Abstract

**Background:** Chest physiotherapy is a common practice in patients undergoing open abdominal surgery. In contemporary times many abdominal surgeries are performed by laparoscopy and carbon dioxide gas used for the pneumoperitoneum interferes with pulmonary function.

**Objective:** To evaluate the effects of diaphragmatic breathing exercises, flow and volume-oriented incentive spirometry on pulmonary function and diaphragm excursion in patients undergoing laparoscopic abdominal surgery.

**Methodology:** We selected 260 patients posted for laparoscopic abdominal surgery and they were block randomization as follows: 65 patients performed diaphragmatic breathing exercises, 65 patients performed flow incentive spirometry, 65 patients performed volume incentive spirometry and 65 patients participated as a control group. All of them underwent evaluation of pulmonary function with measurement of Forced Vital Capacity (FVC), Forced Expiratory Volume in the first second (FEV₁), Peak Expiratory Flow Rate (PEFR) and diaphragm excursion measurement by ultrasonography before the operation and on the first and second postoperative day. With the level of significance set at (p< 0.05)

**Result:** Pulmonary function and diaphragm excursion showed a significant decrease on the first postoperative day in all four groups (p<0.01), but was evident more in the control group than in the experimental groups. On the second postoperative day pulmonary function (Forced Vital Capacity) and diaphragm excursion was found to be better preserved in volume incentive spirometry and diaphragmatic breathing exercise group than in the flow incentive spirometry group and the control group. Pulmonary function (Forced Vital Capacity) and diaphragm excursion showed statistically significant differences between volume Incentive spirometry and
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diaphragmatic breathing exercise group (P<0.03) as compared to that flow incentive spirometry group and the control group.

**Conclusion:** Volume Incentive spirometry and diaphragmatic breathing exercise can be recommended as an intervention for all patients pre and postoperatively, over Flow Oriented Incentive Spirometry for the generation and sustenance of pulmonary function and diaphragm excursion in the management of laparoscopic abdominal surgery

**Keywords:** Diaphragmatic breathing exercise, laparoscopic abdominal surgery, Flow Incentive Spirometry, Pulmonary Function Tests, diaphragm excursion, Volume Incentive Spirometry.