

## **Comparative efficacies of unilateral pulmonary circulation temporary occlusion and simple pulmonary artery occlusion in treating lung cancer.**

**Hong-Li Li<sup>1</sup>, Chao Feng<sup>2</sup>, Song-Tao Shi<sup>3\*</sup>**

<sup>1</sup>Department of Operation Room, Eastern Medical District of Linyi People's Hospital, Linyi, Shandong, PR China

<sup>2</sup>Department of Surgery, Eastern Medical District of Linyi People's Hospital, Linyi, Shandong, PR China

<sup>3</sup>Department of Thoracic Surgery, Eastern Medical District of Linyi People's Hospital, Linyi, Shandong, PR China

### **Abstract**

**Objective:** This study aims to compare the efficacies of unilateral pulmonary circulation temporary occlusion and simple pulmonary artery occlusion in treating lung cancer.

**Methods:** We selected 120 patients with lung cancer who were admitted in our hospital from February 2015 to February 2016. The patients were equally divided into the observation and control groups. The patients in the control group underwent simple pulmonary artery occlusion, whereas the patients in the observation group underwent unilateral pulmonary circulation temporary occlusion. The groups were compared with respect to postoperative complications, bleeding, hospitalization time, and medical expenses of the patients.

**Results:** The incidence of postoperative complications in the observation group was significantly lower than that of the control group (3.4% and 20%, respectively;  $P < 0.05$ ). The number of bleeding cases, hospitalization time, and medical expenses of patients in the observation group were significantly higher than those of the control group (all  $P < 0.05$ ).

**Conclusion:** Unilateral pulmonary circulation temporary occlusion was applied in lung cancer thoracotomy. This process can reduce complications, rate of postoperative bleeding, and treatment time. Postoperative recovery was rapid, and good therapeutic effect was also achieved. Therefore, this method has great potential in clinical applications.

**Keywords:** Lung cancer, Unilateral pulmonary circulation temporary occlusion, Simple pulmonary artery occlusion, Effect analysis.

*Accepted on October 30, 2017*

### **Introduction**

The medical level in China continues to improve, and the concept of accelerating rehabilitation surgery is becoming increasingly common in clinical departments in the country [1,2]. The purpose of this study is to investigate the effect of single lung circulation temporary occlusion in lung cancer surgery. A total of 120 patients with lung cancer who were admitted in our hospital from February 2015 to February 2016 were included for the study.

### **Materials and Methods**

#### **General information**

A total of 120 patients with lung cancer admitted in our hospital from February 2015 to February 2016 were selected, and equally divided into the observation and control groups. The observation group was composed of 33 males and 27 females, and their mean age and average course were  $54.6 \pm$

$7.5$  and  $1.3 \pm 0.6$  y, respectively. The control group is composed of 31 males and 29 females, and their mean age and average course were  $53.8 \pm 7.2$  and  $1.4 \pm 0.7$  y, respectively. No significant difference was observed between the groups with respect to age, sex, or course of disease ( $P > 0.05$ ).

#### **Methods**

**Preoperative evaluation:** Before the operation, the psychological status and character trait of each patient were assessed comprehensively. To reduce their psychological stress and burden and increase their confidence in the treatment, we performed psychological counselling on the patients. Successful cases were then explained to the patients.

#### **Intraoperative anesthesia and nursing**

The patients underwent general anesthesia. The anesthetics included remifentanyl and propofol. During the operation, the liquid velocity and total volume were strictly controlled and kept warm at  $36^{\circ}\text{C}$ .

### Surgical procedure

The patients in the control group underwent simple pulmonary artery occlusion. The hilum of the lung was dissected, the pulmonary artery trunk was dissociated, and the band blockade was placed in advance. During the “freezing of the hilum of the lung,” when the dissection of the pulmonary artery trunk outside the pericardium was difficult, the pericardium was cut open behind the phrenic nerve, the pulmonary artery trunk was dissected inside the pericardium, and the band blockade was placed in advance. Then, the distal pulmonary artery was dissected. The easily separated site was dissected first. When the distal pulmonary artery or branch was dissociated, the No. 7 thread was circumvented for pretreatment. In cases wherein the separating the tumor or lymph node in the pulmonary artery was difficult, the band blockade was tightened, and noninvasive vessel forceps was clamped when necessary. The distal-pretreating thread was tightened. In the absence of blood flow in the pulmonary artery and clear vision, pulmonary angioplasty or sleeve resection was performed according to the degree of pulmonary involvement. A 50 Prolene vascular suture was used for continuous everting suture.

The patients in the observation group underwent unilateral pulmonary circulation temporary occlusion. First, a 1.2 cm incision was made at the seventh intercostal space of the middle axillary line. A subsidiary operating hole (1.2 cm) was then made at the seventh intercostal line of the infrascapular line for the placement of the vascular occlusion forceps. The pleural cavity and tumor were comprehensively explored. The

inferior pulmonary ligament was cut off using an electric hook, and the diaphragmatic pleura around the pulmonary hilum were opened. Some parts of the subcarinal lymph nodes were removed along the inferior pulmonary vein posterior wall and main bronchus posterior wall to expose the bronchi. The non-full-grown lung fissure was cut open with a stitching instrument. To expose the pulmonary artery, we dissociated the superior pulmonary lobe vein. The pulmonary trunk was occluded using noninvasive vascular forceps. For the right pulmonary trunk, the superior vena cava and azygos vein junction were dissociated for the exposure of the anterior branch of the pulmonary artery.

### Statistical methods

Statistical data were processed with the SPSS 19.0 software. The count data were expressed as ratio (%) and compared through  $\chi^2$  or t test. A P value of <0.05 indicated that the difference was statistically significant.

### Results

#### Comparison between the incidence rates of postoperative complications of the two groups

The incidence of postoperative complications observed in the observation group was significantly lower than that in the control group (3.4% and 20%, respectively;  $P < 0.05$ ). The indicated statistical significance is shown in Table 1.

**Table 1.** Comparison between the incidence rates of postoperative complications of the two groups (n, %).

Group	n	Pulmonary infection	Postoperative air leakage	Pleural effusion	Postoperative fibrillation	atrial Complication
Observation	60	1 (1.7)	0 (0)	1 (1.7)	0 (0)	3.4
Control	60	2 (3.4)	3 (5.1)	4 (6.8)	3 (5.1)	20
$\chi^2$		4.38	5.09	6.27	7.35	8.12
P		<0.05	<0.05	<0.05	<0.05	<0.05

#### Postoperative pain scores of patient in the two groups

The visual analog scale pain score of patients in the observation group was significantly lower than that in the control group 6-24 h postoperation ( $P < 0.05$ , Table 2).

**Table 2.** Comparison between the postoperative pain scores of the two groups ( $\bar{x} \pm S$ ).

Group	n	2 h	6 h	12 h	24 h	48 h
Control	60	0.83 ± 0.28	3.05 ± 0.15	5.71 ± 0.19	3.60 ± 0.24	1.33 ± 0.31
Observation	60	0.85 ± 0.21	0.80 ± 0.18	2.36 ± 0.16	1.47 ± 0.15	1.38 ± 0.25
T		0.3130	52.5965	73.8691	41.2215	0.6877

P	0.7554	0.0000	0.0000	0.0000	0.4944
---	--------	--------	--------	--------	--------

#### Comparison of all indexes of patients between the two groups

The number of bleeding incidence, hospitalization time, and medical expenses of patients in the observation group were better than those of the control group (Table 3).

**Table 3.** Comparison of all indexes of patients between the two groups.

Group	n	Hospitalization time	Postoperative bleeding	Medical expenses
Observation group	60	6.3 ± 1.4	175 ± 36	12358 ± 2634
Control group	60	12.5 ± 1.8	352 ± 69	18627 ± 2750

t	11.05	13.26	14.39
P	<0.05	<0.05	<0.05

## Discussion

Unilateral pulmonary circulation temporary occlusion is widely adopted in lung cancer surgery. This method can reduce postoperative complications and bleeding, shorten hospitalization time, facilitate the recovery of patients, and exhibit good therapeutic effect [3,4]. Medical expenses can also be lessened because of short hospitalization time. Thus, economic pressure and burden are reduced, and the quality of life of the patients improves. Patients feel pain when their tissues are damaged. A study reported that pain was divided into acute and chronic persistent pain according to the pain time [5]. Pain can be divided into neuropathic and nociceptive pain. Surgical pain belonged to the latter-acute nociceptive pain. Acute pain usually lasts for less than one month and is often associated with surgical trauma and tissue injury [6]. Chronic pain lasts for more than three months. This pain can persist even after the primary disease is cured or the damage in a tissue is repaired.

Postoperative pain is an immediate pain occurring immediately after surgery and usually lasts for no more than seven days [7]. In cases of traumatic thoracic surgery and joint replacement requiring long functional exercises, analgesia sometimes lasts for several weeks. Postoperative pain is an inflammatory pain caused by nociceptor stimulation by postoperative chemical, mechanical, or temperature changes and belongs to nociceptive pain [8]. The relationship between lung cancer, lymph node metastasis, and pulmonary vessel was explored through thoracotomy. If the pulmonary artery trunk was involved, the root of the affected pulmonary artery trunk and superior and inferior pulmonary veins were dissociated inside and outside the pericardium [9]. The vascular forceps were placed while blocking to prevent the backflow of pulmonary artery and left atrial blood. The affected lung and part of the pulmonary artery were resected in the absence of blood flow. After pulmonary angioplasty or anastomosis, the blocked pulmonary artery trunk was opened, and the pulmonary vein was retained for the restoration of pulmonary circulation [10]. In this study, 120 patients with radical resection of lung cancer were selected. The patients in the observation group underwent unilateral pulmonary circulation temporary occlusion. The results showed that the number of complications, hospitalization time, postoperative bleeding, and medical expenses were significantly reduced. Statistically significant difference was observed ( $P < 0.05$ ). Thus, for the radical operation of lung cancer, unilateral pulmonary circulation temporary occlusion achieved the significant effect.

## Conclusion

Unilateral lung circulation temporary occlusion was applied in lung cancer surgery. This method can reduce complications,

resulting in less postoperative bleeding, short treatment time, and rapid postoperative recovery with good efficacy. Therefore, this procedure is worth popularizing clinically.

## References

1. Floriano BP, Trein TA, Wagatsuma JT, Ferreira JZ, Pinho RH, Santos PSP, Oliva VNLS. Pulmonary hemodynamics and alveolar oxygenation in healthy dogs anesthetized with propofol or isoflurane during one-lung ventilation in a closed-thoracic experimental model. *Am J Vet Res* 2017; 78: 1117-1125.
2. Lu WZ, Wang K, Zhang L, Pan HX. Celastrol inhibits colorectal cancer cell growth in vivo by regulation of miR-21. *Lat Am J Pharm* 2017; 36: 1833-1838.
3. Gupta SK, Juneja R, Saxena A. Central perforation of atretic pulmonary valve using coronary microcatheter. *Ann Pediatr Cardiol* 2017; 10: 304-305.
4. Liu J, Liu X. Knockdown of ET-1 gene can inhibit the proliferation, invasion of human prostate cancer cell. *Biomed Res India* 2017; 28: 3377-3382
5. Shnayderman D, Baginski SG, Lea WB, Erickson SJ. Huge traumatic pulmonary artery pseudoaneurysm. *Radiol Case Rep* 2017; 12: 467-471.
6. Manu F, Akhil J, Glan Devadhas G, Avinash KK. A novel technique for forearm blood vein detection and enhancement. *Biomed Res India* 2017; 28: 2913-2919.
7. Widimský J, Kasalický J, Hurych J, Stanek V. Effect of unilateral pulmonary occlusion on the lesser circulation in patients with chronic pulmonary hypertension together with mitral stenosis. *Casopis Lekarů Ceských* 1969; 108: 348-352.
8. Swenson EW, Choudhury JD. Cardiorespiratory Effects of Unilateral Pulmonary Artery Occlusion as Contrasted with Pulmonary Microembolism. *Med thorac* 1962; 19: 320-333.
9. Lu M, Dong DC, Zhou X. Synthesis and cytotoxicity of tetrahydroisoquinoline derivatives: finding new potential anti-colorectal cancer drugs. *Lat Am J Pharm* 2017; 36: 1816-1820.
10. Powell FL, Hastings RH, Mazzone RW. Pulmonary vascular resistance during unilateral pulmonary arterial occlusion in ducks. *Am J Physiol* 1985; 249: 39-43.

## \*Correspondence to

Song-Tao Shi

Department of Thoracic Surgery

Eastern Medical District of Linyi People's Hospital

PR China