Original Article

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OUTCOMES OF PATIENTS ON VENTILATORY SUPPORT IN CORONARY CARE UNIT; A STUDY AT AFIC

Abdul Hameed Siddiqui, Muhammad Qaiser Khan, Safder Abbas, Shahab Naqvi, Sohail Aziz, Syed Shahram*

Armed Forces Institute of Cardiology and National Institute of Heart diseases Rawalpindi, *Military Hospital Rawalpindi

ABSTRACT

Objective: To determine the outcome of patients and determine prognostic factors associated with death in patients on mechanical ventilation in coronary care unit.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: Study was conducted at AFIC / NIHD Rawalpindi from Jan 2012 to Dec 2012.

Materials and Methods: A total of 104 consecutive patients who underwent endotracheal intubation and mechanical ventilation admitted to coronary care unit of AFIC-NIHD form January 2012 to December 2012.

Results: The following criteria were higher for non survivors: Acute physiology and Chronic Health Evaluation (APACHI) II score 15 ± 4.8 vs 10 ± 5 (p < .0001), lower arterial PH7.25 ± .08 vs 7.33 ± .09 (p <.0001), Aapo2 313 ± 45 vs 291 ± 37 (p .038), MAP 45 ± 7.5 vs 58 ± 9.7 (p < .0001). Non-survivors also had higher serum creatinine and lower urine output, and left ventricular ejection. Mortality rates were higher in patients with PaO2 / FiO_2 <200 than in patients with PaO_2 / FiO_2>200 at admission. By multivariate analysis using linear regression, only three factors were independently associated with death: APACHI II >15 (95% confidence interval 0.747-1.071), Mean arterial pressure < 45 mmHg (95% confidence interval 1.058-1.308) and lower arterial PH < 7.25 (95% confidence interval .209-.480).

Conclusion: Higher mortality in coronary care unit in patients on ventilatory support is multi-factorial in origin but a few parameters like mean arterial pressure, APACHI score and arterial PH are better predictors of adverse outcome and may reflect the severity of underlying ischemic heart disease. Particular attention towards adverse outcome predictors, reduction of coronary ischaemia, co-morbids, and control of infection and use of standardized weaning protocol may improve dismal outcome of these patients.

Keywords: Coronary care, Mechanical ventilation, Outcomes.

INTRODUCTION

Mechanical ventilation is a widely used procedure in intensive coronary care units. Recent studies show that almost one third to one half of patients admitted to these units require mechanical ventilation (MV) at some point during hospitalization. Currently most patients undergoing mechanical ventilation can be quickly removed provided the condition responsible for establishing the ventilation has been treated and / or stabilized. The unnecessary prolongation of this process can result in increased hospital costs and complications associated with it[1-3].

It is well established that 5 to 30% of patients undergoing ventilation are difficult to wean mainly because of underlying severe coronary artery disease complicated by myocardial infarction, previous pulmonary diseases, prolonged mechanical ventilation times, multiple organ dysfunctions and debilitating neurological diseases. The effects of MV in patients with ischemic heart disease are complex and depend upon a number of variables especially the patient's volume status, the role of right and left ventricles, after loads, lung functional status and chest and abdominal compliance. These patients require special precautions for ventilatory, nutritional, haemodynamic and inotropic support. Many of these patients have ventricular dysfunction, pulmonary congestion, haemodynamic instability, myocardial ischemia or use of vasoactive drugs all of which can contribute to the weaning failure and prolonged dependence on mechanical ventilator[3,4].

Correspondence: Dr Abdul Hameed Siddiqui, Consultant Cardiologist, AFIC / NIHD Rawalpindi
Email: drahsahs@gmail.com

MATERIALS AND METHODS

From January to December 2012, one hundred and four (104) patients admitted to CCU and on mechanical ventilation for more

than 8 hours were consecutively included in the study. Sixty one were males (58.7%) and 43 females (41.3%) with mean age of 59.8 ± 14.5 year. Inclusion criteria in the study were patients admitted to the CCU on mechanical ventilation (MV), all ages, both genders and patients who were able to undergo spontaneous ventilation before weaning. Informed consent was taken from patient's family. Clinical and demographic data of the patients were collected from documents, previous diseases, admission diagnosis, date and reason for intubation and ventilatory parameters at the beginning of the weaning. The study objective was to analyze and examine different factors associated with death or otherwise of patients on mechanical ventilation. Categorical data are presented in absolute numbers and percentages and continuous variables in mean ± standard deviations. Multi-variate analysis was done using linear regression and different parameters were studied for survivors and non survivors. P values <0.5 were considered statistically significant (two-tailed). Soft ware used for statistical analysis was statistical package for social sciences version 20.

Table 1: Base line characteristics of patients on mechanical ventilation

Mean Age	**59.87 ± 14.5 years**
Gender Male Female	 61 (58.7%) 43 (41.3%)
Ventilation time (mean ± SD)	84.91 ± 65
Diabetes mellitus	37 (35.6%)
Ejection fraction 0.40 or less	56 (53.8%)
Ejection fraction >0.40	48 (46.2%)
Acute myocardial infarction	31 (29.8%)
Cardiogenic shock	6 (5.8%)
Dilated cardiomyopathy	11 (10.6%)
Arrythmias-atrial & ventricular	12 (11.6%)
Severe sepsis and respiratory tract infection	6 (5,8%)
Previous valve surgery	3 (2.9%)
Atrial septal defect with pulmonary hypertension	2 (1.9%)
Obstructive sleep apnoea	1 (0.96%)
Diabetic ketoacidosis	1 (0.96%)

RESULTS

Clinical characteristics at admission of survivors and non survivors were similar regarding demographics, medical history and Glasgow coma scale. Mean age was 59.8 ± 14.5 years. Sixty one were males (58.7%) and forty three females (41.3%). Thirty seven (35.6%) were diabetics and sixty three (60.6%) non-diabetics.

Main reason for ventilation in majority of cases was pulmonary edema of cardiac origin. Mortality was higher with longer ventilation stay in general. The following criteria were higher for non survivors: Acute physiology and Chronic Health Evaluation (APACHI) II score 15 ± 4.8 vs 10 ± 5 (p < .ooo1), lower arterial PH 7.33 ± .09 vs 7.25 ± .08 (p <.0001), Aapo2 313 ± 45 vs 291 ± 37 (p .038), MAP 45 ± 7.5 vs 58 ± 9.7 (p <.0001). Non-survivors also had higher serum creatinine and lower urine output, higher incidence of cardiogenic shock and failing organs and. Fifty three patients (51%) had ejection fraction between 10 to 30%, 20 (19.2%) between 31 to 40% and 31 between 41 to 60% (29.8%). Six patients (5.8%) had anterior myocardial infarction complicated by cardiogenic shock. Two patients (1.9%) had atrial septal defect with pulmonary hypertension.one patient had obstructive sleep apnoea and another had untreated severe pulmonary stenosis. Three patients (2.9%) had previous prosthetic valve surgery. Eleven (10.6%) patients were known case of dilated cardiomyopathy and required ventilation because of decompensation and severe sepsis and lower respiratory tract infection in the background of ischaemic heart disease was the cause in six (5.8%) patients.

Recurrent ventricular tachycardia, atrial fibrillation with fast ventricular rate and paroxysmal supraventricular tachycardia were precipitating factors in twelve (11.6%) patients. One patient was found to have diabetic ketoacidosis. All the relevant data has been summarized in table 1Mortality rates was

higher in patients with PaO_2/FiO_2 < 200 than in patients with PaO_2/FiO_2 >200 at admission. By multivariate analysis using linear regression, only three factors were independently associated with death: APACHI II >15 (95% confidence interval0 .747-1.071), Mean arterial pressure < 45 mmHg (95% confidence interval 1.058-1.308) and lower arterial PH <7.25 (95% confidence interval 0.209 - 0.480).

DISCUSSION

The study shows that most of the patients who need intubation and ventilation in coronary care setting have underlying left ventricular dysfunction, almost more than 2/3 (70.2%) of patients had ejection fraction 40% or less in our study. These patient sare difficult to wean and extubate and outcome is unfortunately fatal as was the case in present study with mortality of 70%. A number of factors are responsible for the high mortality seen in ventilated patients in CCU. The presence of cardiomyopathy with reduced ejection fraction as a marker may be responsible for weaning failure and prolong dependence on ventilator. These patients develop vasoactive drug addiction and have higher risk of haemodynamic instability or acute myocardial ischaemia. In our study high APACHI score, lower mean arterial pressure and lower Ph were significantly associated with high mortality in ventilated patients and correlation was statistically significant. There were other factors like raised serum creatinine, ejection fraction (EF), multi-organ dysfunction which contributed to high mortality of these patients but the correlation was not statistically significant using linear regression analysis. Almost 56(53.8%) patients had ejection fraction 40% or less but association with mortality was not statistically significant. This was somewhat contrary to similar other studies in which patients with lower EF had higher mortality while on ventilator support[4]. No specific protocol was used for weaning except for spontaneous breathing test (SBT) as is the recommendation in guidelines internationally. However several studies have shown that use of standardized protocol for weaning has made time of extubation more accurate resulting in reduction in the risk of re-intubation, considered an independent predictor of mortality and unnecessary prolongation of the duration of the weaning process[4-6]. In a similar study by Raquel et al, the overall mortality was 21.2% in the group in which standardized protocol was used for weaning[6]. The higher mortality in our cohort might be related to heterogeneity of patients and other factors previously mentioned.

CONCLUSION

Higher mortality in coronary care unit in patients on ventilatory support is multi-factorial in origin but a few parameters like mean arterial pressure, APACHI score and arterial PH are better predictors of adverse outcome and may reflect the severity of underlying ischemic heart disease.

Particular attention towards adverse outcome predictors, reduction of coronary ischaemia, co-morbids, and control of infection and use of standardized weaning protocol may improve dismal outcome of these patients.

Conflict of Interest

This study has no conflict of interest to declare by any author.

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