

RAPID COMMUNICATION

## Clinicopathologic characteristics of esophagectomy for esophageal carcinoma in elderly patients

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### Abstract

**AIM:** To evaluate the risk of esophagectomy for carcinoma of the esophagus in the elderly (70 years or more) compared with younger patients (<70 years) and to determine whether the short-term outcomes of esophagectomy in the elderly have improved in recent years.

**METHODS:** Preoperative risks, postoperative morbidity and mortality in 60 elderly patients ( $\geq 70$  years) with esophagectomy for carcinoma of the esophagus were compared with the findings in 1 782 younger patients (<70 years) with esophagectomy between January 1990 and December 2004. Changes in perioperative outcome and short-time survival in elderly patients between 1990 to 1997 and 1998 to 2004 were separately analyzed.

**RESULTS:** Preoperatively, there were significantly more patients with hypertension, pulmonary dysfunction, cardiac disease, and diabetes mellitus in the elderly patients as compared with the younger patients. No significant difference was found regarding the operation time, blood loss, organs in reconstruction and anastomotic site between the two groups, but elderly patients were more often to receive blood transfusion than younger patients. Significantly more transhiatal and fewer transthoracic esophagectomies were performed in the elderly patients as compared with the younger patients. Resection was considered curative in 71.66% (43/60) elderly and 64.92% (1 157/1 782) younger patients, which was not statistically significant ( $P > 0.05$ ). There were no significant differences in the prevalence of surgical complications between the two groups. Postoperative cardiopulmonary medical complications were encountered more frequently in elderly patients. The hospital mortality rate was 3.3% (2/60) for elderly patients and 1.1% (19/1 782) for younger patients without a significant difference. When the study period was divided into a former (1990 to 1997) and a recent (1997 to 2004) period,

operation time, blood loss, and percentage of patients receiving blood transfusion of the elderly patients significantly improved from the former period to the recent period. The hospital mortality rate of the elderly patients dropped from the former period (5.9%) to the recent period (2.3%), but it was not statistically significant.

**CONCLUSION:** Preoperative medical risk factors and postoperative cardiopulmonary complications after esophagectomy are more common in the elderly, but operative mortality is comparable to that of younger patients. These encouraging results and improvements in postoperative mortality and morbidity of the elderly patients in recent period are attributed to better surgical techniques and more intensive perioperative care in the elderly.

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**Key words:** Esophagectomy; Carcinoma; Esophagus

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### INTRODUCTION

Perioperative management of elderly patients after a major operation is an important issue because of the recent worldwide increase in the elderly population. Esophagectomy for esophageal carcinoma is a major procedure associated with a high mortality and morbidity, and advanced age is often considered a significant risk factor and even a relative contraindication to esophagectomy despite advances in modern surgical practice<sup>[1-3]</sup>.

There have been a small number of studies on the relationship between the clinicopathologic characteristics and age of patients after esophagectomy for esophageal carcinoma. However, whether the prognosis of elderly patients after esophagectomy is more unfavorable than that in younger patients remains still controversial. Some reports emphasized the worse prognosis in elderly patients after esophagectomy<sup>[4,5]</sup>, whereas others emphasized similar outcome irrespective of the age<sup>[6-8]</sup>.

Table 1 Clinicopathologic characteristics *n* (%)

Variables	≥70 years ( <i>n</i> = 60)	< 70 years ( <i>n</i> = 1782)	<i>P</i> value
Mean age (yr)	73.1±3.9	55.8±5.2	0.0007
Sex (male/female)	Sep-51	1453/329	0.61
Tumor location			0.74
Cervical	3 (5.0)	75 (4.2)	
Upper-third	7 (11.7)	186 (10.4)	
Middle-third	32 (53.3)	901 (50.6)	
Lower-third	16 (26.7)	591 (33.2)	
Double location	2 (3.3)	29 (1.6)	
Tumor size (cm)	5.2±2.1	6.5±2.7	0.85
Histological type			0.87
Squamous cell carcinoma	53 (88.3)	1 610 (90.3)	
Adenocarcinoma	4 (6.7)	97 (5.4)	
Other carcinomas	3 (5.0)	75 (4.2)	
Histological differentiation			0.76
Well	8 (13.3)	185 (10.4)	
Moderately	46 (76.7)	1 410 (79.1)	
Poorly	6 (10.0)	187 (10.5)	
TNM stage			0.89
0	1 (1.7)	15 (0.8)	
I	2 (3.3)	94 (5.3)	
II	9 (15.0)	251 (14.1)	
III	45 (75.0)	1 308 (73.4)	
IV	3 (5.0)	114 (6.4)	
Preoperative radiochemotherapy	19 (31.7)	624 (35.0)	0.68

The purpose of this study was to evaluate the risk of esophagectomy for the esophageal carcinoma in the elderly (70 years or more) as compared with younger patients (<70 years) and to determine whether the short-term outcome of esophagectomy in the elderly have improved with increased experience of the surgical team and improved perioperative management in recent years.

## MATERIALS AND METHODS

### Patients

The subjects included 1 842 consecutive patients with primary carcinoma of the esophagus, who had been treated by esophageal resection and reconstruction between January 1990 and December 2004 in our institute. Our patients were unselected and consisted of all of the patients after esophagectomy for esophageal carcinoma during the study period. The patients comprised 1 563 men and 279 women. Sixty were elderly (≥70 years) and 1 782 were younger patients (<70 years). Among the elderly, 17 patients were operated during the period 1990 to 1997, and data obtained were compared with those of 43 patients operated during the period 1998 to 2004.

All patients had detailed preoperative risk assessments based on history of chronic lung or heart disease, chest x-ray, electrocardiogram (ECG), arterial blood gas analysis, pulmonary function tests, and biochemical and hematological tests. The preoperative risk factors analyzed included weight loss more than 10%, anemia (hemoglobin less than 12 g/L), hypertension (prescribed history of hypertension, systolic blood pressure more than 140 mm Hg, and/or diastolic pressure more than 90 mm Hg), chronic pulmonary disease or abnormal lung dysfunction (forced expiratory volume at 1 second [FEV<sub>1</sub>] < 70%

Table 2 Preoperative risks *n* (%)

Risks	≥70 years ( <i>n</i> = 60)	< 70 years ( <i>n</i> = 1 782)	<i>P</i> value
Weight loss	17 (28.3)	564 (31.6)	0.67
Anemia	13 (21.7)	344 (19.3)	0.62
Hypertension	26 (43.3)	512 (28.7)	0.02
Pulmonary dysfunction	43 (71.7)	479 (26.9)	0
Cardiac disease	23 (38.3)	324 (18.2)	0
Cirrhosis	8 (13.3)	155 (8.7)	0.24
Chronic renal disease	11 (18.3)	236 (13.2)	0.25
Diabetes mellitus	24 (40.0)	395 (22.2)	0.003

of predicted normal), cardiac disease (history of ischemic heart disease, heart failure, or abnormal ECG), cirrhosis, chronic renal disease, and diabetes mellitus. Clinicopathologic characteristics, therapeutic methods, and the postoperative morbidity and mortality between elderly and younger patients were compared. Hospital mortality was defined as death within the same hospital admission after surgery, up to 6 mo after surgery. Resection was defined as curative when the tumor was confined to the esophagus with or without involvement of adjacent lymph nodes and all macroscopic tumors had been removed. Resection was palliative when there was infiltration of the tumor beyond the esophagus into mediastinal organs or when there was residual tumor after resection.

### Statistical analysis

Comparisons between groups were performed using the Student's *t* test and  $\chi^2$  test or Fisher's exact test. A *P* value of less than 0.05 was considered statistically significant.

## RESULTS

### Clinicopathologic characteristics and preoperative risks

The clinicopathologic characteristics between the elderly and younger groups are shown in Table 1. There were no significant differences in sex, tumor location, tumor size, histological type, histological differentiation, TNM stage and preoperative radiochemotherapy between the two groups. There were significantly more patients with hypertension, pulmonary dysfunction, cardiac disease, and diabetes mellitus in the elderly group, whereas weight loss, anemia, cirrhosis and chronic renal disease status were not statistically different between the two groups (Table 2).

### Surgical treatment

Operative variables are shown in Table 3. No significant difference was found regarding the operation time, blood loss, organs in reconstruction and anastomotic site between the two groups, but elderly patients were more often to receive blood transfusion than younger patients. Significantly more transhiatal and fewer transthoracic esophagectomies were performed in the elderly patients. Resection was considered curative in 71.66% (43/60) elderly and 64.92% (1 157/1 782) younger patients, which difference was not significant (*P* > 0.05).

**Table 3 Surgical treatment *n* (%)**

Variables	≥70 years ( <i>n</i> = 60)	< 70 years ( <i>n</i> = 1782)	<i>P</i> value
Operation time (min)	239±147	225±139	0.88
Blood loss (mL)	443±364	418±251	0.41
Blood transfusion	23 (38.3)	415 (23.3)	0.01
Types of operations			0
Transthoracic esophagectomy	41 (68.3)	1 563 (87.7)	
Transhiatal esophagectomy	17 (28.3)	190 (10.7)	
Thoracoscopic esophagectomy	2 (3.3)	29 (1.6)	
Organs in reconstruction			0.27
Stomach	53 (88.3)	1 435 (80.5)	
Colon	3 (5.0)	197 (11.1)	
Jejunum	4 (6.7)	150 (8.4)	
Anastomotic site			0.31
Cervical	14 (23.3)	326 (18.3)	
Intrathoracic	46 (76.7)	1 456 (81.7)	
Curative resection	43 (71.7)	1 157 (64.9)	0.34

**Table 4 Postoperative morbidity and mortality *n* (%)**

Variables	≥70 years ( <i>n</i> = 60)	< 70 years ( <i>n</i> = 1782)	<i>P</i> value
Surgical complications			
Anastomotic leakage	2 (3.3)	35 (2.0)	0.34
Hemorrhage	1 (1.7)	19 (1.0)	0.49
Intra-abdominal abscess	0 (0.0)	8 (0.4)	1
Chylothorax	2 (3.3)	39 (2.2)	0.39
Thoracic empyema	0 (0.0)	12 (0.7)	1
Recurrent nerve paralysis	1 (1.7)	20 (1.1)	0.5
Wound dehiscence	1 (1.7)	23 (1.3)	0.55
Medical complications			
Pulmonary	26 (43.3)	501 (28.1)	0.01
Cardiac	23 (38.3)	352 (19.8)	0.001
Renal	1 (1.7)	46 (2.6)	1
Hepatic	0 (0.0)	15 (0.8)	1
Postoperative deaths	2 (3.3)	19 (1.1)	0.15
Anastomotic leakage	1 (1.7)	8 (0.4)	0.26
Pulmonary disease	1 (1.7)	9 (0.5)	0.28
Cerebrovascular accident	0 (0.0)	2 (0.1)	1

**Postoperative morbidity and mortality**

Postoperative morbidity and mortality in the elderly and younger groups are shown in Table 4. There were no significant differences in the prevalence of surgical complications between the two groups. Although the anastomotic leakage rate was low, it was still the most common surgical complication in each group. Postoperative medical complications were encountered more frequently in the elderly, mainly pulmonary and cardiac, whereas other medical complications were not statistically different between the two groups. No patient died on the operation table. The hospital mortality rate was 3.3% (2/60) for elderly patients and 1.1% (19/1 782) for younger patients without a significant difference. There was no significant difference in the types of complication as the causes of death between the two groups.

When the study period was divided into a former (1990 to 1997) and a recent (1997 to 2004) period, operative time, blood loss, and percentage of patients receiving blood transfusion of the elderly patients significantly improved from the former period to the recent period

**Table 5 Postoperative morbidity and mortality in elderly patients during the two periods *n* (%)**

Variables	1990-1997 ( <i>n</i> = 17)	1998-2004 ( <i>n</i> = 43)	<i>P</i> value
Operation time (min)	255±157	212±104	0.008
Blood loss (mL)	520±375	402±249	0.003
Blood transfusion	13 (76.4)	19 (44.2)	0.04
Surgical complications			
Anastomotic leakage	1 (5.9)	1 (2.3)	0.49
Hemorrhage	0 (0.0)	1 (2.3)	1
Chylothorax	1 (5.9)	1 (2.3)	0.49
Recurrent nerve paralysis	1 (5.9)	0 (0.0)	1
Wound dehiscence	0 (0.0)	1 (2.3)	1
Medical complications			
Pulmonary	11 (64.7)	15 (34.9)	0.046
Cardiac	10 (58.8)	13 (30.2)	0.04
Renal	0 (0.0)	1 (2.3)	1
Hospital mortality rate	1 (5.9)	1 (2.3)	0.49

(Table 5). No significant differences in surgical complications were observed, but there was a significant decrease in postoperative cardiopulmonary complications from the former period to the recent period. The hospital mortality rate of the elderly patients dropped from the former period (5.9%) to the recent period (2.3%), but it was not statistically significant.

**DISCUSSION**

Esophageal carcinoma in the elderly has increased in part because of increasing life expectancy. Esophagectomy for carcinoma probably has the highest operative mortality of any elective surgical procedures<sup>[9]</sup>. Therefore, it is important to evaluate the risk of esophagectomy for carcinoma in elderly patients. Advanced age was once considered a relative contraindication to esophagectomy because of the high operative mortality rate<sup>[4,5]</sup>. At the same time, the malignant potential of neoplasms in elderly patients has occasionally been reported to be much less aggressive than that in younger patients<sup>[10]</sup>. Whether the prognosis of elderly patients with esophagectomy for esophageal carcinoma is more unfavorable than that in younger patients remains controversial.

Recently, more and more reports emphasized that esophagectomy could be performed in a high percentage of elderly patients and thus advanced age alone should not be considered as a contraindication for esophagectomy<sup>[6-8]</sup>. We shared this opinion and believed that resection should be offered whenever possible because it offered the only hope of cure and the best method of palliation<sup>[11]</sup>. The presence of risk factors has great impact on surgical outcome, hence thorough preoperative assessment should be carried out in all patients. Even in the presence of medical risk factors, resection is still preferred for the elderly unless the risk is prohibitively high. Most of our patients who did not have resection were unresectable because of extensive local or metastatic disease, and only a small portion (about 20%) of elderly patients were deemed unresectable because of poor physical conditions or cardiopulmonary status.

Preoperative risk assessment is an important aspect of patient selection for esophagectomy, as a significant number of these patients had cardiopulmonary or diabetes mellitus in the preoperative period and cardiopulmonary complications in the postoperative period. Pulmonary complication was one of the most common causes of surgical complication-related deaths in both groups. These results strongly suggest that greater preoperative precautions must be taken to manage cardiopulmonary complications in the elderly patients<sup>[12]</sup>. The anastomotic leakage and chylothorax rate were low in both elderly and younger patients, but these remained the main surgical complications. Pulmonary complication was the most common cause of postoperative death in both elderly and younger patients.

Although a significant number of patients had postoperative surgical or medical complications, only a few of them succumbed to death because of those complications. The mortality rate caused by surgical or medical complications in elderly patients was slightly higher but comparable to that of younger patients, despite higher cardiopulmonary risk and more cardiopulmonary complications in the elderly. The similar outcome was probably the result of significant improvement in surgical technique and more intensive perioperative patient care in our institution. For example, chest physiotherapy was instituted early before operation, and during the postoperative period, cricothyroidotomy was often performed to keep the airway clear of sputum. The more frequent use of transthiatal over transthoracic esophagectomy in elderly patients may also have contributed to the low cardiopulmonary-related mortality<sup>[13]</sup>. Moreover, shorter operative time, reduced blood loss and fewer perioperative blood transfusion in recent years may all have important impact on the reduced incidence of cardiopulmonary complications during this period<sup>[14-17]</sup>. Finally, there has been considerable improvement in postoperative pain control by epidural anesthesia block. Adequate analgesia decreases pulmonary complications by decreasing the disturbances of pulmonary mechanics after thoracotomy or laparotomy and enabling patients to generate effective cough<sup>[18]</sup>. The pulmonary complication rate decreased to only 34.9% in recent years in contrast to 64.7% in the previous era.

In conclusion, our study showed that preoperative medical risk factors and postoperative cardiopulmonary complications after esophagectomy are more common in the elderly, but operative mortality was comparable to that of younger patients. These encouraging results and improvements in postoperative mortality and morbidity in recent period are attributed to better surgical techniques and more intensive perioperative care in elderly patients. However, a careful patient selection procedure must be used to exclude the high-risk elderly patients from the operative list and thus will help to reduce the postoperative morbidity and mortality rate in this group of patients.

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