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A CLINICAL STUDY OF PATIENTS ON INVASIVE MECHANICAL VENTILATION IN MEDICAL INTENSIVE CARE UNIT OF TERTIARY CARE CENTRE

General Medicine

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ABSTRACT

Background: Despite advances in the management of acute respiratory failure with mechanical ventilation, mortality has not decreased significantly and the cost still remains high. Knowledge of the epidemiology of patients requiring mechanical ventilation, including mortality rates and mortality risk factors, may help to improve therapeutic strategies, as might counselling of patients or their relatives.

Material and method: A cross-sectional observational study was conducted for duration of 2 years to asses' clinical profile of patients on invasive Mechanical ventilation in medical Intensive Care Unit of tertiary care centre. A proforma was designed to collect the desired information from the patients. The preformed structured proforma consisted of recording of investigations was used as data collection tool.

Results: Majority of patients belonged to the age group of 56-65 years with male predominance. M:F -1.7:1. Majority of patients in the present study required mechanical ventilation due to complicated pneumonia (35) followed by ARDS (28) and cardiogenic pulmonary oedema (11). VAP was the most common complication (26%) seen in the present study.

KEYWORDS

Clinical profile, ICU, Mechanical ventilation

INTRODUCTION:

Mechanical ventilation is a method of artificial ventilation where mechanical means is used to assist or replace spontaneous breathing. The primary indication for initiation of mechanical ventilation is basically hypoxemic and or hyperbaric respiratory failure. The primary objective of mechanical ventilation is to decrease the work of breathing, thus avoiding respiratory muscle fatigue, and to reverse life-threatening hypoxemia and progressive respiratory acidosis. [1]

In patients with acute respiratory failure mechanical ventilation is the cornerstone of management.[2,3] Patients admitted to ICUs who need mechanical ventilation are expected to have higher mortality rates compared with those who do not require respiratory support.[4]

Despite advances in the management of acute respiratory failure with mechanical ventilation, mortality has not decreased significantly and the cost still remains high.[5-10]Knowledge of the epidemiology of patients requiring mechanical ventilation, including mortality rates and mortality risk factors, may help to improve therapeutic strategies, as might counselling of patients or their relatives.[13] Esteban et al.found that mortality depends on (i) factors present at the start of mechanical ventilation, (ii) factors developed during the course of mechanical ventilation, and (iii) factors related to patients' management.[11]

Although a number of studies [12, 13] have been conducted in different parts of the globe to assess the characteristics and the mortality risk, lacunae exists in the knowledge regarding the epidemiological profile of patients with acute respiratory failure requiring mechanical ventilation in India, especially in Pune. An enhancement in the existing review of literature is required to improve the understanding of patients who require mechanical ventilation in developing countries like India in which there is limited resource allocation.

Thus the present study was aimed to study different characteristics in patients on invasive mechanical ventilation in Medical ICU.

MATERIALAND METHODS:

A descriptive cross-sectional study was conducted for duration of two years (October 2016 to September 2018) to study the patients on invasive mechanical ventilation in medical ICU. The study was conducted in the department of medicine of Dr. D.Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune and is a numeration of patients of the department fulfilling the inclusion criteria. A total of 100 Patients on invasive mechanical ventilation for 2 or more than 2 hours and above age of 12 were included as study subjects.

Ethical clearance was obtained from Institutional Review Board of institute. Written informed consent for participation was obtained from the relatives of the patients prior to conduction of study. The relatives of the patients were informed regarding the purpose, procedures, risks and benefits of the study in their own vernacular language.

A proforma was designed to collect the desired information from the patients**.** After recording of the demographic details and other variables such as duration of mechanical ventilation, any other pre-existing condition, and duration of stay, diagnosis and history an extensive general and systemic examination was also done and recorded. The structured proforma also consisted of recording of investigations such as haemoglobin, TLC, DLC (P/L/E/M), platelets, urea, creatinine, total billirubin, directbillirubin, SGOT / SGPT, alkaline phosphatase, serum electrolytes, uric acid,serum protein, random blood sugar levels, chest x-xays, ABG, blood cultures, urine cultures, endotracheal tube tip cultures.

DATAANALYSIS:

Collected data using proforma was entered in Microsoft Excel and subjected to statistical analysis using Statistical Package for Social Sciences (SPSS, IBM version 20.0). The level of significance was fixed at 5% and $p \leq 0.05$ was considered statistically significant. Descriptive statistics was used to find the frequencies, mean and standard deviation of variables considered in the study.

RESULTS:

Majority of patients belonged to the age group of 56-65 years with male predominance. M:F -1.7:1. Majority of patients in the present study required mechanical ventilation due to complicated pneumonia (35) followed by ARDS (28) and cardiogenic pulmonary oedema (11). GBS was found to be a high indication in males and cardiogenic pulmonary edema in females for mechanical ventilation. Range for ventilatory support was1-66days. CMV +PEEP was found to be the most frequently used initial mode in 76% patients. VAP was the most common complication (26%) seen in the present study with barotraumas being the least (2%). In the present study mortality was 67 % even after ventilatory support. Mortality in males was 71.4 % and 62.1% in females. 100% mortality was reported in GBS. A comparative evaluation revealed difference in Sofa Scores on Day 1 and Day3 with significantly higher scores on day 1 when compares to day 3.

DISCUSSION:

In this study 100 patients aged 12 years and above were admitted to medical intensive care unit of tertiary care centre, requiring mechanical ventilation for various indications. Critical status of these patients was assessed using SOFA score at admission and after 48 hours. Age, sex, disease distribution, progress and outcome were studied along with complications in various aspects. Association between gender and mortality was also sought.

In the present study a wide range of age distribution was observed. The patients in the present study ranged from age above 12 years to more than 65 years. In line with the results of the present study Tomicic V et al.,[14] also observed a wide age distribution in patients receiving mechanical ventilation.In the present study mean age was found to be 48.27±20.32 years, the study conducted by study by Estaban et al.,[15] found the mean age of 59.2 years in their study.

In the present study maximum mortality was in the age group ≥66 years. Ian Lawrence Cohen et al.,[16] in a study, concluded that age had an important effect on outcome from mechanical ventilation. Other factors, such as ICU duration and diagnosis, also influence outcome, and age should not be used as a sole criterion in evaluating the potential benefit of mechanical ventilation to an individual patient. Another study by Lakshimipathi Chelluri et al.,[17] in a study concluded that older age, in addition to functional status and co morbidities, was associated with increased mortality at 2 months. In another study E Y Tang et al.,[18] concluded that severity of acute illness and chronic co-morbidities, but not age, are predictors of MICU and hospital mortality in elderly ventilated patients.

In the present study, 35% cases required mechanical ventilation due to complicated pneumonias, predominantly aspiration pneumonitis secondary to various co-morbid conditions such as stroke, generalized tonic clonic convulsion, metabolic encephalopathy etc. Another 28% cases were put on ventilator due to ARDS/ALI that resulted because of various cases that included, community acquired pneumonia, sepsis ,chronic renal failure, post cardiac arrest, hepato-renal syndrome, pulmonary thromboembolism, motor neuron disease, Duchenne muscular dystrophy, snakebite, myasthenia gravis, complicated malaria, alcohol liver disease, and dengue shock syndrome.11% cases were ventilated due to cardiogenic pulmonary edema. 9% cases were ventilated due to organophosphate poisoning. Acute exacerbation of COPD accounted for 8% cases while acute exacerbation of Asthma accounted 5% cases, 4% cases were ventilated due to GBS. Similar indications were observed in their study by Martin J. Tobbin.[19] and Prashant Prakash et al.,[20]

In the present study the mortality among males was found to be 71.4 % and 62.1% in females. In contrast with the results of the present study Martin H. Kollef et al[21] in a study concluded that in their patient cohort, women requiring mechanical ventilation were at greater risk for hospital mortality than men. Epstein et al.,[22] in a study concluded that there is no difference in hospital mortality rates between mechanically ventilated men and women.

In the present study mortality was high in cases of complicated pneumonia and ARDS/ALI. Mortality was acceptable in cases of acute exacerbation of asthma and cardiogenic pulmonary edema In a study done by Estaban et al.,[15] the mortality was 52 % in patients who received ventilation because of acute respiratory syndrome and 22% in patients who received ventilation for an exacerbation of chronic obstructive pulmonary disease.

In the present study 49% patients had a complicated course and 51% had uncomplicated course. VAP was the most common complication encountered which was developed in 26% of the patients. Airway access complication was seen in 16% patients. Cardiovascular complication mainly as hypotension was found in 10% patients. GI bleed was seen in 7% patients. Barotauma was seen in 2% patients.
Similar observations were made by Prashant Prakash et al.,[20] who reported that out of the 100 patients, course was complicated in 55 patients.

Tables:

Table 1: Baseline characteristics of study subjects

Age Range in years	Frequency	Percentage
15-25	17	17
26-35	10	10
36-45	8	8
46-55	9	9
56-65	29	29
> 66	27	27
Gender		
Male	63	63
Female	37	37
Indication for Ventilation		
Complicated pneumonia	35	35
ARDS/ALI due to various causes	28	28
Cardiogenic pulmonary edema	11	11
OPP	9	9
Acute exacerbation of COPD	8	8
Acute exacerbation of asthma	5	5
GBS	4	4

Table 2: Gender wise distribution of indication for mechanical ventilation

Disease	Male (%)	Female (%)
Complicated pneumonia(n=35)	22(62.8)	13(37.2)
ARDS/ALI due to various causes(n=28)	24(85.7)	4(14.3)
Cardiogenic pulmonary edema(n=11)	3(27.3)	8(72.7)
OPP(n=9)	4(44.5)	5(55.5)
Acute exacerbation of COPD(n=8)	5(62.5)	3(37.5)
Acute exacerbation of asthma(n=5)	2(40)	3(60)
GBS(n=4)	3(75)	1(25)

Table 3: Mortality in patients on mechanical ventilation

Diseases	No. of deaths	Percentage
Complicated pneumonia(n=35)	24	68.5
ARDS/ALI due to various causes(n=28)	18	64.2
Cardiogenic pulmonary edema(n=11)	6	54.54
OPP(n=9)	7	77.9
Acute exacerbation of COPD(n=8)	5	62.5
Acute exacerbation of asthma(n=5)	2	40
GBS(n=4)	4	100

ARDS/ALI-Acute respiratory distress syndrome/Acute lung injury, OPP-Organo phosphorus poisoning GBS- Gullian barre syndrome

Table 4: Complication of Mechanical Ventilation

Complication	Percentage
VAP	26
Airway access complication	16
Cardiovascular complication mainly hypotension	10
GI bleed	7
Barotrauma	2

VAP-Ventilated associated pneumonia

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