Preoperative Pulmonary Function Tests in COPD Patients Posted For Major Upper Abdominal Surgeries: Evaluation of Postoperative Pulmonary Complications

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Abstracts: Background & aims: Pulmonary complications are a major cause of morbidity and mortality during the post-operative period after major upper abdominal surgeries. The incidence of post-operative pulmonary complications has been reported to vary between 5% and 80%. Incidences vary between hospitals. Various factors affect postoperative pulmonary outcome. So our aim was to study various possible factors (Gender, age, PFT finding, type of anaesthesia) which have impact on post operative pulmonary outcome. Method: This retrospective study was conducted at our hospital to evaluate the incidence of postoperative pulmonary complications (PPC) in patients with chronic obstructive pulmonary disease (COPD) and altered pulmonary function tests that underwent elective major upper abdominal surgery. Incidences of PPC were studied in relation to gender, age, type of anaesthesia, smoking and PFT findings. In our study, 45 adult COPD patients with altered PFT (FEV1/FVC< 88% of predicted for women and < 89% of predicted for men) were included whose entire post-operative period until discharge was observed from record. Result: Among them, 20% of patients were experienced PPC in form of bronchospasm (8.88%), prolonged intubation and mechanical ventilation (4.44%), pneumonia (4.44%), acute respiratory insufficiency (2.22%). Risk factors for PPC were male gender, elderly (>65years), low FEV1/FVC (71.9 ±10.9%), general anaesthesia. No significant differences were found for co-morbidity (COPD) and abnormal lung function test between patients with or without PPC. In our study none of patients was having severe respiratory symptoms before operation. Surgical duration for all patients was less than 180 minutes. Patients with PPC had longer hospital stays (16.6 ±15.0 vs. 7.5 ± 5.7 days) and stayed longer in surgical intensive care units (7.0 ± 5.9 vs. 1.7 ± 0.7 days) than did those with no complications ($p < 0.05$). Conclusion: The incidence of PPC was not statistically significant in COPD patients with altered PFTs who were undergone elective major upper abdominal surgeries. [Ushma S NJIRM 2017; 8(3):26-29]

Key Words: Chronic pulmonary obstructive disease, pulmonary function test, post operative outcome

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Introduction: A Chronic Obstructive pulmonary disease (COPD) reaches a significant percentage of the general population[1] and is more common in people older than 50 years. Throughout their lives, many of these patients are undergoing any surgical procedure which would lead to the adoption of special measures in the peri-operative period. The postoperative complication is defined as a second illness, unexpectedly occurring up to 30 days after surgery which alter the clinical picture of the patient and that requires a therapeutic intervention. Postoperative pulmonary complications (PPC) have rather variable incidence, from 5 to 80% depending on the population studied, the definition adopted for complication and the presence of risk factors inherent in the patient; the most frequent are atelectasis, pneumonia, acute respiratory failure, tracheo-bronchial infection leads to prolonged mechanical ventilation and broncospasm.[1-13] COPD is a potential factor for PPC of more serious and with higher rate of mortality. Preoperative risk factors of patients with severe COPD undergoing abdominal surgery include advanced age, smoking, production and colour of sputum, Reduced forced expiratory volume in the first second (FEV1) and FEV1/FVC (forced vital capacity) ratio, general anaesthesia with long duration surgery and location of the abdominal incision and preoperative abnormal x-ray of chest.[3, 6, 11, 12, 14-21] these factors can harm even more in the already compromised pulmonary function[3]. However, not sure really what is the value of each of these additional risks. So, the study was conducted to verify the incidence of postoperative pulmonary complications (PPC) and mortality in patients with chronic obstructive pulmonary disease (COPD) who underwent elective major abdominal surgery. Incidence of PPC and mortality were studied in relation to gender, age, type of anaesthesia and PFT findings.

Methods: The retrospective study was conducted at our institute. Data were collected from 1st Aug 2015 to 1st July-2016. We studied record of 150 post-operative patients underwent a major upper abdominal surgery which was having history of cough, altered pulmonary function tests (FEV1/FVC< 88% of predicted for women and < 89% of predicted for men) (Table 1), smokers. All patients' pre-operative finding, details of therapeutic and preventive measures for the pre and

postoperative periods (interruption of consumption habits; respiratory physiotherapy; nebulisation as per physician opinion and antibiotic therapy for prevention of chest infection and analgesia in the post-operative period) and their intra operative findings and their course of recovery in the postoperative period till discharge were taken from records. Respiratory condition of the patients was well optimized before operation. Pulmonary complications were recorded according to the following definition:

1. Acute respiratory infection. Pneumonia, characterized by the appearance of recent pulmonary infiltrate on the chest x-ray associated, at least two of the following signs: discharge purulent tracheo-bronchial secretion, elevation of body temperature (higher than 38.3°C) and increase in the number of circulating leukocytes (greater than 25% of the normal value).
2. Tracheobronchitis was diagnosed by increasing the quantity of sputum, change of colour or pus-like sputum with normal chest x-ray[31].
3. Atelectasis with clinical impact. Evidence of pulmonary atelectasis in chest x-ray associated with acute respiratory symptoms.
4. Acute respiratory insufficiency resulting clinical picture of sharply poor pulmonary gas exchange, with mechanical ventilation.
5. Bronchospasm: Presence of wheeze on auscultation. The cases of bronchospasm associated with intubation or extubation were not considered as a pulmonary complication.
6. Prolonged intubation and mechanical ventilation: Need for orotracheal intubation for more than 48 h, for the maintenance of the mechanical ventilation for treatment of acute respiratory failure or aspiration of tracheo-bronchial secretion in those unable to remove it.[32,33]

MedCalc version 12.2.1.0 software (Ostend, Belgium) was used for statistical calculations. The data was collected and tabulation formed and statistical analysis of continuous data was done by unpaired "t" test and Chi-square test was applied for discrete data. Results were considered statistically significant with p value <0.05 and highly significant with p value <0.001.

Result: Out of 150 cases, 35 patients were non smokers, 20 patients were morbidly obese (BMI>40), 25 patients operated in emergency, 4 patients were paediatric and 21 patients were operated without preoperative pulmonary function tests. So these patients were excluded from the study. Thus we evaluated 45 COPD patients with altered PFT for PPC after major upper abdominal surgeries. Among them, 33(73.33%) were male and 12(26.66%) were females; 13(28.88%) patients operated under SA and 32(71.11%) operated under GA (Table 2). Among these 45 patients, 9(20%) patients were suffered PPC. All these 9 patients were undergone surgery under general anaesthesia. Among this 9 patients, 8(88.88%) patients were male and only 1(11.11%) was female. Also the patients who were suffered PPC, 7(77.77%) patients were above 65 years of age. Postoperative complications were observed as per the Table 3.

Table: 1 Distribution of patients with COPD undergoing elective surgery according to the values of FEV1

Classified COPD patients with altered PFT	N	(%)
Mild (FEV_1 >80%)	21	46.66%
Moderate (FEV_1 50-80%)	16	35.55%
Severe (FEV_1 30-50%)	8	17.77%
Very severe (FEV_1 <30%)	-	-
Total	45	100%

Table: 2 Distribution of different variables studied in respect of altered PFT and post-operative pulmonary complications

Studied variables	From all patients with Altered PFT
Sex M:F	33:12 (73.33% : 26.66%)
Age > 65 years	40(88.88%)
GA : SA	32(71.11%) : 13(28.88%)

Table: 3 Types of post-operative pulmonary complications

Post operative pulmonary complication	No. Of patients who suffered (%)
bronchospasm	4(8.88%)
Prolonged intubation and mechanical ventilation	2(4.44%)
Pneumonia	2(4.44%)
Acute respiratory insufficiency	1(2.22%)
Tracheobronchitis, atelectasis	None

Discussion: The few works that address the surgical patient with COPD are conflicting in their results, and contain several disputes in regards to the possibility that this patient is subjected to surgery and that have a higher risk of developing PPC in relation to the population normal[5, 6, 18] The study group was composed of patients with COPD and altered PFT undergoing major abdominal surgery. The diagnosis of COPD was made when patients had a history of chronic bronchitis or emphysema associated with

values of FEV1/FVC less than 88% of predicted for women and below 89% of predicted for males. The incidence of PPC in patients with COPD has also wide variation: Wong et al[6] and Pereira et al[38] obtained 37%. Kroenke et al[18] showed a rate of 33% in patients with COPD. Stein and casara[7] showed a rate of 45% in patients with COPD. The numerical difference between these percentages was produced by the fact that the authors of the works concerned used definitions different for pulmonary complication. In our study, the incidence of PPC was 20% in form of bronchospasm (8.88%), prolonged intubation and mechanical ventilation (4.44%), pneumonia (4.44%), acute respiratory insufficiency (2.22%). Incidence of PPC differs from reference studies because reference studies were older one. Nowadays therapeutic and preventive measures for the pre and postoperative periods (interruption of consumption habits; respiratory physiotherapy; nebulisation as per physician opinion and antibiotic therapy for prevention of chest infection and analgesia in the post-operative period) were taken. In our study, all the patients were well optimized preoperatively. Their lung examinations were absolutely normal before operation. So the incidences of PPC were decreased. In 9 patients (20%) who suffered complications, an analysis was performed to evaluate the existence of association between the various variables present in the preoperative and the emergence of PPC. It was demonstrated that male patients had more pulmonary complications (24.24%) than the female (8.33%). There is no logical reasons for the female patients suffer fewer complications than those of the male. But, surprisingly, only one woman suffered complications out of all 12 (7.1%) females.

The individual analysis of the patient showed that it was not different from the other patients in which there were no complications, with respect to the various variables studied. In our study, who suffered PPC, out of them 7 patients were above the age of 65 years. The high age was considered as risk factor for PPC. This may be because of changes in pulmonary physiology with advancing age.[43, 44] the presence of lung or respiratory symptoms in the preoperative period, as well as smoking, are considered important risk factors for occurrence of PPC[3, 5, 36, 39]. By analysis of the literature, was expected to have association between the presence of respiratory symptoms and pulmonary complication. However, this occurrence was not confirmed by our study, as in our study; all patients were scheduled for elective surgery and so well optimized preoperatively.

Conclusion: Pulmonary complications after surgery are a leading cause of postoperative morbidity. Advances in anaesthesia and surgical technique have made operative intervention possible in patients with severe cardiopulmonary diseases who previously would have been denied for surgery. This study concludes that the incidence of the post-operative pulmonary complications was not statistically significant in patients with altered PFTs who were undergone elective major upper abdominal surgery after well optimization.

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