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Research Article

**RATE OF OCCURRENCE OF POST-OPERATIVE  
PULMONARY COMPLICATIONS AFTER CORONARY  
BYPASS SURGERY**<sup>1</sup>Dr Muhammad Tayyab Farid, <sup>2</sup>Dr Ahsan Riaz, <sup>3</sup>Dr Muhammad Sajid<sup>1</sup>Allied / DHQ Hospital Faisalabad.

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**Abstract:**

**Objective:** This research work carried out to find out the rate of occurrence and risk factors of pulmonary complications after the surgical intervention for CB (Cardiopulmonary Bypass) and its correlation with the before surgery and intra-operative factors of risks.

**Methodology:** This research work was an analysis based on observations of 517 patients who had to experience cardio-pulmonary bypass surgery. We noted the rate of occurrence of Post-Operative Pulmonary Complications and their risk factors. We applied the logistic regression for the determination of the correlation of before surgery and intra-operative factors of risks with the prevalence of Post-Operative Pulmonary Complications.

**Results:** There was occurrence of Post-Operative Pulmonary Complications in 6.20% (n: 32) patients. The most frequent pulmonary complication after the surgical intervention was atelectasis that was present in 3.86% (n: 20) patients, followed by failure of respiratory system in 1.54% (n: 8) patients, pneumonia was present in 0.58% (n: 3) patients & ARDS (Acute Respiratory Distress Syndrome) in .19% (n: 1) patients. The most important risk factors of these complications was elder age equal or greater than 60 years of age, long duration of CPB with greater than two hours, pre-operative pulmonary HTN (Hypertension) and intra-operative injury of phrenic nerve. The rate of mortality was 9.40% among the patients present with the Post-Operative Pulmonary Complications & this rate was only 1% among patients with no Post-Operative Pulmonary Complications.

**Conclusion:** The rate of prevalence of the Post-Operative Pulmonary Complications was 6.20% in this current research work. Elder age, long duration of CPB, pre-operative HTN and intra-operative phrenic nerve injury are the most important factors of risk for the post-operative pulmonary complications after surgical intervention.

**Keywords:** Post-Operative Pulmonary Complications, Pulmonary, Mortality, Bypass, Pneumonia.

**Corresponding author:****Dr. Muhammad Sajid,**

Allied / DHQ Hospital Faisalabad.

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**INTRODUCTION:**

Regardless of many developments in the field of peri-operative care, Post-Operative Pulmonary Complications are still the most leading reason of high rate of morbidity as well as mortality after the cardiac surgery of adults. These complications have association with the enhanced hospitalization duration and these have a great influence on the health care facilities for the patients of cardiac surgery. There are many factors of these complications. The damage of phrenic nerve is the cause due to management of the cold saline in the peri-cardial cavity in the duration of the cardiac arrest & alveolar edema is the cause by the distension of the left ventricular and the increased pressure in pulmonary are the main causing factors for these fatal complications. Reported rate of occurrence of the pulmonary complications after the cardiac surgery differs from 6.0% to 70.0% relying on the standard utilized to describe the complications related to pulmonary function.

There are very few research works focusing on the intra-operative & post-operative factors of risk accountable for the establishment of the pulmonary complications among patients who were undergoing cardiac surgery with the utilization of cardiopulmonary bypass. In this current research work, we aimed to determine the rate of occurrence of Post-Operative Pulmonary Complications and inter-operative risk factors linked with these complications in the patients who were undergoing cardiac surgery utilizing the cardiopulmonary bypass.

**METHODOLOGY:**

This was an observational research study conducted in Cardiology Department of Allied / DHQ Hospital Faisalabad. A sum of total 517 patients who were undergoing the cardiac surgery utilizing the CPB (Cardiopulmonary Bypass) from March 2017 to November 2018, were the part of this research work. All the patients undergoing CABG (Coronary Artery bypass Grafting) and valvular surgeries were the part of this research work. All the patients who were undergoing congenital cardiac methods were not the part of this research work. We used the standard procedure of surgery in all the patients. Median skin incision carried out for all the procedures. We used the standard cardiopulmonary apparatus for bypass for all the patients for incorporation of membrane oxygenator & filters of arterial line. We carried out the Venus cannulation through the atrium of right side utilizing either 2 single-venous cannulas or a 2-

stage single-venous cannula. Then arterial cannulation carried out through the rising aorta utilizing either angles tip or smooth tip cannula for aortic perfusion.

We used the lactated ringer to prime circuit of CPB. After the establishment of the CPB, we lowered the temperature from 30 to 28 degree centigrade for maintaining hypothermia in the duration of surgery. We used the cold blood cardioplegia for arresting & protection the heart of patients facing CABG. We shifted all the patients to ICU in very stable condition. Pulmonologist recorded the information about the Post-Operative Pulmonary Complications. We considered the failure of respiratory system if the duration of the ventilation was greater than 2 days or if there was requirement of re-intubation in patients. The availability of fever confirmed the pneumonia. The death after the surgery or within one month after surgical intervention was the operative mortality. SPSS V.23 was in use for the statistical analysis of the collected information. Chi-square method was in use for the determination of the impact of the Post-Operative Pulmonary Complications on the operative rate of mortality and for the comparison of the rate of occurrence of Post-Operative Pulmonary Complications among the patients of CABG. Analysis of logistic regression was in use for the determination of the correlation of pre-surgical & intra-surgery variables on the occurrence of these complications after the surgical intervention.

**RESULTS:**

Total 517 patients were the part of this research work. The average age of the included patients was  $49 \pm 15.36$  years. There were 23.40% (n: 121) female patients in this research work. Out of total five hundred and seventeen patients, 67.50% (n: 349) patients underwent CABG, 1% (n: 5) patients underwent CABG plus replacement of aortic valve and 31.50% (n: 163) patients had the valvular surgeries. We found the occurrence of Post-Operative Pulmonary Complications in 6.20% (n: 32) patients. The very frequent Post-Operative Pulmonary Complications was atelectasis which was present in 3.86% (n: 20) patients, followed by respiratory failure present in 1.54% (n: 8) patients, pneumonia was present in 0.58% (n: 3) & ARDS in 0.19% (n: 1) patients (Table-1). We found no important disparity in the occurrence of the pulmonary complications among the patients who experienced CABG or the valvular surgeries.

**Table-I: Type Of Operations And Incidence Of Post-Operative Pulmonary Complications**

Types of Procedures		Value	
		No	Percent
CABG		349.0	67.50
CABG plus Aortic valve replacement		5.0	1.00
Valvular Operations	Mitral Valve Replacement (%)	105.0	20.30
	Aortic Valve Replacement (%)	40.0	7.70
	Aortic plus Mitral Valve Replacement (%)	18.0	3.50
Total Valvular Operations		163.0	31.50
Post-operative Pulmonary Complications	Pneumonia	3.0	0.58
	Respiratory Failure	8.0	1.54
	Acute respiratory distress syndrome	1.0	0.19
	Atelectasis	20.0	3.86
Total Post-operative Pulmonary Complications		32.0	6.20

There was an important disparity in the rate of operative mortality among patients who established Post-Operative Pulmonary Complications in comparison to the patients in whom there was not any prevalence of the any type of such complication or abnormality. The rate of operative mortality was 1.54% (n: 8), and out of these total eight patients, .580% (n: 3) patients were present with Post-Operative Pulmonary Complications after the surgical intervention and remaining 1% (n: 5) were the patients with no presence of Post-Operative

Pulmonary Complications. Among total three mortalities in the patients of Post-Operative Pulmonary Complications, one patient developed the ARDS and two remaining patients underwent respiratory failure. In this current research work, the most important risk factors for the occurrence of Post-Operative Pulmonary Complications were elder age equal or greater than sixty years, prolonged CBP duration, pre-operative pulmonary HTN and intra-operative injury of phrenic nerve (Table-3).

**Table-II: Association Of Pulmonary Complications With Operative Mortality**

Operative Mortality	Pulmonary Complications (Yes)		Pulmonary Complications (No)		P-value
	No	Percent	No	Percent	
Yes	3.0	9.40	5.0	1.00	0.0100
No	29.0	90.60	480.0	99.00	

**Table-III: Multivariate Analysis Of Risk Factors Of Post-Operative Pulmonary Complications**

Risk factors	OR	(95% CI)	p-value
Age > 60 years	4.16	1.990 - 8.670	<0.0010
Pre-op Pulmonary hypertension	2.60	1.180 - 5.730	0.0140
CPB time > 120 minutes	3.62	1.460 - 8.970	0.0030
Phrenic nerve injury	7.06	1.730 - 28.740	0.0020

### DISCUSSION:

The pulmonary complications are not much common after CPB but it can be fatal in some serious patients. The range of the Post-Operative Pulmonary Complications can be from 3.0% to 16.0% after grafting and from 5.0% to 7.0% after valvular surgery of heart surgery. The rate of prevalence of Post-Operative Pulmonary Complications in this

current research was much comparable with the findings of other case works of international level. In current work, atelectasis was present in 3.86% (n: 20) patients. Al-Qubati stated an occurrence rate of post-operative atelectasis in only 1.11% patients. Some other research works stated 14.10% to 70.0% prevalence of the post-surgical atelectasis after this cardiac surgery. The decrease in the prevalence rate

of the atelectasis in this research work was because of the practice of incentive spirometry before surgery in every patient and some positive approaches with utilization of the positive end expiration pressure (from 7 to 8 cmH<sub>2</sub>O) & CPAP at 5.0 cmH<sub>2</sub>O in the duration of ventilation after the compliance of surgery. In this research work, pneumonia after surgery was present in 0.580% patients. Concluded prevalence of pneumonia after surgical intervention is from 2% to 2.70%.

Some research works reported very occurrence of pneumonia after surgery from 15.0% to 20.0%. Various research works reported different risk factors for Post-Operative Pulmonary Complications as elder age, habit of cigarette smoking, COPD, diabetes mellitus, fatness, injury of lung, infection of external wounds and many others. One previous research work conducted in our institute in the year of 2014, the rate of occurrence of failure of respiration system was 4.76% & ARDS was 0.080 & pneumothorax was about 0.910%. In this current research work, there was no occurrence of the pneumothorax. With the comparison of the previous works with this current study, we reached at the point that prevalence of Post-Operative Pulmonary Complications is very rare in our hospital and these complications are decreasing with the passage of time.

### CONCLUSION:

Occurrence of Post-Operative Pulmonary Complications in this research work was 6.20%. The most important risk factors were elder age, long durations of CPB, pre-operative HTN, and intra-operative injury of phrenic nerve injury for Post-Operative Pulmonary Complications after the surgical intervention.

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