ORIGINAL RESEARCH

Analysis of Postoperative Pulmonary Complications in Patients Undergoing Abdominal Surgeries at a Tertiary Care Hospital

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ABSTRACT

Background:Physiological changes in the respiratory system that occur immediately after the induction of general anesthesia explain the majority of postoperative complications. Thus, respiratory drive and muscle function are altered, lung volumes reduced, and atelectasis develops in more than 75% of patients receiving neuromuscular blocking drugs (NMBD). This study was conducted to assess postoperative pulmonary complications in patients undergoing abdominal surgeries.**Materials and Methods**:100 patients who were going to have abdominal surgeries were evaluated for eligibility. The study included all patients, aged 18 to 80, undergoing abdominal surgery who were kept in a postsurgical intensive care unit (ICU) for more than 8 hours after surgery. The designated anaesthetist used a systematic proforma to gather the preoperative and intraoperative characteristics. Following surgery, every patient was sent to the postsurgical intensive care unit (ICU). The patient's data sheet in the ICU was used to track their progress, including any respiratory issues.**Results**: In this study there were total 100 subjects out of which 49 were males and 51 were females. Out of 100 subjects, pulmonary complications were seen in 25 subjects. Among 12 subjects, cardiac morbidity was associated with pulmonary complications. Among 6 subjects, respiratory morbidity was associated with pulmonary complications. Malignancy, smoking, intraoperative and postoperative complications were the associated factors of pulmonary complications in 3,2,1 and 1 subject, respectively. The mean length of ICU stays of subjects with pulmonary complications had been 12.6 days whereas that of subjects without any complications had been 4.3 days.**Conclusion**: Postoperative Pulmonary Complications were associated with cardiac comorbidity, respiratory comorbidity, malignancy, intraoperative and postoperative complications. Also, the subjects who had complications had to stay in the ICU for longer period as compared to those who did not have any complications.

Keywords: ICU, Comorbidity, Pulmonary, Complications.

INTRODUCTION

Nearly 234 million patients undergo major surgery worldwide every year.[1] Approximately 16% will suffer a complication within 30 days.[2] In 2015, the European Perioperative Clinical Outcome (EPCO) standardized the concept of postoperative complications (POCs) in the various organ systems, which constitutes an important advance in perioperative medicine.[3]

One set of under-reported complications are postoperative pulmonary complications (PPCs) that are costly and increase patient mortality. After abdominal surgery (AS), PPCs are one of the most important causes of postoperative morbidity and mortality.[4,5] Various perioperative risk factors are

related to their appearance in the postoperative period.[6]

Physiological changes in the respiratory system that occur immediately after the induction of general anesthesia explain the majority of POCs.[7] Thus, respiratory drive and muscle function are altered, lung volumes reduced, and atelectasis develops in more than 75% of patients receiving neuromuscular blocking drugs (NMBD). The respiratory system may take 6 weeks to return to its preoperative state after general anesthesia for major surgery.[8]

The outcomes after abdominal surgery are influenced by postoperative complications, and pulmonary complications are associated with increased morbidity and length of hospital stay.[9] While cardiac complications are related directly to cardiac status[10], postoperative pulmonary complications (PPC) combine infectious causes such as pneumonia, respiratory failure as well as exacerbation of chronic obstructive pulmonary disease (COPD). To assist with resource allocation, efforts have been made to identify risk factors for PPC in an effort to direct efforts toward patients identified to be at high risk.[11,12] The lack of specificity for respiratory symptoms makes it more difficult to individually evaluate PPC although unequivocal evidence are pneumonic changes on chest X-ray or positive sputum microbiology for pulmonary infections. Patients with COPD are at greater risk for the development of PPC.[13]

This study was conducted to assess postoperative pulmonary complications in patients undergoing abdominal surgeries.

MATERIALS AND METHODS

100 patients who were going to have abdominal surgeries were evaluated for eligibility. The study included all patients, aged 18 to 80, undergoing abdominal surgeries who were kept in a postsurgical intensive care unit (ICU) for more than 8 hours after surgery. The designated anesthetist used a systematic proforma to gather the preoperative and intraoperative characteristics. Following surgery, every patient was sent to the postsurgical intensive care unit (ICU). The patient's data sheet in the ICU was used to track their progress, including any respiratory issues.

Duke's activity scoring system, which is based on the metabolic equivalent test, and the American Society of Anesthesiologists' physical status assessment were used to evaluate the patient. Every patient had a chest X-ray taken, and the evaluating physician or anesthesiologist may choose to conduct more in-depth examinations, such as arterial blood testing and pulmonary function tests.

The Mann-Whitney U-test was used to determine whether there had been statistically significant changes in the mean age, length of hospital and ICU stay, and duration of anesthesia with respiratory complications. McNemar's test was applied to determine whether the postoperative respiratory variables had changed statistically significantly. The chi-square test was employed to evaluate the correlation between risk factors and PPC.

RESULTS

In this study there were total 100 subjects out of which 49 were males and 51 were females.Out of 100 subjects, pulmonary complications were seen in 25 subjects.Among 12 subjects, cardiac morbidity was associated with pulmonary complications. Among 6 subjects, respiratory morbidity was associated with pulmonary complications. Malignancy, smoking, intraoperative and postoperative complications were the associated factors of pulmonary complications in 3,2,1 and 1 subject, respectively.

The mean length of ICU stays of subjects with pulmonary complications had been 12.6 days whereas that of subjects without any complications had been 4.3 days.

Table 1: Gender-wise distribution of subjects

Gender	Number of subjects	Percentage
Males	49	49%
Females	51	51%
Total	100	100%

Table 2: Number of subjects with pulmonary complications

Prevalence of complications	Number of subjects	Percentage
Absent	75	75%
Present	25	25%
Total	100	100%

Table 3: Factors associated with pulmonary complications

Factors	Number of subjects	Percentage
Cardiac comorbidity	12	12%
Respiratory comorbidity	06	06%
Malignancy	03	03%
Smoking	02	02%
Intraoperative complication	01	01%

Postoperative complication	01	01%

DISCUSSION

Postoperative pulmonary complications (PPCs) are not uncommon after prolonged surgeries that affect the patient outcome adversely and increase hospital stay and utilization of resources. The incidence of PPCs which are heterogeneous depends on its definition and varies in different surgical categories.

Even mild PPCs can be associated with increased early mortality and would need special attention for improving the outcome.[14] Identification and optimization of the risk factors are important to reduce or prevent PPCs and to minimize premature deaths in patients undergoing surgery.[15,16]

The risk factors for PPCs are identified in multiple studies, and various predictive factors have been recognized in LAS VEGAS risk scoring and by the validated ARISCAT scoring.[17,18] The level of risk of surgery, duration of surgery, volume of intraoperative fluids, inotropic support, and neuromuscular blocking agents used are identified to be associated with PPCs.[19-21]

This study was conducted to assess postoperative pulmonary complications in patients undergoing abdominal surgeries.

In this study there were total 100 subjects out of which 49 were males and 51 were females. Out of 100 subjects, pulmonary complications were seen in 25 subjects. Among 12 subjects, cardiac morbidity was associated with pulmonary complications. Among 6 subjects, respiratory morbidity was associated with pulmonary complications. Malignancy, smoking, intraoperative and postoperative complications were the associated factors of pulmonary complications in 3,2,1 and 1 subject, respectively. The mean length of ICU stays of subjects with pulmonary complications had been 12.6 days whereas that of subjects without any complications had been 4.3 days.

Kumar L et al (2018)[22] prospectively examined risk factors associated with the development of PPC in patients undergoing abdominal surgery. The primary outcome was to determine the association of predefined risk factors in the prediction of PPC after abdominal surgery. Secondary outcomes were evaluation of outcomes of PPC. This was a prospective study conducted in the gastrosurgical and urological units of a tertiary care referral hospital in patients undergoing abdominal surgery over a period of 6 months (November 2015–April 2016). Relevant preoperative and intraoperative variables were recorded by the anesthesiologist in a pro forma provided. Postoperatively, data from the Intensive Care Unit (ICU) were collected from data sheets. PPC were defined according to preset criteria and outcomes of the patients including ICU stay, hospital stay, and mortality were noted. Chi-square test was used to find the association of risk factors of PPC. Mann–Whitney test was used for continuous variables and McNemar's test for postoperative respiratory variables. A final regression analysis was performed with factors with significant association ($P < 0.1$) One hundred and fifty patients were included, and 24 patients (16%) developed PPC as defined by their criteria. Emergency surgery (44.4% of PPC) and cardiac comorbidity (23.9% of PPC) were significant associations for pulmonary complications. The length of ICU and hospital stay (LOICU, LOHS) and mortality were higher in the group with pulmonary complications ($P < 0.001$). Emergent surgery and cardiac comorbidities were independent predictors for the development of PPC. PPC are associated with increased LOHS, LOICU stay, and mortality.

Gupta S et al (2020)[23] determined the risk factors and assess the incidence of PPC after non-cardiac surgery. This prospective, observational study was conducted on 1,170 patients undergoing non-cardiac surgery. Details of patient, surgical, and anesthetic factors were collected, and patients were followed up for the entire duration of hospital stay for the occurrence of PPC. Assess Respiratory Risk in Surgical Patients in Catalonia (ARISCAT) score and the length of hospital stay was noted for all the patients. Regression analysis was used to find the risk factors associated with development of respiratory complications. The incidence of PPC was found to be 59 in 1,170 patients (5%) in their hospital. Multivariate analysis revealed that patients with intermediate and high risk ARISCAT scoring had higher odds of developing PPC. Higher age (>50 years), positive cough test, presence of nasogastric tube, and intraoperative pulmonary complications were identified as independent risk factors associated with the occurrence of PPC. They found 5% incidence of PPC in their study. Recognition of the delineated risk factors and routine use of ARISCAT score for preoperative assessment may help identify patients at a higher risk of developing postoperative pulmonary complications.

CONCLUSION

Postoperative Pulmonary Complications were associated with cardiac comorbidity, respiratory comorbidity, malignancy, intraoperative and postoperative complications. Also, the subjects who had complications had to stay in the ICU for longer period as compared to those who did not have any complications.

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