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Research Article

Clinical profile and outcome in patients with ventilator associated pneumonia in ICU at a tertiary care hospital

Dr. Mohan. D. Kashinkunti [1]*, Dhananjaya M[2]
[1]Professor, Department of Medicine, SDM College of Medical Sciences and Hospital, Sattur, Dharwad-580009, State-Karnataka, India.
[2]Postgraduate student, Department of Medicine, SDM College of Medical Sciences and Hospital, Sattur, Dharwad-580009, State-Karnataka, India.

Corresponding author
Dr. Mohan D Kashinkunti
Email: drmohandk@gmail.com

Abstract: Ventilator associated pneumonia (VAP) a type of hospital acquired pneumonia associated with increased morbidity and mortality. Knowledge about the clinical profile is necessary to have aneffective preventive measure to reduce mortality in patients admitted to ICU. Aim and objectives of the presented study was to study the clinical profile and outcome of ventilator associated pneumonia (VAP) in ICU over one year period. A hospital based study was carried out from July 2012 to June 2013 in the ICU. Patients who were on mechanical ventilation (MV) for more than 48 hours were monitored at frequent intervals for development of VAP using clinical and microbiological criteria until discharge or death.The data was analyzed for determining VAP infection rate. A total of 230 patients were on ventilator in ICU. Among them 48 developed Ventilator Associated pneumonia with the incidence of 20.8%. Undifferentiated fever was the commonest diagnosis followed by Dengue and malaria.Acinetobacter & Pseudomonasaeruginosa were commonest organisms in VAP. VAP occurred in a sizeable number of patients on MV. Chronic respiratory failure, supine head position were the risk factors associated with VAP. Simple awareness about these risk factors can be used for effective preventive measures.
Keywords: VAP, clinical profile, risk factors,endotracheal aspirates, VAP infection rate

INTRODUCTION

Ventilator Associated Pneumonia (VAP) refers to a type of pneumonia that occurs more than 48-72 hours after endotracheal intubation, and is one of the most common nosocomial infections in patients receiving mechanical ventilation. [1]. The differences in VAP incidences are based on the antibiotic profile, ICU care and the population of study [2]. The incidence of VAP according to the National Nosocomial Infection Surveillance Program is 7.6 cases per 1000 patient ventilator days [3]. The incidence of VAP is higher in adult ICU patients, ranging from 15 to 30% [10, 15, 16].

Development of VAP ≤ 96 hours of mechanical ventilation is termed as early onset and a delay of more than 96 hours is termed as late onset [5]. Endotracheal intubation alone is a risk factor for the development of pneumonia among hospitalized patients [6]. The end result is either colonization or aspiration of the respiratory contents with potential pathogens [7, 8]. The mortality rate among these patients ranges from 16-20% [5, 9].

A study of both incidence and risk factors was necessary to implement preventive measures and thereby reduce mortality rate in these patients.

MATERIALS AND METHODS

This is a prospective study which included 230 patients requiring mechanical ventilation on admission to ICU or during the stay in ICU at a tertiary care hospital. Patients admitted over the period of 1year from July 2012 to 31st June 2013 were included. Disease profile and demography of the patients were studied. The clinical pulmonary infection score (CPIS) was tabulated from the available data (includes temperature, leukocytes, tracheal aspirate volume and the purulence of tracheal secretions, chest X-ray, oxygenation- PaO2/FiO2 and the semi-quantitative culture of the tracheal aspirates). The patients with CPIS which was more than 6 were considered to have developed VAP. VAP was diagnosed by the growth of pathogenic organisms.

Ventilator associated complications were noted. Complications associated withintubations, machine problems, those which may be due to underlying diseases, intubated outside and discharge against medical advice were excluded.
Incidence of VAP in patients with ALI (Acute lung injury) and ARDS (acute respiratory distress Syndrome) and without ALI and ARDS were noted.

RESULTS

During a one year period 640 consecutive patients admitted to the ICU were prospectively evaluated. Out of which 230 patients were intubated. Of these, 48

(20.8%) developed VAP during their ICU stay. Early onset VAP occurred in 21 (%), while late onset VAP was observed in the remaining 27 (%) patients. The incidence of VAP was 20.8% per 1,000 ventilator day.

Of the 48 study patients, 28 were men (73.7%) and 20 (26.3%) were women. The mean ± SD age of patients receiving MV was 45.11 ± 16.2 years (range, 18 to 78 years). Most common comorbid condition was diabetes (14) followed by hypertension (12). The underlying disease requiring mechanical ventilator were sepsis(18), dengue (11), Malaria 6 followed by poisoning, pneumonia, GB syndrome and CVA Table 1.

Table1: clinical characteristics of people with VAP

Sex	**Number Of Patients**
Male	28
Female	20
Comorbid conditions	
Diabetes mellitus	14
Hypertension	12
IHD	6
Smoking	21
Alcohol	19
Disease profile of patients requiring mechanical ventilator	18
Sepsis	11
Dengue	06
Malaria	05
Pneumonia	04
Poisoning	02
GBS	02
CVA	

Univariate analysis indicated that chronic lung failure and supine head position were significantly associated with VAP.

The organisms isolated from the study were *Acinetobacter* was isolated from 26 patients, *Pseudomonas aeruginosa* from 18 patients, *Klebsiella pneumoniae* from 9 patients, *E.coli* from 6 patients, *Staphylococcus aureus* from 4 and *Enterobacter* from 3 patients Including mixed growth (table 2).

Table 2: organisms isolated in VAP

Organisms	**VAP**
Acinetobacter baumannii	26
Pseudomonas aeruginosa	18
Klebsiella pneumonie	9
Escherichia coli	6
Staphylococcus aureus(MRSA)	4
Enterobacter aerogenes	3

Of the total ALI/ARDS group of 134 patients 18 developed VAP.In other complications 1 patient developed shock, 1 patient had Myocardial infarction, 2 patients had ventricular fibrillation and 2 patients had developed ICU psychosis.

Overall mortality was 16(33.3%). Advancing age and associated co-morbid illness is associated with significant mortality.

DISCUSSION

Diagnosis and treatment of ventilator-associated pneumonia which causes considerable morbidity and mortality remain a challenge [10]. Organisms causing VAP, along with complicating risk factors and comorbidities, result in extended ICU stay periods, health care costs, and the requirement of costlier antimicrobial agents [11].

VAP is the commonest nosocomial infection amongst patients receiving MV in ICU. The incidence of VAP in our setting was 20.8%. Infection rates in other studies conducted by Torres et alwas 24%, Kerver et al 67%,Kollef et al 15.5%, Fagon et al 27.5%,Rakshit et al 47%respectively[12].

The estimated prevalence of VAP ranges from 10 to 65%, with a 20% case fatality rate.VAP accounts for 13-18% of all hospital acquired infections. Recent studies have shown VAP to be the most common infectious complication among patients who were admitted to the ICU. The complications and treatment cost significantly rises with VAP caused by resistant organisms, due to the cost of newer broad spectrum anti microbials and supportive measures. In various studies, the incidence of VAP was found to vary from 7% to 70%. A similar incidence was found in studies done by Rakshit *et al*. and Andrade *et al*. [13, 14].

The diagnostic criteria for VAP in patients receiving mechanical ventilation is the presence of two or more of the following clinical features: Temperature of > 38°C or <36°C; leukopenia or leukocytosis; purulent tracheal secretions and decreased PaO2. If two or more of these abnormalities are present, a chest radiograph should be evaluated for alveolar infiltrates or an air bronchogram sign. Quantitative procedures for adequate sampling of the respiratory aspirates should be done, based on the local expertise and the cost considerations. Empirical anti -microbial therapy and supportive care should be initiated by the subject's clinical state, clinical suspicion, and the available investigations.

The common pathogens which were isolated were the aerobic gram-negative bacilli such as *Pseudomonas aeruginosa*, *Escherichia coli*, *Klebsiella pneumoniae* and *Acinetobacter* species and gram-positive cocci like *Staphylococcus aureus.*

Recent studies have shown the increasing incidence of multidrug resistant pathogens (MDR) among the patients with VAP. A study by Dey *et al*. showed the increased incidence of MDR pathogens in endo-tracheal aspirates. Earlier studies have shown that Pseudomonas was the most common organism. Staphylococcus was the most common organism in a study by Fagon *et al*. *P. aeruginosa* in a study by Torres *et al*. and Rakshit *et al.* But in our study *Acinetobacter* found to be the most common organism causing VAP, followed by Pseudomonas species.

Due to the increasing incidence of MDR organisms in ICUs, an early and correct diagnosis of VAP is a challenge for optimal antibiotic treatment. The emergence of MDR pathogens can be prevented by adopting an antibiotic institutional policy and dose de-escalation regimens .Isolation of the causative organism from ET secretions and its culture sensitivity is crucial in the management of VAP.

The early diagnosis and institution of appropriate antimicrobial therapy has shown reduced patient mortality. The incidence of VAP can be prevented by adopting careful intubation techniques, avoiding gastric over- distension, maintaining adequate endotracheal cuff pressure and efficient tracheal suctioning.

The mortality in our study is 33.3%. The mortality rate which was associated with VAP was higher in patients aged above 60 years. The infection rates could possibly be reduced by practicing aseptic measures in the ICU. The overall outcome of VAPs could improve with the anti-microbial policies of individual centers.

CONCLUSION

VAP, an important nosocomial infection among the critically ill patients, requires measurement to reduce mortality. A fair knowledge about VAP and its associated parameters is important to reduce hospital ICU stay. Despite the small sample size which is a limitation of our study, our findings tells the various etiological factors for VAP. Further studies can facilitate knowledge about the disease and thereby minimize the occurrence of VAP through the implementation of simple, low cost preventive measures. Awareness about the various risk factors will help in reduction of the morbidity and mortality associated with VAP.

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