NxM0	扁平上皮癌
5	81・女	0	OP	T2N0M0	T2N0M0	カルチノイド
6	80・男	0	HT，IP	T1N0M0	T1N0M0	腺癌
7	80・女	1	AP	T1N0M0	T2N2M0	大細胞癌
8	82・男	1	HT	T1N0M0	T1NxM0	扁平上皮癌
9	83・女	2	SSS	T2N0M0	T2NxM0	腺癌
10	81・男	0	HT	T2N2M0	T3N0M0	扁平上皮癌
11	82・女	0	RAPM	T1N0M0	T1NxM0	腺癌
12	82・男	0	DM，OCI	T1N0M0	T1NxM0	腺癌
13	81・女	0	HT，DM	T1N0M0	T1NxM0	腺癌
14	82・男	1	HT，OCI	T1N0M0	T1NxM0	腺癌

HT：高血圧，DM：糖尿病，OP：閉塞性肺炎，IP：間質性肺炎，AP：狭心症，
SSS：洞不全症候群，RAPM：リウマチ性多発筋炎，OCI：陳旧性脳梗塞

II．対象および方法

当施設でVATS肺葉切除を開始した1997〜2004年末の8年間に行った肺癌に対する肺切除例558例のうち80歳以上の症例を対象とし，術式，臨床病期，病理病期，術前PS，術前・術後合併症，入院日数，予後，死因を検討した．本稿では，胸腔鏡を併用した肺葉切除術のうち，手術創が10 cm以下のものをVATS肺葉切除と定義した．VATS肺葉切除は7〜10 cmの皮切で行い，手術の手順は胸腔鏡用の器具を用いる他は標準的な肺葉切除術とほぼ同一である[2]．生存率の算出にはKaplan-Meier法を用いた．

III．結　　果

1．臨床病期および術前PS，合併疾患（表1）

1997〜2004年に当施設で行った80歳以上の肺癌例に対する肺切除術は14例であった．年齢は80〜83歳で，男性，女性それぞれ7例であった．術前のPSは，0：10例，1：3例，2：1例であった．術前合併症としては高血圧を6例，糖尿病を3例に認めた他，陳旧性脳梗塞を2例，狭心症を1例，洞不全症候群を1例に認めた．症例5では非定型抗酸菌症による閉塞性肺炎を認めた[3]．症例6では無症状ながらCT上両側下肺野背側に蜂巣肺を伴う細粒状影を認め，間質性肺炎を合併していた．臨床病期はT1N0M0が9例，T2N0M0が4例と，1期例が14例中13例と大部分を占めた．症例10は右上葉の胸壁に接する径50 mmの扁平上皮癌の患者で，#4に孤立性のリンパ節腫脹（短径10 mm以上）が認められた．PSは良好であり，本人・家族の意向を踏まえ手術適応とした．

ND 2 b以上のリンパ節郭清が行われて病理病期が確定した症例は4例（症例1，5，6，10）あったが，全例がN0であった．症例7では，系統的なリンパ節郭清を行わなかったが，下肺静脈を切断するさいに摘出した#9に転移を認め，N2であることが判明した．症例10ではリンパ節転移を認めなかったものの，肋骨への浸潤を認めT3であった．切除肺の病理診断による組織型は腺癌8例，扁平上皮癌4例，大細胞癌1例，カルチノイド1例であった．

2．術　式（表2）

術式は，癌の局在部位の他に患者のPS，術前合併症，肺機能などを考慮のうえ，症例ごとに検討し決定した．アプローチの点から術式をみると，気管支形成を行った症例4および5，術前よ