



Post-lobectomy pulmonary rehabilitation on peak oxygen uptake in old age lung cancer patients

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Introduction

Pulmonary rehabilitation lead to the improvement of pulmonary function in lung cancer patients. So far, many studies have shown the effect of preoperative pulmonary rehabilitation. However, only a few studies have performed postoperative pulmonary rehabilitation with exercise tolerance test and setting exercise goal with VO₂peak for individual patient. We aimed to evaluate how cardiopulmonary exercise test (CPET)-based treadmill training could affect cardiopulmonary function, especially peak oxygen uptake (VO₂peak) in old age post-lobectomy patients with lung cancer.

Methods

Old-age patients aged >65 years, with pathologically verified non-small cell lung cancer (NSCLC) stage I-IIIa after lobectomy were included in this study. A total of 31 patients were enrolled, among them, 22 patients who agreed to get pulmonary rehabilitation were allocated to the pulmonary rehabilitation group, and 9 patients who didn't want to get pulmonary rehabilitation were assigned to the control group. (Table 1). Before starting pulmonary rehabilitation, patient's exercise capacity was assessed and rehabilitation intensity was set for each patient. Psychological status was also assessed. After performing pulmonary rehabilitation, the physical function, psychological state, and quality of life were measured again.

Table 1. Demographic and clinical variables of the patients

	Pulmonary rehabilitation (N=22)	Control (N=9)	P-value
Age, mean (years)	69.15 ± 7.52	68.90 ± 8.92	0.89
Sex male/female(%male)	11 (50%)	5 (55%)	0.78
Current smoker yes/no (%yes)	3/19 (14%)	1/8 (11%)	0.59
BMI (kg/m ²)	26.1 ± 4.0	25.9 ± 3.5	
Baseline VO ₂ peak	22.46 ± 4.67	22.07 ± 5.54	0.91

BMI, Body mass index; VO₂peak, maximal oxygen uptake

Table 2. Mean changes in the cardiopulmonary function

Variable	Pulmonary rehabilitation		Control		F	P-value
	Pre	Post	Pre	Post		
VO ₂ peak (mL/kg/min)	22.46±4.67	27.92±4.28	22.07±5.54	23.41±5.34	15.00	<0.001
6MWD (M)	486.82±52.5	558.68±51.50	468.00±78.80	513.67±99.45	2.845	0.102
Maximal SBP (mmHg)	122.45±17.16	121.73±21.54	122.33±17.27	131.00±19.27	1.110	0.301
Maximal DBP (mmHg)	80.13±10.33	81.64±11.83	75.00±10.11	74.33±11.31	0.237	0.630
Maximal HR (/min)	97.23±23.08	93.32±14.23	102.89±28.10	88.89±11.10	1.534	0.225

Data are presented as mean±standard deviation.
VO₂peak, peak oxygen consumption; 6MWD, 6-minute walking distance; SBP, systolic blood pressure; HR, heart rate

Results

Pulmonary rehabilitation improved VO₂peak in the rehabilitation group compared with the control group. Other variables, such as the 6MWD, maximal heart rate, and maximal systolic blood pressure showed no significant changes between the groups (Table 2) (P<0.0001).

Psychological and quality of life parameters didn't show statistically significant differences between groups (Table 3).

Table 3. Mean changes in the psychological function and HRQoL

Variable	Pulmonary rehabilitation		Control		F	P-value
	Pre	Post	Pre	Post		
PHQ-9	15.41±6.19	11.05±2.36	14.89±6.27	11.78±2.68	0.268	0.609
GAD-7	9.91±3.66	7.82±1.56	8.78±3.11	7.33±0.71	0.346	0.561
FSS	22.45±13.05	15.59±9.55	17.71±9.46	13.14±3.29	0.129	0.722
PSQI-K	7.68±4.54	4.68±2.80	9.44±3.84	6.33±3.12	0.006	0.939
EORTC QLQ-LC13	22.05±3.84	17.86±4.09	19.75±3.24	16.50±2.33	0.635	0.432
FACT-G physical	13.00±4.58	8.91±2.54	10.38±3.16	7.75±0.71	1.015	0.322
FACT-G social	25.18±5.57	24.86±6.45	25.78±5.31	26.44±4.00	0.212	0.649
FACT-G emotional	12.27±5.34	9.82±2.95	10.38±3.11	8.13±2.75	0.016	0.901
FACT-G functional	24.45±6.55	27.68±5.58	27.56±7.18	28.33±6.23	0.869	0.359

Data are presented as mean±standard deviation.
HRQoL, Health related quality of life; PHQ-9, Patient Health questionnaire; GAD-7, Generalized Anxiety Disorder Screener; FSS, Fatigue Severity Scale; PSQI-K, Pittsburgh Sleep Quality Index - Korean version; EORTC QLQ-LC13, European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Lung Cancer; FACT-G, Functional Assessment of Cancer Therapy-General.

Conclusion

Pulmonary rehabilitation benefits patients with lung cancer. This study provided evidence that individualized tailored pulmonary rehabilitation training is effective in improving cardiopulmonary function, especially VO₂peak, in old-age lung cancer patients who underwent lobectomy.