

# Association of Pre-Operative and Intra Operative Parameters with Post-Operative Mechanical Ventilation in Cases Undergoing Elective Abdominal Surgeries

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## Abstract

**Introduction:** The surgical outcome is always influenced by postoperative respiratory complications. In few cases post-operative mechanical ventilation is needed while undergoing surgeries with general anaesthesia. There are many postoperative and intraoperative parameters responsible for this. This study was designed to assess the association of pre and intra operative parameters with post-operative mechanical ventilation in cases subjected to elective abdominal surgery. **Materials and methods:** A total 100 cases scheduled to undergo elective major or minor abdominal surgeries between age group 21-70 years were recruited. Cases were administered with general anaesthesia and cases were scheduled for extubation at the end of surgery, but complicated cases were shifted to ICU for post-operative mechanical ventilator support. Peak expiratory flow rates were measured in those extubated within 24 hrs after surgery. **Results:** Low albumin levels, alcohol consumption, preoperative hospital stay, preoperative respiratory tract infection, COPD, bronchial asthma, obstructive sleep apnea, Sputum production, smoking were not statistically significant and pre-operative hospitalization time, Smoking, >10% weight loss, Hypertension, ischemic heart diseases, cerebrovascular complication were significantly correlating with postoperative mechanical ventilation. **Conclusion:** Significant parameters such as <10% weight loss, pre-operative hospitalization and smoking found to be significant parameters of requirement of post-operative mechanical ventilation by multiple logistic regressions.

**Keywords:** Post-operative mechanical ventilation, Weight loss, Duration of hospital stay, Peak expiratory flow rate (PEFR).

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## INTRODUCTION

Postoperative respiratory complications influencing surgical outcome in 5%-10% cases undergoing various surgeries, especially 9%-40% in cases subjected to abdominal surgeries [1]. Complications like postoperative respiratory failure, acute respiratory distress syndrome, post-operative aspiration pneumonia and atelectasis usually associated and in severe cases may lead to death [2-4]. Cases with history of pre-operative pulmonary complications, neurological disorders, unstable levels of consciousness and gastro esophageal complications are potent for intra operative and postoperative pulmonary complications [5].

Mechanical ventilation with involving of high tidal volumes is a traditional way to prevent post-operative pulmonary complications in cases under general anaesthesia [6]. Whereas, studies suggested that mechanical ventilation along with high tidal volumes lead to alveolar overstretching which causes ventilator

associated pulmonary injury and extra pulmonary organ dysfunction [7].

This study was designed to assess the association of pre and intra operative parameters with post-operative mechanical ventilation in cases subjected to elective abdominal surgery.

## MATERIALS AND METHODS

The present prospective study was conducted in Department of Anesthesiology, MNR Medical College and Hospital, Sangareddy and Maheshwara Medical College, Patancheru during April 2017 to June 2018. A total 100 cases scheduled to undergo elective major or minor abdominal surgeries between age group 21-70 years were recruited. Cases with severe preoperative respiratory complication and infections were excluded.

Informed consent was obtained from all the cases and study protocol was approved by institutional

ethics committee. A detailed clinical history including history of respiratory complications, bronchial asthma, cardiovascular and cerebrovascular complications, COPD, details of smoking and details of weight loss (>10% in last 6months) were collected. All the cases were undergone to complete haemogram.

Cases were administered with general anesthesia containing nitrous oxide, oxygen, volatile agents, opioids, and neuromuscular blocking agents. All the cases were scheduled for extubation at the end of surgery, but complicated cases were shifted to ICU for post-operative mechanical ventilator support. Intravenously, Fentanyl was administered as

postoperative analgesia. Peak expiratory flow rates were measured in those extubated within 24 hrs after surgery. Data was collected from the cases and data analysis was done by using SPSS statistical software. Spearman Correlation analysis was done to check correlation between pre and intra operative parameters with post-operative mechanical ventilation.

## RESULTS

A total 100 cases scheduled to undergo elective major or minor abdominal surgeries between age group 21-70 years with mean age of 45.38 years (Table-1).

**Table-1: Details of demographic variables of participants**

Variables	Mean $\pm$ SD
Age (In years)	45.38 $\pm$ 10.94
Sex (n=100)	Male 69 (69%)
	Female 31 (31%)
Body weight (In Kgs)	55.24 $\pm$ 9.51
BMI	23.7 $\pm$ 4.88
Height (In cm)	158.3 $\pm$ 3.36
BSA (Kg/m <sup>2</sup> )	23.9 $\pm$ 5.03

**Table-2: Details of Clinical, respiratory and surgical status of post-operative ventilated and not ventilated cases**

Variables		Protective post-operative ventilation		No post-operative ventilation	
		Number	Percentage	Number	Percentage
Sex (n=100)	Male (n=69)	21	30.4%	48	69.5%
	Female (n=31)	08	25.8%	23	74.1%
Under Alcohol (n=39)		18	46.1%	21	53.9%
Cardio vascular & neurological status					
Ischemic heart diseases (n=11)		01	9.09%	10	90.9%
Hypertension (n=29)		13	44.8%	16	55.17%
Cerebrovascular accident (n=4)		03	75%	01	25%
Clinical and laboratory status					
Low albumin levels (n=27)		15	55.6%	12	44.4%
Obesity (n=12)		08	66.7%	04	33.3%
>10% Weight loss (n=21)		13	61.9%	08	38.1%
ASA score (n=93)		38	40.9%	55	59.1%
Respiratory status					
Smoking (n=67)		27	40.3%	40	59.7%
RTI (n=08)		05	62.5%	03	37.5%
COPD (n=03)		01	33.3%	02	66.7%
Bronchial Asthma (03)		01	33.3%	02	66.7%
Obstructive sleep apnea (n=31)		12	38.7%	19	61.3%
Sputum production (51)		30	58.8%	21	41.1%
Intra operative parameters					
Upper abdominal incision		18	40.9%	26	59.1%
Lower abdominal incision		11	55%	09	45%
Open surgery		34	49.27%	35	50.72%
General Anesthesia		11	28.2%	28	71.8%
Blood component transfusion		32	69.5%	14	30.46%

**Table-3: Details of Pco2, Po2, PEFR and time of hospitalization in the study participants**

Parameters		Mean $\pm$ SD
Peak expiratory flow rate (PEFR)	Pre-operative	351.5 $\pm$ 54.7
	Post-operative	245.2 $\pm$ 43.5
Pco2	Pre-operative	42.04 $\pm$ 4.83
	Post-operative	34.2 $\pm$ 4.01
Po2	Pre-operative	90.65 $\pm$ 8.95
	Post-operative	78.32 $\pm$ 10.46
Duration of Hospitalization		4.35 $\pm$ 0.98

## DISCUSSION

Mechanical ventilation and general anesthesia are need in cases subjected to minor or major surgeries [8]. The surgical outcome is always influenced by postoperative respiratory complications [9]. Management of postoperative pulmonary complications is a major task for anesthetist. Studies suggested that over 20-30% cases undergoing to various surgeries with general anesthesia have high probable risk for postsurgical respiratory complications [10-12]. This study was aimed to evaluate factors influencing pre and post-operative mechanical ventilation in cases subjected to selected abdominal surgeries. A total 100 cases scheduled to undergo elective major or minor abdominal surgeries between age group 21-70 years with mean age of 45.38 years (Table-1).

In this study, low albumin levels, alcohol consumption, preoperative hospital stay, preoperative respiratory tract infection, COPD, bronchial asthma, obstructive sleep apnea, Sputum production, smoking did not found to be significantly correlating with the need for postoperative mechanical ventilation. Pre-operative hospitalization time, Smoking, >10% weight loss, Hypertension, ischemic heart diseases, cerebrovascular complication were significantly correlating with postoperative mechanical ventilation. Intra operative variable like upper abdominal incision, lower abdominal incision, Open surgery, General Anesthesia and blood component transfusion were statistically significant ( $p < 0.005$ ). >10% weight loss, pre-operative hospitalization and smoking found to be significant parameters of requirement of post-operative mechanical ventilation by multiple logistic regressions.

Study by Hall *et al.*, Found Preoperative duration of hospitalization was significantly correlated with the risk of pneumonia postoperatively [13]. various studies suggested that >60 years age, low albumin levels, history of COPD and smoking were key risk factors for post-operative respiratory complications [14]. Jones and Eaton *et al.*, in their surgical study related to digestive tract found low serum albumin and serum protein, which they attributed to preoperative and postoperative under nutrition. Surgery duration more than 3 hours is an important risk factor for post-operative pulmonary complications because prolonged surgical procedure need post-operative ventilator support. Study by Chumillas *et al.*, noted preoperative and postoperative pulmonary checkup is helpful for the

management of post-operative pulmonary complications in moderate and high-risk cases subjected to upper abdominal surgery [15].

## CONCLUSION

Parameters such as >10% weight loss, pre-operative hospitalization and smoking found to be significant parameters of requirement of post-operative mechanical ventilation by multiple logistic regressions. Further studies are required to evaluate the same with more sample size and in cases requiring prolonged ventilator support.

## REFERENCES

1. Wong, D. H., Weber, E. C., Schell, M. J., Wong, A. B., Anderson, C. T., & Barker, S. J. (1995). Factors associated with postoperative pulmonary complications in patients with severe chronic obstructive pulmonary disease. *Anesthesia & Analgesia*, 80(2), 276-284.
2. Brooks-Brunn, J. A. (1997). Predictors of postoperative pulmonary complications following abdominal surgery. *Chest*, 111(3), 564-571.
3. McCulloch, T. M., Jensen, N. F., Girod, D. A., Tsue, T. T., & Weymuller, E. A. (1997). Risk factors for pulmonary complications in the postoperative head and neck surgery patient. *Head & neck*, 19(5), 372-377.
4. Money, S. R., Rice, K., Crockett, D., Becker, M., Abdoh, A., Wisselink, W., ... & Hollier, L. (1994). Risk of respiratory failure after repair of thoracoabdominal aortic aneurysms. *The American journal of surgery*, 168(2), 152-155.
5. Kanat, F., Golcuk, A., Teke, T., & Golcuk, M. (2007). Risk factors for postoperative pulmonary complications in upper abdominal surgery. *ANZ journal of surgery*, 77(3), 135-141.
6. Neto, A. S., Cardoso, S. O., Manetta, J. A., Pereira, V. G. M., Espósito, D. C., Pasqualucci, M. D. O. P., ... & Schultz, M. J. (2012). Association between use of lung-protective ventilation with lower tidal volumes and clinical outcomes among patients without acute respiratory distress syndrome: a meta-analysis. *Jama*, 308(16), 1651-1659.
7. Lellouche, F., Dionne, S., Simard, S., Bussières, J., & Dagenais, F. (2012). High tidal volumes in mechanically ventilated patients increase organ dysfunction after cardiac surgery. *Anesthesiology*:

*The Journal of the American Society of Anesthesiologists*, 116(5), 1072-1082.

8. Weiser, T. G., Regenbogen, S. E., Thompson, K. D., Haynes, A. B., Lipsitz, S. R., Berry, W. R., & Gawande, A. A. (2008). An estimation of the global volume of surgery: a modelling strategy based on available data. *The Lancet*, 372(9633), 139-144.
9. Khuri, S. F., Henderson, W. G., DePalma, R. G., Mosca, C., Healey, N. A., & Kumbhani, D. J. (2005). Determinants of long-term survival after major surgery and the adverse effect of postoperative complications. *Annals of surgery*, 242(3), 326.
10. Shander, A., Fleisher, L. A., Barie, P. S., Bigatello, L. M., Sladen, R. N., & Watson, C. B. (2011). Clinical and economic burden of postoperative pulmonary complications: patient safety summit on definition, risk-reducing interventions, and preventive strategies. *Critical care medicine*, 39(9), 2163-2172.
11. Arozullah, A. M., Daley, J., Henderson, W. G., Khuri, S. F., & National Veterans Administration Surgical Quality Improvement Program. (2000). Multifactorial risk index for predicting postoperative respiratory failure in men after major noncardiac surgery. *Annals of surgery*, 232(2), 242-253.
12. Arozullah, A. M., Khuri, S. F., Henderson, W. G., & Daley, J. (2001). Development and validation of a multifactorial risk index for predicting postoperative pneumonia after major noncardiac surgery. *Annals of internal medicine*, 135(10), 847-857.
13. Hall, J. C., Tarala, R. A., Hall, J. L., & Mander, J. (1991). A multivariate analysis of the risk of pulmonary complications after laparotomy. *Chest*, 99(4), 923-927.
14. Arozullah, A. M., Daley, J., Henderson, W. G., Khuri, S. F., & National Veterans Administration Surgical Quality Improvement Program. (2000). Multifactorial risk index for predicting postoperative respiratory failure in men after major noncardiac surgery. *Annals of surgery*, 232(2), 242-253.
15. Chumillas, S., Ponce, J., Delgado, F., Viciano, V., & Mateu, M. (1998). Prevention of postoperative pulmonary complications through respiratory rehabilitation: a controlled clinical study. *Archives of physical medicine and rehabilitation*, 79(1), 5-9.