



CORELATION OF PREOPERATIVE VARIABLES WITH POSTOPERATIVE PULMONARY COMPLICATIONS IN PATIENTS UNDERGOING ELECTIVE SURGERY UNDER GENERAL ANESTHESIA

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ABSTRACT

Background: Almost every patient undergoing a major surgical procedure will experience some degree of physiologic alteration in lung function. A postoperative pulmonary complication is defined as any respiratory complication that occur within 48-72 hours following a surgical procedure. The relationship between preoperative variables and postoperative pulmonary complications in surgical patients has been the subject of numerous studies. Development of POPC is due to a combination of factors, including surgical pathology and existing comorbidities, as well as surgical and anaesthetic management in the perioperative period. The main risk factors that have been associated with postoperative pulmonary complication are smoking, chronic obstructive pulmonary disease, advanced age, site and duration of surgery, obesity and comorbidity.

KEYWORDS : POPC, Lung function, GA.

The preoperative evaluation should include steps to prepare patients for surgery and to identify those at high risk for developing complications, thus allowing physicians to take prophylactic measures to reduce the incidence of postoperative pulmonary complications. The most common postoperative pulmonary complications are atelectasis, respiratory infections, bronchoconstriction and respiratory failure.

AIM

To correlate the preoperative variables with postoperative pulmonary complications in patients undergoing elective surgery under general anesthesia.

OBJECTIVES

- 1] To determine the incidence of postoperative pulmonary complications.
- 2] To observe patients, if any, requiring active intervention like O₂ therapy, CPAP, BIPAP, nebulisation, antibiotics and ventilatory support.

MATERIAL & METHODOLOGY

Study Population :

200 adult patients (both sexes included), age ranging from 20-60 years, belonging to ASA Grade 1 and 2 undergoing surgery under general anesthesia

Study Design: Prospective observational study

Sample Size Calculation

The incidence of POPC found by various investigators since the advent of anesthesia has been reported to vary from 10% to 80%. With newer anesthetic techniques and increased patient safety this has reduced with an average (p)=14%. Hence taking p=14 with 5% margin of error, the minimum required sample size at 5% level of significance is calculated to be 185 patients.

Statistical Methods

Statistical testing was conducted with the statistical package for the social science system version SPSS 17.0. Continuous variables were presented as meanSD or median (IQR) for non normally distributed data. Categorical variables was expressed as frequencies and percentages.

The comparison of normally distributed continuous variables

between the groups was performed using Student's t test.

Nominal categorical data between the groups were compared using Chi-squared test or Fisher's exact test as appropriate.

Non-normal distribution continuous variables were compared using Mann Whitney U test.

To identify potential factors associated with post-operative pulmonary complications univariate analyses was performed. A stepwise approach was used to enter new terms into the model, with a limit of p<0.05 to enter the terms.

For all statistical tests, a p value less than 0.05 was taken to indicate a significant difference.

Inclusion Criteria

- Patients in the age group of 20-60 years.
- ASA Grade I and II of either sex.
- Patients undergoing surgery under general anesthesia.
- Patients consenting to participate in the study

Exclusion Criteria

- Patients refusal for participation.
- Patient with acute respiratory, cardiovascular, hepatic, neurological and renal diseases.
- Patients with neuromuscular disease.
- Patients undergoing surgery under regional anesthesia.

Anesthesia Technique

All patients underwent preoperative assessment after having been scheduled for surgery.

- After receiving the patient in the operation theatre, monitors were attached to the patient, intravenous access was established.
- All patients were premedicated with midazolam and fentanyl.
- After premedication, induction was done with propofol and vecuronium bromide.
- Intubation was done after ventilation with 100% O₂ for 3 minutes.
- Maintenance of anesthesia was done with O₂, N₂O, Isoflurane and vecuronium.
- Reversal of patient with 100% O₂, glycopyrrolate and neostigmine.
- Patients were shifted to recovery for monitoring.

Patients were observed for 24-72 hours postoperatively for-

- 1) Adequacy of pain relief
- 2) Vitals like pulse rate, spo₂, BP were monitored
- 3) Any complication related to pulmonary system like-
 - a) Aspiration pneumonia
 - b) Tracheobronchitis
 - c) Atelectasis
 - d) Acute respiratory failure
 - e) Bronchoconstriction
 - f) Pulmonary edema
 - g) Pulmonary embolism
 - h) Pneumothorax
- 4) Requirement of any active intervention like O₂ therapy, CPAP, BIPAP, nebulisation, mechanical ventilation etc.

OBSERVATIONS AND RESULTS-



DISCUSSION

Of the 200 patients studied, 111(55.5%) were women and 89(44.5%) were men. Out of total of 7, 6 complications occurred in male patients(85.7%) and 1 in female patient(14.3%). The p value was 0.046 (p value<0.05), so this difference was significant in relation to gender of patient.

The average age group was 34±9.49 years, median age was 30 years and the patients ranged between 22-58 years. Between 21-30 years there were 103 patients(51.5%), between 31-40 there were 43 patients(21.5%), between 41-50 there were 43 patients(21.5%) and between 51-60 there were 11 patients(5.5%). Out of 7, 1 complication occurred between 21-30 years(14.3%), 1 between 41-50 years(14.3%) and 5 between 51-60 years(71.4%). The average age of patients with POPC was 49.29±11.86 years and the average age of patients without POPC was 33.45±8.95 years. The p value was <0.001(p value <0.05) so this difference was highly significant in relation to age of the patient.

The mean weight of patients was 65.68±5.22 kilograms(kgs), median weight was 67 kgs and the patients ranged between 49-85 kgs. The mean weight of patients without POPC was 65.28±4.80 kgs and the mean weight of patients with POPC was 76.43±5.38 kgs. The p value was <0.001(p value <0.05)

so this difference was highly significant in relation to weight of the patient.

The mean height of patients was 1.55±0.06 metres(m), median height was 1.5 m and the patients ranged between 1.5-1.7 m. The mean height of patients without POPC was 1.55±0.06 m and the mean height of patients with POPC was 1.57±0.08 m. The p value was 0.376(p value >0.05) so this difference was not significant in relation to height of the patient.

The average BMI was 27.44±2.82 kg/m², median BMI was 27.34 and the patients ranged between 20.76-37.78. The mean BMI of patients without POPC was 27.31±2.69 and the mean BMI of patients with POPC was 31.17±4.04. The p value was 0.044(p value <0.05) so this difference was significant in relation to BMI of the patient.

The mean duration of surgery was 1.91±0.82 hours(hrs), median duration was 1.5 hrs and the duration ranged between 1-5 hrs. The mean duration in patients without POPC was 1.88±0.79 hrs and the mean duration in patients with POPC was 2.71±1.15 hrs. The p value was 0.008(p value <0.05) so this difference was significant in relation to duration of surgery.

147 patients (73.5%) belonged to ASA Grade 1 and 53 patients (26.5%) belonged to ASA Grade 2. Out of 7, 1 complication (14.3%) occurred in ASA Grade 1 and 6 complications (85.7%) occurred in ASA Grade 2. The p value was 0.002(p value <0.05) so this difference was significant in relation to ASA Grade of the patient.

In type of surgery 68 patients (34%) belonged to general surgery, 51(25.5%) to obstetrics and gynaecology, 51 (25.5%) to ENT, 20 (10%) to orthopaedics and 10 (5%) to dental surgery. Out of 7, 3 (42.9%) complications occurred in general surgery (upper abdominal surgery), 2 (28.6%) in ENT (shared airway) and 2 (28.6%) in dental surgery. The p value was 0.029 (p value <0.05) so this difference was significant in relation to type of surgery.

Comorbidity associated with the basic surgical illness was observed in 49(24.5%) patients among which the most common was DM in 23(11.5%) patients, followed by HTN in 11(5.5%) patients, hypothyroidism in 10(5%) patients, asthma in 3(1.5%) patients and COPD in 2(1%) patients.

Out of 7, 3 (42.9%) complications occurred in asthmatic patients, the p value was <0.001(p value <0.05) so this was highly significant.

2 complications (28.6%) occurred in COPD patients, the p value was 0.001 (p value <0.05) so this was highly significant.

2 complications (28.6%) occurred in diabetic patients, the p value was 0.186 (p value >0.05) so this was not significant.

1 complication (14.3%) occurred in hypertensive patient, the p value was 0.331 (p value >0.05) so this was not significant.

Out of 200, 1 patient (0.5%) had history of cough and 9 patients (4.5%) had history of smoking. Out of 7, 1 complication (14.3%) occurred in patient with cough and 4 (57.1%) occurred in smokers. The p value was <0.001 (p value <0.05) so this difference was highly significant in relation to patients with history of smoking and cough.

Out of 200, 2 patients (1%) had history of allergy to dust and both of them (28.6%) had POPC. The p value was 0.001 (p value <0.05) so this difference was highly significant in relation to patients with history of allergy to dust.

198 patients(99%) had adequate pain relief(VAS <4) post surgery and 2 patients(1%) had inadequate pain relief (VAS>4). Out of 7, 5 complications (71.4%) occurred in those with adequate pain relief and 2 (28.6%) in those with inadequate pain relief. The p value was 0.001 (p value <0.05) so this difference was highly significant in relation to adequacy of pain relief.

POPCs developed in 7(3.5%) patients out of which 3 (42.9%) had bronchospasm, the p value was < 0.001 (p value <0.05) so this was highly significant.

3 (42.9%) had respiratory failure out of total of 7, the p value was <0.001 (p value <0.05) so this was highly significant.

1 (14.3%) had pneumonitis out of total of 7, the p value was 0.035 (p value <0.05) so this was significant.

1 (14.3%) had atelectasis out of total of 7, the p value was 0.035 (p value <0.05) so this was significant.

1 patient had both atelectasis and respiratory failure.

Among the interventions done 4 patients (57.1%) out of 7 were nebulised, the p value was <0.001(p value <0.05) so this was highly significant.

2 patients (28.6%) out of 7 received mechanical ventilation, the p value was 0.001(p value <0.05) so this was highly significant.

1 patient (14.3%) out of 7 received antibiotics, the p value was 0.035 (p value <0.05) so this was significant.

1 patient (14.3%) out of 7 received NIV, the p value was 0.035 (p value <0.05) so this was significant.

1 patient received both antibiotics and nebulisation.

The univariate analysis of the various variables studied identified the following risk factors that were statistically significant for POPCs- male gender, history of smoking, cough and allergy to dust, higher age group, BMI and ASA grades, prolonged duration of surgery, lung diseases like asthma and COPD, ENT surgeries with shared airway, upper abdominal surgeries and dental surgeries with risk of per-op aspiration.

CONCLUSIONS

- 1) Preoperative assessment of patients scheduled to undergo surgery under general anesthesia assists the physician in determining preoperative risk.
- 2) Physiological changes that occur after GA, including alterations in lung volume, ventilatory gas exchange and respiratory defense mechanisms, impose an increased risk of pulmonary complications for susceptible patients.
- 3) There is no standard definition of POPCs so the discrepancy between findings in different studies is understandable.
- 4) Following risk factors for POPCs were identified- male gender, history of smoking, cough and allergy to dust, higher age group, BMI and ASA grades, prolonged duration of surgery, lung diseases like asthma and COPD, ENT surgeries with shared airway, upper abdominal surgeries and dental surgeries with risk of per-op aspiration.

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