

# Evaluation of Post-operative Pulmonary Complications in Patients of Emergency Abdominal Surgeries: A Teaching Hospital Based Study.

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## ABSTRACT

**Background:** The outcomes after abdominal surgery are influenced by postoperative complications (PPC), and pulmonary complications are associated with increased morbidity and length of hospital stay.<sup>[1]</sup> Post-operative pulmonary complications are common, serious and expensive. **Methods:** It is a retrospective case control study, carried out in 60 (30 cases and 30 controls) patients in Pacific Institute of Medical Sciences, Udaipur, India during the period from July 2015 to November 2015; according to inclusion & exclusion criteria. Cases comprised of those patients who underwent emergency laparotomy and developed Post-operative pulmonary complications. **Results:** Emergency surgery was associated with a significantly higher risk for pulmonary complications. The mean age of patients with pulmonary complications was significantly higher than those without [Table 1]; however, on regression analysis, age was not a predictor for postoperative complication. **Conclusion:** The emergent abdominal surgery, increasing age, and cardiac comorbidity increase the risks of PPC. PPCs were associated with increased length of ICU and hospital stay and mortality.

**Keywords:** Surgery, postoperative pulmonary complications & risk factors.

## INTRODUCTION

The outcomes after abdominal surgery are influenced by postoperative complications (PPC), and pulmonary complications are associated with increased morbidity and length of hospital stay.<sup>[1]</sup> Post-operative pulmonary complications are common, serious and expensive.<sup>[2]</sup> While cardiac complications are related directly to cardiac status,<sup>[3]</sup> postoperative pulmonary complications 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 Post-operative pulmonary complications in an effort to direct efforts toward patients identified to be at high risk.<sup>[4,5]</sup> The lack of specificity for respiratory symptoms makes it more difficult to individually evaluate PPC although unequivocal evidences 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 Post-operative pulmonary complications.<sup>[6]</sup> Preoperative risk factors are a major determinant of postoperative morbidity. Several risk factors both preoperatively and intraoperatively have been identified with

respiratory impairment after abdominal surgery. Aim of this study was to the post-operative pulmonary complications in patients of emergency abdominal surgeries.

## MATERIALS AND METHODS

This present study was conducted in the Department of General Surgery Wards, Pacific Institute of Medical Sciences, Umarda, Udaipur, India. It is a retrospective case control study, carried out in 60 (30 cases and 30 controls) patients in Pacific Institute of Medical Sciences, Udaipur, India during the period from July 2015 to November 2015; according to inclusion & exclusion criteria. Cases comprised of those patients who underwent emergency laparotomy and developed Post-operative pulmonary complications. Controls were selected from group who didn't develop Post-operative pulmonary complication.

## RESULTS & DISCUSSION

**Table 1:** Age distribution comparison

Age in years	Cases (n=30)	Controls (n=30)
≤ 25	4 (13.3)	9 (30.0)
25-45	10 (33.3)	7 (23.3)
45-65	9 (30.0)	8 (26.7)
≥ 65	7 (23.3)	6 (20.0)

Emergency surgery was associated with a significantly higher risk for pulmonary

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complications. The mean age of patients with pulmonary complications was significantly higher than those without [Table 1]; however, on regression analysis, age was not a predictor for postoperative complication. Gender distribution between both groups was comparable. Patients were classified as obese or nonobese based on the BMI  $\geq 30$ . There was no association with increasing BMI and pulmonary complications. Patients having upper abdominal pathologies had more chances of developing post-operative pulmonary complications.

**Table 2:** Distribution of surgeries in cases and control group

Parameters	Cases (n=30)	Controls (n=30)
Duodenal and gastric perforation	19 (63.3)	11(36.7)
Small bowel perforation	6 (20.0)	13 (43.3)
Colonic perforation	-	1 (3.3)
Bowel gangrene	3(10.0)	2(6.7)
Rectal prolapse	2(6.7)	-
Ileal band	-	1(3.3)
Ileal stricture	-	1(3.3)
Irreducible umbilical hernia	-	1(3.3)

**Table 3:** No. of patients with low SpO2 levels (<90%)

Variables	No. of patients	
	Cases (n=30)	Controls (n=30)
Pre-operative	7(23.3)	4(13.3)
Post-operative	19(63.3)	3(10.0)

Like many prospective studies, age  $\geq 65$  years was found to be an important risk factor for PPCs. Hall et al published in Chest journal (1991) that ASA classification  $>1$  and age  $>59$  could predict 88% of the patients who will develop PPCs.<sup>[7]</sup> ACP guideline, 2006 have also placed advanced age in the category of Risk factors which are supported by good evidence.<sup>[8]</sup> Most of the studies couldn't associate obesity with PPCs. ACP guidelines, 2006 also find good evidence against being a risk factor. Present study couldn't compare this risk factor as most of the patients were not obese.<sup>[8]</sup> It was 3 times more common in Case group, COPD being most common. ACP guidelines also place COPD in Risk factors of good evidence category.<sup>[8]</sup> But the duration of illness before surgery was not specified by most of the studies. This may get clear in time to come. It was abnormal in 2/3rd of present cases (crepts being most common) while 93% of the Controls had normal chest examination. Valerie et el Chest, 2006 did a case-control study in 164 patients and found abnormal clinical findings to be a risk factor (p=0.045). But, chest examination is a very subjective criterion.<sup>[9]</sup> So, authors tried Respiratory rate and SpO2 as comparison variables. More than half of cases had tachypnea, while 93% of the control had normal respiratory rate. SpO2

$\geq 86$  fared equally in both groups but patients having SpO2  $<86$  were from case group only. So, it is inferred that many patients with subclinical lung compromise in pre-op period may show normal saturation levels due to increase RR compensation. So, counting RR precisely over 1min fully is important. These were 3 times more common in case group, COPD being most common. Valerie et el Chest 2006 also found abnormal chest findings to be a significant risk factor (p value=0.038).<sup>[9]</sup> So, chest X-ray must be done along with abdominal x-rays in emergency scenarios. ACP guidelines place prolonged surgeries in Risk factor of good evidence category but what duration increases the risk is not mentioned.<sup>[8]</sup> In present study, in surgeries lasting  $>3.2$  hours chances of PPCs increased. Brunn et al Chest 1997 found that duration  $>4$ hrs was a significant risk factor (p=0.0062).<sup>[10]</sup> Present study found that those patients who had to be shifted to ventilator or T-piece in ICU had more chances of developing PPCs. This variable has not been considered in studies so far. It is a subjective criterion as sometimes recovery of patients from anesthesia is prolonged regardless of lung compromise. Post-operative abnormal clinical findings; Nine percentage of the cases had creptitations, most probably due to increased secretions. Decreased air entry was found in 21% of cases, may be due to atelectasis. Post-op SpO2 levels; These were monitored daily for 5 days. 63.3% of the Cases recorded low SpO2 levels in contrast to 23.3% in pre-op period. It shows that physical stress during intra op period aggravated subclinical respiratory compromise which couldn't be detected preoperatively. So, SpO2 measurement was found to be easy and effective way to monitor PPCs. It must be done pre-operatively to set a baseline.

Limitations of this study were sample size (60) could have been more if study span extended few more years. Small sample size decreased the significance of statistical analysis. Population mostly consisted of males (94%). Pulmonary function tests via spirometer were not possible in emergency cases. Anesthetic parameters- type of anesthesia, post op analgesia could not be compared as they remained same in most of the patients. Pulmonary complications have been contributory to postoperative morbidity and mortality in abdominal surgery.<sup>[11]</sup> In this study,<sup>[11]</sup> authors had taken into account cognitive dysfunction as a variable as impaired cognitive functions could predispose to pulmonary complications by increasing susceptibility to aspiration.<sup>[12]</sup> We documented a 16% incidence in complications although the reported incidence is variable between 9% and 40%.<sup>[13]</sup> The variations result on account of the differences in the quantification of respiratory problems and patient profiles and nature of surgeries. We proposed this

study to evaluate incidence of pulmonary complications at our center with a view to improve correctable causes and quality of care. We did not identify correctable causes but were able to identify some predispositions.

## CONCLUSION

In conclusion, the emergent abdominal surgery, increasing age, and cardiac comorbidity increase the risks of PPC. PPCs were associated with increased length of ICU and hospital stay and mortality.

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