Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE04,2022

Original research article

Clinical profile of patients with ventilator associated pneumonia

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Abstract

Ventilator associated pneumonia (VAP) complicates the course of 8-28% of patients receiving mechanical ventilation. The present study was conducted with an aim to know the outcome of VAP and to identify pathogens, compare the bacteriological profile, duration of mechanical ventilation and length of hospitalization.

The current study was a prospective observational study, conducted in Department of General Medicine. Cases were taken from patients on mechanical ventilation admitted to MICU in Hospital. A Study population included 101 patients after meeting inclusion and exclusion criteria.Out of 101 patients who developed VAP. The incidence of VAP 15.04%. Majority of the patients were in age group between 31 to 40 years(20%), with predominantly male preponderance 65.3%. The occurrence of late VAP 64.40%was more common than early VAP 35.60%. Incidence is directly proportional to duration of mechanical ventilation and re-intubation is a strong risk factor for development of VAP. Simple and effective measure to prevent ventilator associated pneumonia should be employed in all ICU settings including staff education, hand hygiene, oral hygiene with chlorhexidine, nursing in semi recumbent position, promoting nasogastric feeds, performing closed suction of endotracheal tubes, minimising re-intubation and daily interruption of sedation.The incidence of patients who are being admitted to ICU and requiring mechanical ventilation is increasing. Knowledge of causative microbial flora in a local setting would be vitally important to ensure more effective utilization of antibiotics and thereby, a better outcome. It would also allow formulation of strategies to decrease the incidence of VAP. There is an urgent need for many more hospital based prospective studies in our country.

Keywords: Ventilator associated pneumonia, mechanical ventilation and clinical profile

Introduction

The care of critically ill patients in intensive care unit is a primary component of modern medicine. ICU create potential for recovery in patients who otherwise may not have survived. However, they are associated with problem of nosocomial infections[1].

Critical care units increasingly use high technology medicine for patient care, hemodynamic monitoring, ventilatory support, hemodialysis, parenteral nutrition and drugs particularly antibiotics to counteract infections. It is indeed a paradox that use of high-tech medicine has brought in its wake the dangerous and all too frequent complications of nosocomial infections[2].

Nosocomial pneumonia is defined as an infection of the lung parenchyma that was neither present nor incubating at the time of hospital admission. Health-care associated pneumonias (HCAP) and nosocomial pneumonias are the second leading cause of hospital- acquired infections and are increasing in proportion due to the increased use of assisted ventilation and prolonged care of critically ill patients. Nosocomial pneumonias occur in 0.5-2.0% of hospitalized patients[3].

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A diagnosis of Ventilator associated Pneumonia (VAP) is arrived at, using clinical criteria when a patient who has been mechanically ventilated for ≥48 hours develops a new or progressive infiltrate and the respiratory specimens are positive[4].

Ventilator associated pneumonia (VAP) complicates the course of 8-28% of patients receiving mechanical ventilation[1].VAP increases morbidity, period of ventilation and mortality, Despite the availability of newer antimicrobials the treatment of VAP has proved to be difficult[5, 6]. The clinical presentation and organism causing VAP are different in different in different set ups. Hence there is every need for early diagnosis and management of these patients to decrease morbidity and mortality.

Methodology

Study design

The study was prospective observational study.

Inclusion criteria

All the patients who are on mechanical ventilation for more than 48 hours irrespective of the cause.A total of 101 patients of both sexes, who were on mechanical ventilation for more than 48 hours were selected.

Clinical and diagnostic criteria were based on the Clinical Pulmonary Infection Score (CPIS). The CPIS originally proposed by Pugin and others helps in diagnosing VAP with a sensitivity of 72% and specificity of 80%. It includes

1. New or progressive infiltrates in chest radiography.
2. Atleast two of the following four.

a) Hypothermia or hyperthermia.
b) Presence of purulent secretions.
c) Leucocytosis or leukopenia.
d) Decreasing oxygen saturation.

Exclusion criteria

1. Patient already having pneumonia at the time of admission.
2. Patient who developed pneumonia in first 48 hours of mechanical ventilation.

Sample size: 101.

Sampling method

- All the eligible study subjects, satisfying inclusion and exclusion criteria were recruited into the study by convenient sampling.

Methods of collection of data

All adult Patients who develop VAP in critical care units as per definition in inclusion criteria's are investigated clinically, radiologically and bacteriologically to determine presence of pneumonia. Clinical and diagnostic criteria were based on the Clinical Pulmonary Infection Score (CPIS).

Patients who developed pneumonia within 48 hours or those who were admitted with pneumonia Age, sex, date of admission to ICU, date of initiating mechanical ventilation and mode of access to the patient airway were recorded. Indication of mechanical ventilation was noted.

Investigation conducted

- Total blood counts.
- RFT
- LFT
- ABG
- CHEST X-RAY
- Endotracheal aspirate culture and sensitivity

Results

Table 1: Type of VAP distribution among subjects

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Type of VAP	Count	%
Early VAP	36	35.6%
Late VAP	65	64.4%
Total	101	100.0%

In the study 35.6% had early VAP and 64.4% had late VAP.

Table 2: Age distribution comparison between two groups

Age	Type of VAP					
	Early VAP		Late VAP		Total	
	Count	%	Count	%	Count	%
<20 years	7	19.4%	9	13.8%	16	15.8%
21 to 30 years	4	11.1%	14	21.5%	18	17.8%
31 to 40 years	8	22.2%	13	20.0%	21	20.8%
41 to 50 years	3	8.3%	6	9.2%	9	8.9%
51 to 60 years	5	13.9%	13	20.0%	18	17.8%
61 to 70 years	5	13.9%	4	6.2%	9	8.9%
>70 years	4	11.1%	6	9.2%	10	9.9%

χ 2 =4.072, df =6, p =0.667

In Early VAP group, majority of subjects were in the age group 31 to 40 years (22.2%) and in Late VAP group majority of subjects were in the age group 21 to 30 years (21.5%).

Table 3: Sex distribution comparison between two groups

Sex	Type of VAP					
	Early VAP		Late VAP		Total	
	Count	%	Count	%	Count	%
Female	15	41.7%	20	30.8%	35	34.7%
Male	21	58.3%	45	69.2%	66	65.3%

χ 2 =1.215, df =1, p =0.270

In Early VAP group, 41.7% were females and 58.3% were males and in Late VAP group, 30.8% were female and 69.2% were males.

Table 4: Diagnosis distribution comparison between two groups

Diagnosis	Type of VAP					
	Early VAP		Late VAP		Total	
	Count	%	Count	%	Count	%
Acute Alcoholic Intoxication With HypoglycemicEncephalopathy	0	0.0%	2	3%	2	2%
AldwithHepaticEncephalopathy	3	8.3%	1	1.5%	4	3.9%
AmitrazCompoundConsumption	1	2.8%	0	0.0%	1	1.0%
Acute Bacterial Menigitis	0	0.0%	2	3.1%	2	2.0%
Chronic Bacterial Menigitis	0	0.0%	2	3.1%	2	2.0%
CKD With PulmonaryOedma	1	2.8%	1	1.5%	2	2.0%
Complete Hanging With Hie	0	0.0%	5	7.6%	5	4.9%
COPD With RespiratoryFailure	0	0.0%	3	4.6%	3	3.0%
CVA	9	25.0%	10	15.4%	19	18.8%
CVT	2	5.6%	1	1.5%	3	3.0%
Dengue Shock Syndrome	0	0.0%	1	1.5%	1	1.0%
Diabetic Ketoacidosis	2	5.6%	2	3.1%	4	4.0%
DKA With Urosepsis	1	2.8%	0	0.0%	1	1.0%
GBS With RespiratoryFailure	0	0.0%	5	7.6%	5	5.0%
IHD With LV Dysfunction	3	8.3%	0	0.0%	3	3.0%
Leptospirosis	0	0.0%	1	1.5%	1	1.0%
Op Compound Poisoning	6	16.7%	16	24.6%	22	21.8%
Primary PAH	0	0.0%	1	1.5%	1	1.0%
Recurrent CVA	1	2.8%	0	0.0%	1	1.0%
Snake Bite WithNeuroparalysis	2	5.6%	0	0.0%	2	2.0%
Status Epilepticus	0	0.0%	3	4.6%	3	3.0%

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Transverse Myiletis	1	2.8%	0	0.0%	1	1.0%
Tubercular Menigitis	0	0.0%	1	1.5%	1	1.0%
Urosepsis With AKI	0	0.0%	1	1.5%	1	1.0%
Viral Encephalitis	3	8.3%	4	6.1%	7	6.9%
Viral Hemmorhagic Fever	1	2.8%	2	3.1%	3	3.0%
Viral Hepatitis With HepaticEncephalopathy	0	0.0%	1	1.5%	1	1.0%

$\chi 2 = 44.66$, df =35, p =0.154

In Early VAP group, majority of subjects were diagnosed to have CVA (25%) and in Late VAP group, majority of subjects were diagnosed to have OP Compound poisoning (24.6%).

Discussion

VAP is the most common nosocomial infection in the intensive care unit (ICU) with an incidence ranging from 8 to 28% in intubated mechanically ventilated patients. It is an important cause of morbidity and mortality despite the available antimicrobial therapy, advanced supportive care modalities and the use of a wide-range of preventive measures.

This study was done to know the outcome of patients in Ventilator Associated Pneumonia and to identify the pathogens causing VAP, how the development of VAP influenced duration of mechanical ventilation and length of hospitalization. In our study of 101 patients the incidence of VAP was more in males(65.3%).The majority were in between 31 to 40 yrs of age. In the study of hinagadani*et al.*[7] and ravi*et al.*[2] The mean age of the patients was 34 years having a predominance of male population. The common age group in a study done by nagraj*et al.* is 30-49 yrs with male preponderance.

In our ICU set up late onset VAP was most common when compared to early onset VAP 35.6% of the patients were categorized as early onset VAP while 64.4%as late onset VAP. In a study done by ravi*et al.* of 60 patients 42 (70%) patients developed late VAP and 18(30%) patients developed early VAP. In a study done by hinagadani*et al.*[7]of the 37 patients who developed VAP, 10 patients developed early-onset (27.02%) VAP and 27 patients developed the late-onset type (72.97%). But in study done by Charles *et al.* [8]of 18 patient's early onset VAP occurred in 13 (72.2%) patients, while late onset VAP was observed in the remaining 5 (27.8%) individuals.

In our study majority of cases who developed VAP were cases of organ phosphorouspoisoning(21.8%) This could be because the poison causes excessive secretions and patient may get drowned in his own secretions similar to study done by ravi*et al.* [2], hinagadani*et al.* [7] and Noyalmariya joseph *et al.*[9].

The relationship between the duration of endotracheal intubation and development of VAP has been studied by several authors. Fagon*et al.* estimated an increased risk of 1% per day of mechanical ventilation. Torres *et al.* [5] reported an increased incidence of VAP among patients ventilated more than 5days compared to those with less than 5 days. Langer *et al.* demonstrated a high and constant rate of acquisition of VAP in first 8 to 10 days of endotracheal intubation with a lower rate thereafter[10]. There is a similar trend of increasing lengths of endotracheal intubation and a high rate of acquisition of VAP in first 10 days of intubation in our study. The mean duration of ventilation in this study was 12.31± days in early VAP it was 6.64±3.97 days and in late vap it was 15.45±8.08days similar to study done by ravi*et al.* [2] an average of 15.57±6.38 days for late VAP and 7.28±1.36 days for early VAP.19 days in study done by hinagadani*et al.*[7].

Conclusion

- Incidence was 15.04%.
- In the study 35.6% had early VAP and 64.4% had late VAP.Main indication for ventilator support in patients who developed VAP was Organophosphorous poisoning (21.8%).

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