Preoperative exercise therapy in lung cancer surgery reduces the risk of postoperative pulmonary complications

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Background: Patients with **lung cancer** often present poor cardio-respiratory fitness. Although **rehabilitation programs** have demonstrated beneficial effects in patients with cancer, heart failure and COPD, the impact of **preoperative exercise** intervention has not been thoroughly examined in lung cancer surgery.

Objectives: The primary aim was to test the effectiveness of a **short-term high-intensity training (HIT)** program on the occurrence of major postoperative complications. Secondary aims entailed the **impact of HIT** on aerobic exercise capacity.

Methods:

- Two centers RCT
- Lung cancer resection patients
- Two groups: usual care (UC) or rehabilitation (rehab)
- Preoperative rehab conducted by physiotherapists, 2 to 3 high-intensity training (HIT) sessions/week.
- Functional assessment: peak oxygen uptake (VO_{2peak}), anaerobic threshold (AT) during cardiopulmonary exercise testing, 6 minute walking test (6MWT).
- Outcome data: 30-day mortality, ICU admission, postoperative organ dysfunction. Bundle of perioperative interventions to minimize postoperative pulmonary complications (PPCs).
- unpaired Student t test or Mann–Whitney U-test for continuous variables, Pearson test χ^2 test for dichotomous variables.
- paired Student t test or paired Wilcoxon signed-rank test for within-group analysis.

Results:

- **189 patients** were screened, and 151 were analyzed (N=77 in UC group and N=74 in Rehab group).
- Median time from enrollment to surgery was 26 days (IQR 21-33 days).
- After the HIT program, rehab patients presented significant increases in VO_{2peak} , in AT, in **maximal power** as well as in **walking distance**.
- UC patients presented significant decreases in VO_{2peak} , in AT and in **walking distance**.
- Non significant reduction of overall complication risk (**Odds Ratio [OR], 0.56**; 95% confidence interval [CI], 0.29-0.1.07; P=0.080).
- **Incidence of PPCs was lower in the Rehab group**, (Rehab 23.0% vs UC 43.9%, P=0.018).
- Significant **reduction in the occurrence of atelectasis** (12.2% vs 36.4%, P<0.001).

Conclusions: This study demonstrated that preparing patients scheduled to undergo lung cancer resection with a HIT program **enhanced aerobic fitness** parameters and resulted in **fewer PPCs**, compared with patients receiving usual care.