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A Systematic Study of Preoperative Exercise Therapy in Patients Undergoing Lung Surgery

Sahoo Bhushan*

Department of Respiratory Medicine, Sambalpur University, Bihar, India

Description

Lung cancer is one of the leading causes of cancer death. It is frequently diagnosed at a late stage due to its initial asymptomatic course often leading to a poor prognosis. Roughly, lung cancer can be divided into two histological groups; non-small cell lung cancer and small cell lung cancer. In general, patients diagnosed with NSCLC have higher survival rates than patients diagnosed with, especially in those patients which are found eligible for tumour resection. Surgical removal remains the best option for patients with stage I and II NSCLC and for selected patients with locally advanced disease. However most patients selected for surgical removal have limited functional capacity, owing to associated comorbidities and/or the stage of the disease.

Exercise interventions have been identified as a successful therapy to improve overall physical and psychological wellbeing in some cancer populations. Also exercise interventions have been shown to be effective in reducing symptoms and reducing the exacerbations of the disease. There is increasing evidence in the field of lung surgery and also in other surgical specialties that a preoperative exercise therapy program has beneficial effects on the postoperative course, especially on the prevention of postoperative complications, the length of hospital admission, physical fitness and quality of life.

We conducted a systematic literature search. The patient population of interest was all patients diagnosed with lung cancer and scheduled for lung resection surgery. The intervention studied was PET compared to standard care. Outcome measures were aerobic capacity, physical fitness, and postoperative complications, length of hospital stay, quality of life and mortality. Authors SP and JF screened and selected studies on the basis of title and abstract, separately. After primary selection, authors reviewed the full text of the selected studies and determined suitability for inclusion, based on the established selection criteria. For further eligible studies, cross-references were screened. Disagreements were solved by discussion with each other and the senior author until consensus was reached.

Additionally, the authors assessed the clinical importance of the PET outcome measures of the included studies, according exercise physiology and in this systematic review different terms will be used to describe and measure the effect of a PET program.

For describing those effects two different terms are often used, physical activity and physical fitness. Physical activity is defined as any bodily movement produced by skeletal muscles, which results in energy expenditure, which can be measured in kilojoules or kilocalories. Physical capacity/fitness or 'being physically fit' is defined as: 'the ability to carry out daily tasks with vigour and alertness, without undue fatigue and with ample energy to enjoy leisure-time pursuits and to meet unforeseen emergencies. For measuring the effect of PET programs, the most widely used parameters are ventilatory threshold and VO_2 peak. VO_2 peak is defined as the highest value of VO_2 attained at a maximal incremental exercise test. The ventilatory threshold is the point during exercise at which pulmonary ventilation becomes disproportionately high with respect to the oxygen consumption. This point is believed to be the onset of usage of the anaerobic pathway. In case the data in the studies could not be presented in a consistent format and systematic reporting of comparable outcome variables was lacking, a meta-analysis will not be conducted and only a systematic review will be undertaken.

Usual care patients in the intervention group had lower hospital stay had fewer days needing a chest tube and lower incidence of prolonged chest tube There was no improvement in shutte walk test distance patients with NSCLC awaiting surgical resection. Preoperative PR containing 3 to 5 exercise sessions a week for 4 weeks. Each session consists aerobic and resistance training. The target intensity was between 60% and 80% of the peak workload achieved during incremental cycling exercise. Quality of life was unchanged after exercise training. A three-week exercise program, five sessions a week. Each consisted of 3 h of respiratory exercises on the bench, mattress pad and wall bars, respectively, followed by a high intensity training of the upper limbs with the rowing ergometer and the lower limbs by means of the treadmill and the peak VO_2.

The length of the interventions ranged from one day to four weeks preoperative. Study started with a four-week intervention, but this was found not feasible due to patients' and professionals' unwillingness to delay surgery. Therefore they started a second study that included a ten sessions exercise intervention to be completed in one week Divisi and colleagues initially started with an exercise intervention for four weeks, but they extended it with two weeks for nine patients who needed further improvement of

***Address for Correspondence:** Sahoo Bhushan, Department of Respiratory Medicine, Sambalpur University, Bihar, India, E-mail: bhushan.sahoo@icloud.com*

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physical fitness before surgery. The frequency of exercise sessions ranged from one time per week to 10 sessions per week. Majority of the included studies included aerobic exercise and resistance exercise as part of the exercise intervention, except two studies that focussed on resistance training entirely. Six studies included breathing exercises. One study incorporated smoking cessation and optimisation of pharmacological treatment as a part of the exercise intervention.

According to the methodology we have ordered the outcome measures of the included studies. We have ordered the outcome measures in order of clinical importance gives an overview of the ordered outcome measures and they are divided in high, intermediate and low importance for decision making. In the second study patients who were randomised to the PET program had fewer days needing a chest tube and had lower incidence of prolonged chest tubes compared to the control group. Also patients in the PET arm of the study had a reduced, near significant, length of hospital stay. There were no significant differences in the incidence of postoperative pulmonary complications. In the study patient had postoperative atrial fibrillation, solved by pharmacological treatment. Three patients displayed atelectasis requiring respiratory physiotherapy and fiberoptic bronchoscopy. The average hospital stay was 10 ± 1 days. No mortality was reported after a follow-up of 30 ± 3 months. Four patients experienced 1 complication each whereas 3 patients experienced 2 complications each.

The impact of the PET program on the health related quality of life was not significant, except a significant improvement of the depression score as reported showed that in the PET group that power measured with the power a knowing participation in change test significantly increased and that it decreased in the control group. Hope, as measured with the herth hope index showed no significant inter/intra group differences. Peddle and colleagues demonstrated that quality of life was unchanged after the PET program, but there were significant and clinically meaningful declines from presurgery to postsurgery on the lung cancer subscale. This systematic review highlights the current evidence on the effects of PET in patients with lung cancer scheduled for a lobectomy. PET programs might have a beneficial effect on postoperative complications, mortality, length of hospital stay, physical fitness and quality of life. However, definitive conclusions cannot be made because of the heterogeneity of PET programs and timing of PET. The methodological quality of the ten included studies ranged from poor to good. Multiple studies have investigated the effects of PET in the surgical population. Also studies have specifically looked at exercise interventions in patients with lung cancer and/or scheduled for lung surgery.

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