



Anaesthesiology

INCIDENCE OF POST OPERATIVE PULMONARY COMPLICATIONS IN PATIENTS UNDERGOING ELECTIVE SURGICAL PROCEDURE UNDER GENERAL ANAESTHESIA FOLLOWING SARS-COV-2 INFECTION: A OBSERVATIONAL COHORT STUDY

Sornam Annamalai	Postgraduate, Department of Anaesthesia, Saveetha medical college, Thandalam.
Jayashree Ramesh*	Postgraduate, Department of Anaesthesia, Saveetha medical college, Thandalam*Corresponding Author
Dhivya Ravikumar	Postgraduate, Department of Anaesthesia, Saveetha medical college, Thandalam
Lakshmi Ramakrishnan	Professor and Head of Department of Anaesthesia, Saveetha medical college and hospital, Thandalam

ABSTRACT **BACKGROUND:** Severe acute respiratory syndrome – Corona virus (SARS-CoV-2) has brought a huge change in the pulmonary status in our population. This condition further aggravates when the patients are subjected to General anaesthesia for elective surgical procedures. This study is an observational study to find the incidence of postoperative pulmonary complications from preoperative, intraoperative and postoperative features leading to pulmonary complications. We have evaluated the COVID history and various features that could lead to postoperative pulmonary complications. **RESULTS:** Increasing age, male gender, Smoking history, COPD, Asthma, Stroke, Ground glass opacity during COVID, surgery within 4 weeks of COVID infection, Breathe holding time of less than 15 seconds, intraoperative bronchospasm, impaired tidal volume, surgery more than 6 hours, postoperative bronchospasm, unplanned ventilation are the features that lead to postoperative pulmonary complications. **CONCLUSION:** The postoperative pulmonary complications is comparatively higher in population who had COVID-19 Infection and more severe in severe COVID infected patients when compared to normal population.

KEYWORDS : COVID-19, Postoperative, Pulmonary, General anaesthesia

INTRODUCTION:

Severe acute respiratory syndrome-Corona virus (SARS-CoV-2) was the recent pandemic that occurred. Patients coming for elective surgery post Covid infection state are vulnerable for subsequent pulmonary complications, due to pro-inflammatory cytokines and immunosuppressive response to surgery and mechanical ventilation in patients undergoing general anaesthesia. In our study we have tried to measure the rate of postoperative pulmonary complications which were defined as pneumonia, Acute respiratory distress syndrome or unexpected postoperative ventilation. Unexpected postoperative ventilation may include any episode of non-invasive ventilation, invasive ventilation or extracorporeal membrane oxygenation after initial extubation post surgery.

AIM OF THE STUDY: To evaluate the incidence of postoperative pulmonary complications in patient coming for elective surgical procedure under general anaesthesia following SARS-CoV-2 infection

MATERIALS AND METHODS:

After obtaining institutional ethical committee clearance, this study was conducted in Saveetha medical college, Chennai, Tamilnadu, INDIA during January 2021 to April 2021.

Sample size: 60 patients were included in the study.

STUDY DESIGN: This is an observational cohort study.

INCLUSION CRITERIA:

- ASA 1-3 PATIENTS
- Age 18-60 years
- Both gender
- Resolved SARS-CoV-2 infected patients within 8 weeks duration
- Elective surgical procedures under General anaesthesia
- BMI less than 42

Patients who were on tracheostomy, obese -BMI more than 42 and who had Active SARS-CoV-2 infection were excluded from the study.

Patients coming for elective surgical procedures under general anaesthesia were evaluated preoperatively, intraoperatively and postoperatively on pulmonary function.

Preoperative assessment includes the standard routine assessment which are Age, Gender, BMI, History of presenting illness, Comorbidities - on-going treatment for any medical condition and their drug history to optimize prior to surgery, Smoking and alcohol

history, Previous surgical history and their anaesthesia related effects. Along with the above COVID-19 related history which includes Date of COVID-19 infection, Treatment for the same (oxygenation and ventilation), Length of hospital stay during COVID infection (ICU stay, if any), CT grading and Recovery profile were all documented

Routine investigations were done and hemodynamics noted including room air saturation for all patients.

Beside Peak expiratory flow meter was used alongside with Breathe holding time. Pulmonary function test was done for all patients who were infected by COVID-19 virus coming for elective surgery under general anaesthesia.

Preoperatively 42 patients had been reserved intensive care unit with ventilator on stand-by mode.

All patients were ventilated in standard VCV mode with TV-6-8ml/kg, PEEP-5cms water and PIP set at 30cms to obtain a ET_{CO2} of 30-35mmHg.

Intraoperative observation includes:

- Mode of ventilation (any change over to PCV)
- Intraoperative bronchospasm or Hypoxia
- High PEAK airway pressures and Impaired tidal volume
- Duration of surgery and
- Mode of extubation process were all noted down.

Postoperative observation includes:

- ICU stay
- Need for prolonged ventilation / unplanned ventilation
- ARDS
- Sepsis / Pneumonia were followed up and noted.
- Further deterioration of lung function were further analyzed.
- Grade of surgery was categorized on the basis of BUPA schedule of procedures as either minor (minor or intermediate) or major (major or complex major).

STATISTICAL ANALYSIS:

The study was done according to STROBE guidelines for observational studies. Continuous data were tested for distribution, with normally distributed data presented as mean and 95% CI. Differences between groups were tested using the unpaired t test.

The X² and Fischers exact test were used for categorical data.

RESULTS:

60 patients were included in the study , who were resolved SARS –CoV-2 patients coming for elective surgery under general anaesthesia within 8 weeks duration.

Increased incidence of postoperative pulmonary complication was found with increasing age and male gender with a significant p value of 0.0014.

The comorbidities that were documented includes Current smoking history ,Asthma ,Chronic obstructive pulmonary disorder (COPD) ,Ischemic heart disease (IHD) , Stroke , Diabetes , Hypertension and Peripheral vascular disease Of which smoking history showed significant p value of 0.0052 , COPD (p value: 0.0003) ,Asthma (p value :0.004) and Stroke (p value :0.004). All these comorbidities had higher incidence of postoperative pulmonary complication when compared to others shown in fig1

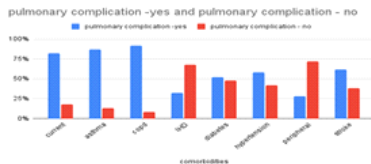
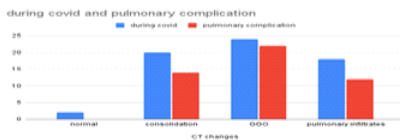


FIGURE 1: Comorbidities and postoperative complications.

Patients CT report during COVID showed either consolidation, ground glass opacity or pulmonary infiltrates and they were compared to post operative pulmonary outcome which showed patients with Ground glass opacity has significant postoperative pulmonary complication (p value: 0.002) when compared to others.

FIGURE 2: CT CHANGES DURING COVID VS POSTOPERATIVE PULMONARY COMPLICATION is shown in the figure below



Patients coming for elective surgery after resolved SARS-CoV -2 infection within 4 weeks showed significant p value 0.003 which indicates more postoperative pulmonary complication than patients coming after 8 weeks (p value 0.006).

Fig 3 shows the Peak expiratory flow rate in post Covid patients and its associated postoperative pulmonary complication of which 100l/min of PEFR has significant postoperative pulmonary complication (p value:0.004) along with 100-150l/min (p value:0.006), while the others were not statistically significant.

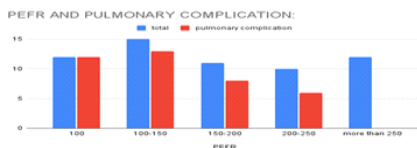


FIGURE 3 : PEFR and post operative pulmonary complication in post covid 19 patients.

Breathe holding time of less than 15 seconds and 15-20 seconds shows statistical significance with postoperative pulmonary outcome (p value:0.005) , while others are not significant.

Pulmonary function test shows restrictive pattern in 48 patients while 12 had normal PFT pattern.

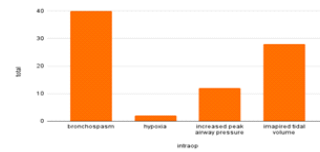
DLCO was also performed to confirm the restrictive pattern and they were all advised incentive spirometry and chest physiotherapy prior to surgery.

The grading of surgery into minor (minor or intermediate) and major (major or complex major) based on BUPA scoring .

Intraoperative period showed higher incidences of bronchospasm and

impaired tidal volume delivery in COVID-19 affected patients which is depicted in fig 4.

FIGURE 4 depicts intraoperative events in postcovid patients coming for general anaesthesia under elective surgical procedure



Prolonged duration of surgery more than 6 hours has significant (p value : 0.003) postoperative pulmonary complication when compared to surgeries less than 6 hours.

Pneumonia , Bronchospasm , Pulmonary embolism , unexpected postoperative ventilation and ARDS were the significant pulmonary complications observed. Of which Bronchospasm and unexpected ventilation were significant (p value of 0.005 and 0.002)

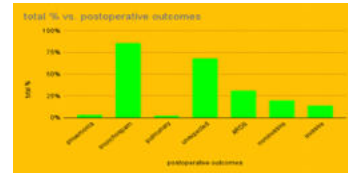


FIGURE 5: Postoperative pulmonary complication observed in post covid infected patients coming for elective surgical procedures under general anaesthesia.

Out of 6 patients who had unplanned ventilation , 3 patients were on invasive ventilation , of which 2 were extubated uneventfully after 24 hours , 1 patient in view of ARDS was extubated after 72 hours.

Preoperatively 42 patients had planned ventilation of which only 10 patients required ICU stay for observation. 6 patients had unplanned ventilation , of which 4 were shifted from operating room and 2 patient from ward to ICU.

DISCUSSION:

Recovered SARS-CoV-2 infected patients are prone for various infections and complications that might require surgical intervention like Mucoromycosis, Superior mesenteric vein thrombosis , Acute infection triggering cholelithiasis , and many more. These surgical procedures require General anaesthesia and is very challenging for the anaesthetist , as SARS-CoV-2 infection further worsens lung compliance. Postoperative outcomes in SARS-CoV-2 infected patients are substantially worse than pre pandemic baseline rates of pulmonary complications and mortality. NEPOGODIEV et al published 30 day mortality and pulmonary complications in patients with ongoing COVID-19 infection in THE LANCET journal. Their study shows 16.8% in patients with an unexpected critical care admission, and 23.4% in frail patients older than 70 years which almost correlates with our study. Also in their study, ARDS had the highest mortality rate (68%) and occurred much more frequently (20%) , while our study showed lesser incidence of ARDS and higher incidence of Bronchospasm and unexpected postoperative ventilation. Postoperative pulmonary complications in recovered SARS-CoV-2 patients approach those of the sickest patients with community-acquired COVID-19 who are admitted to intensive care. In the immediate covid infection adequate optimization of lung function with spirometry , chest physiotherapy and counselling should be advised. The elective surgeries can be delayed unless mandatory for better postop.outcome. Wherever possible regional anesthesia is advised.

For emergent surgical situations a planned postoperative respiratory management is essential for better outcome.

CONCLUSION: Postoperative pulmonary complications in recovered SARS-CoV-2 infected patients was significantly higher in patients undergoing General Anaesthesia

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