



Post-operative Pulmonary Complications in Elderly Patients Undergoing Elective Open Upper Abdominal Surgery under General Anaesthesia

Authors

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Abstract

Background: Postoperative pulmonary complications are an important factor responsible for the mortality and morbidity in the post-operative period after surgery and may also increase the length of stay in the hospital.

Objectives: To find out the incidence of pulmonary complications post-operatively among elderly patients after elective open upper abdominal surgery under general anaesthesia and to study the effect of pre-existing respiratory ailments on post-operative pulmonary complications.

Methodology: This was a hospital based cross-sectional study conducted in the department of anaesthesiology, GMC Srinagar.

Results: Postoperatively, 49% of the patients had SPO₂ less than 94% while on auscultation, there was decreased air entry in about 42% of the patients. On chest X-Ray, the major finding was collapse in 15% of the patients postoperatively. The respiratory rate was increased in 28% of the patients.

In total, about 55% of the patients had post-operative pulmonary complications. The presence of pre-operative pulmonary complications was associated with the development of respiratory complications in the post-operative period ($p < 0.001$).

Conclusion: The presence of preoperative respiratory symptoms was the most important risk factor for the development of postoperative pulmonary complications.

Introduction

Postoperative pulmonary complications are an important factor responsible for the mortality and morbidity in the post-operative period after surgery and may also increase the length of stay in the hospital. There may be multiple causes for post-operative pulmonary complications including the pre-operative health status of the patient, type

of surgery, duration of surgery, the type of anaesthesia and many more. Obesity, smoking, age and sex of the patient and other co-morbidities are patient risk factors. These factors may act synergistically. The incidence of post-operative pulmonary complications varies ranging from 2% to 40%.^{1,2}

Objectives

1. To find out the incidence of pulmonary complications post-operatively among elderly patients after elective open upper abdominal surgery under general anesthesia.
2. To study the effect of pre-existing respiratory ailments on the post-operative pulmonary complications.

Methodology

This study was a cross-sectional hospital based study which was conducted in the department of Anesthesiology, SMHS hospital, Government Medical College, Srinagar. The period of study was from 2015 to 2017 with 1 year of data collection. The study was approved by the local committee and each patient's consent was sought before participating in this study.

Inclusion Criteria

- 1) Patients undergoing elective open upper abdominal surgery under general anesthesia.
- 2) Patients who are willing to participate and provide a written informed consent.
- 3) Patients aged >60 years.

Exclusion Criteria: Patients who remained intubated after surgery were excluded.

Data Collection: At the baseline, thorough history taking, general physical examination, systemic examinations and all the routine tests were performed for each patient and important findings noted pre-operatively. After the surgery was over, the findings on general physical examination, systemic examination and the findings on the routine tests were noted.

Any patient who had derangement of any of the respiratory parameters was considered to have a pulmonary complication. The parameters were recorded at the time of admission for the surgery and also at 48 hours after the surgery for this study.

SPO₂ of <95% and a respiratory rate of >20 were considered to be deranged as per the evidence from literature.^{3,4}

Results

In the study period a total of 53 patients fulfilling the eligibility criteria were included in the study. Table 1 shows the general characteristics of the patients in our study.

Table 1: General characteristics of the patients

		Number	Percentage
Gender	Male	31	58.5
	Female	22	41.5
Age group	≤ 75 years	33	62.3
	≥ 76 years	20	37.7
Smoking status	Smoker	26	49.1
	Non-smoker	27	50.9
Co-morbidities*	Hypertension	11	20.8
	Diabetes Mellitus	9	17.0
	Hypothyroidism	5	9.4
	Asthma	2	3.8
	COPD	1	1.9
	No Comorbidity	28	52.8
	Total	53	100.0

*The total of comorbidities does not sum up to 53 as some patients had more than one comorbidity and the percentages of comorbidities have been calculated with a denominator of 53.

There were more men (58.5%) in our study compared to women (41.5%). Maximum patients belonged to the age group of less than 75 years (62%). The mean age was found out to be 72.5 years with a standard deviation of 7.5 years. About 49% of the patients were smokers while the

rest were non-smokers. The most common comorbidity among our study subjects was hypertension with about 21% of the patients having hypertension followed by diabetes which was present in 17% of the patients.

Hypothyroidism was present in 10% of the patients while Asthma and COPD were present in lesser percentages. At least one comorbidity was present in 47% of the patients.

Table 2: Preoperative pulmonary findings of the patients

Parameter*		Number	Percentage
SO2	≤ 94%	9	17.0
	≥ 95%	44	83.0
Auscultatory findings	Air entry normal	50	94.3
	Wheeze	3	5.7
Chest X-Ray	Clear	51	96.2
	Hyperinflated	2	3.8
Pre-operative pulmonary complications	Yes	9	17
	No	44	83
Total		53	100.0

*Preoperatively, the respiratory rate was normal in all patients. Pre-operatively we had 17% of the patients having SPO2 less than 94%. On auscultation, about 6% of the patients had wheeze and on chest X-Ray lung fields were clear in 96% of the patients. Only 17% of the patients had pre-operative pulmonary complications. A patient having at least one

Table 3: Postoperative findings among the patients

Parameter		Number	Percentage
SO2	≤ 94 %	26	49.1
	≥ 95 %	27	50.9
Auscultatory findings	Air entry normal	27	50.9
	Wheeze	4	7.5
	Decreased air entry	22	41.5
Chest X-Ray findings	Clear	39	73.6
	Collapse	8	15.1
	Opacity	5	9.4
	Hyperinflated	1	1.9
Respiratory rate	≤ 20	38	71.7
	≥ 21	15	28.3
Post-operative pulmonary complications	Yes	29	54.7
	No	24	45.3
Total		53	100.0

Postoperatively, 49% of the patients had SPO2 less than 94% while on auscultation, there was decreased air entry in about 42% of the patients. On chest X-Ray, the major finding was collapse in 15% of the patients postoperatively. The respiratory rate was increased in 28% of the patients.

Considering all parameters, about 55% of the patients had post-operative pulmonary complications. A patient having at least one abnormal parameter among the following i.e., SPO2, auscultatory findings, chest X-ray findings

Table 2 shows the preoperative findings in our patients.

abnormal parameter among the following i.e., SPO2, auscultatory findings, chest X-ray findings or respiratory rate, was considered to have a pre-operative pulmonary complication.

Table 3 shows the post-operative findings of the patients.

or respiratory rate, was considered to have a post-operative pulmonary complication.

Table 4a and 4b show the relationship of postoperative pulmonary complications with various patient characteristics and pre-operative pulmonary complications.

Table 4a: Relationship of postoperative pulmonary complications with patient characteristics

		Present	Absent	Pearson’s chi-square	P value
Gender	Male	19(61.3%)	12(38.7%)	1.302	0.254
	Female	10(45.5%)	12(54.5%)		
Age-group	<=75	17(51.5%)	16(48.5%)	0.362	0.547
	>=76	12(60.0%)	8(40.0%)		
Smoking	Smoker	15(57.7%)	11(42.3%)	0.182	0.669
	Non-smoker	14(51.9%)	13(48.1%)		
Total		29(54.7%)	24(45.3%)		

Table 4b: Comparison of pre-operative pulmonary complications with post-operative complications

McNemar Test		Pre-operative pulmonary complications			P value
		Yes	No	Total	
Post-operative pulmonary complications	YES	9 (100.0%)	20 (45.5%)	29(54.7%)	<0.001
	NO	0 (0.0%)	24 (54.5%)	24 (45.3%)	
Total		9(100%)	44(100.0%)	53(100%)	

There was no relationship between the patient’s gender, age or smoking status with the presence or absence of postoperative pulmonary complications. The presence of pre-operative pulmonary complications was associated with the development of respiratory complications in the post-operative period (p<0.001, table 4b)

Discussion

In our study, all 53 patients underwent elective open surgery under general anaesthesia and pulmonary complications occurred in 29 patients (55%). A patient having at least one abnormal parameter among the following i.e., SPO2, auscultatory findings, chest X-ray findings or respiratory rate, was considered to have a post-operative pulmonary complication. Using these basic parameters to pick up the pulmonary complications made our finding of the post-operative pulmonary complications very sensitive. Although age might have been an important risk factor, it was not found to have a role in our study since all patients were above 60 years and all fall in the geriatric age group. Gender and smoking also had no effect on the development of postoperative pulmonary complications in our study although smoking has been found to increase the risk of post-operative pulmonary complications^{5,6}. This effect might have been missed as the patients who smoked were advised

to quit smoking at the time they got registered in the hospital for elective surgery which might have been at least 1 to 2 months before.

A significant relationship was found in the incidence of post-operative complications with the pre-operative complications (p<0.001). All the patients who had some pre-operative pulmonary complication also had some complication in the post-operative period while 45.5% of the patients who had no complication in the pre-operative period developed some complication in the post-operative period.

Our study had some limitations. The study was limited only to elective open abdominal surgery under general anaesthesia. The sample size was small. An important concern in this study is that we have evaluated only the patients who were operated under general anaesthesia. A question arises as to whether spinal anaesthesia or epidural anaesthesia may alter the complication rates. Also the rates may differ for laparoscopic and emergency surgeries. Therefore, we recommend more studies be conducted to evaluate all the factors that may be related to post-operative pulmonary complications.

Conclusion

In conclusion, the presence of preoperative respiratory symptoms was the most important risk factor for the development of postoperative

pulmonary complications. We believe that the identification of the patients at high risk for postoperative pulmonary complications, the evaluation of the preoperative pulmonary risks and the management of the respiratory problems of the patients before surgery may result in an improved outcome of surgical procedures with less postoperative pulmonary complications.

Conflicts of Interest: None declared.

Author contributions:

First Author: Idea of study, data collection and write-up

Second Author: Guidance and Supervision

Third Author: Statistical analysis

4th, 5th and 6th authors: Review of literature

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