

# The clinical effect of thoracoscopic subsegmentectomy in the treatment of peripheral lung cancer

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**Abstract:** Objective: To investigate the clinical effect of thoracoscopic subsegmentectomy in the treatment of patients with early lung cancer. Methods: A retrospective analysis was performed between January 2021 and December 2022. The clinical data of 121 patients with early lung cancer admitted to the hospital were collected. According to different surgical methods, they were divided into control group (n=59) and observation group (n=62). The observation group was given thoracoscopic subsegmentectomy, and the control group was given thoracoscopic segmentectomy. The perioperative indicators, inflammatory factors and complications were compared between the two groups. Results: The number of resected subsegments in the observation group was less than that in the control group. The levels of CRP and PCT in the observation group were lower than those in the control group. There was no significant difference in the incidence of complications, operation time, intraoperative blood loss, width of lesion margin, and length of hospital stay between the two groups. Conclusions: Thoracoscopic subsegmentectomy and thoracoscopic segmentectomy have the same surgical effect in the treatment of early stage lung cancer, but thoracoscopic subsegmentectomy can reduce the number of resected subsegments and reduce the inflammatory response after operation.

**Keywords:** VATS; Subsegmentectomy; Lung Cancer

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Lung cancer is a relatively common cancer in clinical practice, with the highest mortality rate among all cancers [1- 2]. Therefore, timely treatment is of great significance for patients with early lung cancer [3]. Pulmonary segmentectomy is a useful surgical treatment of early peripheral lung cancer with tumor diameter  $\leq 2$  cm (tumor is located in the outer third of the lung) can not only ensure adequate resection margin, but also maintain the morphology of the residual lung. With the continuous maturity of technology such as thoracoscopy, clinical segmentectomy has been extended to the subsegmental level of the lung [4]. In clinical practice, it has been found that for small pulmonary nodules located at the edge of a lung segment or between adjacent lung segments, pulmonary subsegmentectomy can reduce the damage of normal lung tissue to a greater extent and retain more lung function, thereby realizing the "internal minimally invasive" of reducing tissue damage. The aim of this study is to retrospectively analyze the clinical effects of thoracoscopic segmentectomy and thoracoscopic subsegmentectomy in the treatment of patients with early stage lung cancer.

## 1. Data and Methods

### 1.1 General Information

From 2021 and December 2022, the clinical data of 94 patients with early lung cancer admitted to our hospital were analyzed. Inclusion criteria: located in the outer third of the lung; Single pulmonary nodule; Maximum tumor diameter  $\leq 2.0$  cm and solid ratio  $\leq 0.5$  [7]; Aged 18-70 years; Primary adenocarcinoma; Complete clinical data. Exclusion criteria: combined with other system tumors; Acute infection or chronic infection; Combined with other immune or endocrine diseases; Conversion to extended resection or thoracotomy; Pregnancy or lactation. According to different surgical methods, they were divided into control group (n=59) and observation group (n= 62 ).

### 1.2 Methods

The two groups of patients underwent chest CT, electrocardiogram, abdominal ultrasound and other examinations before operation. At the same time, in order to quickly find the lesion and ensure the resection margin, the two groups of patients were planned according to three-dimensional reconstruction of CT images before operation.

The observation group was treated with thoracoscopic subsegmentectomy. The subsegmental pulmonary arteries, bronchi and veins were separated under thoracoscopy using electric coagulation hook. The subsegmental pulmonary arteries, bronchi and veins were separated by linear cutting and stapler. Extent of pulmonary subsegmental resection was determined by tissue ventilation inflation and the natural collapse of the affected lung. Then the lung tissue in the target area was resected with staplers. The control group was treated with thoracoscopic segmentectomy, and the segmental pulmonary arteries, bronchi and veins were separated and the intersegmental plane was determined as the observation group.

### 1.3 Observation indexes and evaluation criteria

(1) Perioperative indicators: the operation time, intraoperative blood loss, number of resected subsegments, width of lesion resection margin, and length of hospital stay were compared between the two groups. (2) Inflammatory factors: the blood Serum C-reactive protein (CRP) and procalcitonin (PCT) levels of the two groups before operation and at 1 and 3 days after operation were compared. (3) Complications: the postoperative complications including atelectasis, pulmonary air leakage, respiratory failure, arrhythmia, pulmonary infection and other complications were compared between the two groups.

### 1.4 Statistical Processing

Data in this study were analyzed and processed by SPSS 23.0 statistical software. Measurement data conforming to normal distribution were represented by ( $\bar{x}\pm s$ ) and t test, while measurement data non-conforming to normal distribution were represented by M (P25, P75) and Mann-Whitney U test. The count data were expressed as rate (%),  $\chi^2$  test was used, and  $P<0.05$  was considered statistically significant.

## 2. Results

### 2.1 Comparison of perioperative indexes between the two groups

There was no significant difference in operation time, intraoperative blood loss, incisional margin width and hospital stay between the two groups ( $P<0.05$ ), the number of resection subsegments in observation group was less than that in control group, and the difference was statistically significant ( $P<0.05$ ), Table 1.

### 2.2 Comparison of the levels of inflammatory factors between the two groups

The levels of CRP and PCT in the two groups were higher than those before surgery 1 and 3 days after surgery, and the levels of CRP and PCT in the two groups were lower than those in the control group 3 and 3 days after surgery, and the levels of CRP and PCT in the observation group were lower than those in the control group, the differences were statistically significant ( $P<0.05$ ), Table 2.

### 2.3 Comparison of complications between the two groups

There was no significant difference in the incidence of complications between the two groups ( $P>0.05$ ).

Table 1 Comparison of perioperative indicators between the two groups

Group	Operation time,min	Intraoperative blood	The number of resected subsegments	Width of lesion	Hospital stay,day
Observation group (n=62)	133.24±23.44	22.72±11.75	2(1,4)	2.21±0.18	5.22±1.12
Control group (n=59)	131.26±23.11	23.12±12.78	3(2,5)	2.26±0.27	5.45±1.28
t/U	1.344	1.373	4.454	1.134	1.232
P	0.113	0.212	<0.001	0.213	0.233

Table 2. Comparison of the level of inflammation factor in the preoperative and postoperative 1 dam 3 d.

Group	CRP(mg/L)		
	preoperative	postoperative1 day	postoperative 3 days
Observation group (n=62)	3.6(1.9,4.8)	17.6(11.4,36.7)	8.5(3.6,11.3)
Control group (n=59)	3.6(1.9,4.8)	25.6(17.2,46.5)	11.9(5.2,15.7)
U	0.656	4.364	3.324
P	0.676	<0.001	<0.001

  

Group	PCT(ng/mL)		
	preoperative	postoperative1 day	postoperative 3 days
Observation group (n=62)	0.026(0.018, 0.030)	0.126(0.091, 0.176)	0.055(0.028, 0.086)
Control group (n=59)	0.024(0.016, 0.037)	0.161(0.09, 0.193)	0.077(0.043, 0.094)
U	1.283	3.283	3.377
P	0.676	0.002	0.004

### 3. Discussion

Lung cancer has become the highest rate of malignancies in our country, which seriously affect people's life and health. The thoracic surgery is a hot topic in thoracic surgery in recent years, and for early lung cancer, it can effectively keep the lung normal tissue.

In recent years, with the development of minimally invasive surgery, the subsegmentectomy has been applied to clinical practice. Before surgery, the area of lung removal was planned through 3d reconstruction, and the location of the lesion was accurately identified. Removing the lung segment accurately, and protect the normal lung, can reduce the impact on lung function. Preoperative operation path planning can minimize damage to the intersegment artery and subsegment<sup>[8]</sup>. In this study, surgical time, the incidence of blood volume, the width of the lesion and the amount of hospitalization was no obvious difference. In the case of the lung loss, the observation group was less than the control group. The cause may be a three-dimensional technical plan for the laparoscopic subsection of the thoracoscopy, which can be removed by precision, and can keep normal lung tissue as much as possible while removing the lesion.<sup>[9]</sup>

The CRP is an acute phase protein, which is able to reflect the inflammatory state of the body in the inflammation, trauma and infection of inflammation, trauma and infection<sup>[10-11]</sup>. The PCT is mainly concentrated in the thyroid gland, which is found in the thyroid gland, which is a common detection indicator for early lung bacterial infections, which directly stimulates the synthesis and secretion of PCTS in thyroid cells, and increases the level of serum expression in the chest, and increases the level of the serum expression<sup>[12-13]</sup>. The study showed that the PCT level of the two groups of CRPCT was higher than before surgery, and the PCT level was lower than in the control group, and both of these surgery could cause different degree of inflammation, but the laparoscopic subsection ectomy was more invasive and less damaged, and the degree of postoperative inflammation was relatively light. In addition, there was no significant difference in the incidence of complications of the two groups, indicating that the laparoscopic subsection of the case was better safe for patients with early lung cancer. Above all, the thoracoscopic subsection resection and pulmonary resection treatment for early lung cancer surgery were fairly safe.

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