Ventilator Associated Pneumonia: Retrospective Results In An Intensive Care Unit

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Citation

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Abstract

Background: Ventilator associated pneumonia (VAP) is the most common nosocomial infection in the intensive care unit (ICU).

Aims: A retrospective study was undertaken to examine the incidence, pathogens of VAP, and to identify risk factors associated with its development, and to assess outcomes.

Settings and Design: A retrospective study was undertaken.

Results: Of 135 patients in the study, 8 (5.93 %) had VAP.Mortality in the VAP cases was significantly higher (87,5%) than non-VAP cases (7,9%, p<0,001). . COPD, reintubation, tracheostomy, steroid treatment and coma in patients with VAP were significantly higher than non-VAP cases. Acinetobacter species were the most common pathogen (in 5 of 8 patients, 62,5%) associated with VAP.

Conclusion: Good management strategies for VAP like adequate infection control practices, early and accurate diagnosis, and more specific antimicrobial use may significantly improve patients outcome.

INTRODUCTION

Ventilator associated pneumonia (VAP) is the most common nosocomial infection in the intensive care unit (ICU). It is associated with prolonged mechanical ventilation, increased ICU length of stay and substantially an increased attributable mortality ([1], [2]).

The incidence of VAP ranges from 10-65 % of intubated patients depending on the risk factors ([1]). Risk factors were emergency surgery, chronic obstructive pulmonary disease (COPD), reintubation, coma, steroid treatment, enteral feedings, tracheostomy, acute physiology, age, chronic health evaluation (APACHE II) score, prior antibiotics, and Intermittant positive pressure ventilation (IPPV) hours ([2]).

The mortality of VAP ranges from 13 % to 55 %. VAP is commonly caused by antibiotic-resistant nosocomial organisms like Pseudomonas aeruginosa, Eschericha coli, Klebsiella pneumonia, Acinetobacter species and Staphylococcus species([1],[2]).

We aimed to examine the incidence, pathogens of VAP, and to identify risk factors and to assess outcomes.

MATERIALS AND METHODS

A retrospective study was undertaken to examine the incidence, pathogens of VAP, and to identify risk factors associated with its development, and to assess outcomes. Data were obtained for 135 patients admitted to an ICU from January to May 2003. Cases of VAP were defined as patients with hospital-acquired pneumonia diagnoses occuring > 48 h following intubation. Control subjects without VAP consisted of all patients in the study. Patients' age, gender, IPPV hours, reintubation, underlying illness, acute physiology, chronic health score (APACHE II), type of surgery (elective/emergency), nutrition, total ICU stay, steroid treatment, tracheostomy and antibiotic usage were recorded.

All analyses were performed by the computerized SPSS 10.0 program. Results are given as mean±standard deviation, and Chi-square test was used for groups VAP and non-VAP. Also Mann-Whitney –U test was used to compare for each two groups. A value of $p<0.05$ was considered statistically

significant.

RESULTS

Of 135 patients in the study, 8 (5.93 %) had VAP. Basic characteristics of VAP and non-VAP cases was shown in Table 1.

Figure 1

Table 1: Basic characteristics of VAP and non-VAP cases

Variable	VAP (n=8)	Non_VAP (n=127)	p value
Age	61.63±11.30	54.31±18.61	NS
Gender			
Male	5 (62.5%)	55 (43%)	
Female	3 (37.5%)	72 (57%)	NS

NS: Not significant

There was no difference between VAP and non-VAP cases according to age and sex. Comparison of VAP and non-VAP patients was shown in Table 2.

Figure 2

Table 2: Comparison of VAP and Non-VAP cases

Variable	VAP (n=8)	%	Non-VAP (n=127)	%	p value
Mortality	7	87.5	10	7.9	<0.001
Emergency surgery	2	25	8	6.3	NS
COPD	5	62.5	16	12.6	0.002
Reintubation	1	12,5	4	3	<0.001
Coma	7	87.5	31	24.4	<0.001
Steroid treatment	4	50	16	12.6	0.017
Naso-gastric canul	7	87.5	78	61.9	NS
Tracheostomy	2	25	2	1.6	0.017
Prior antibiotic	7	87.5	79	62.2	NS
APACHE II score	11.00±3.26		8.87±5.047		NS
Total ventilation hrs	13.00±11.31		0.56±1.39		0.017
Total ICU stay	17.00±14.63		3.23±2.24		<0.001

COPD: Chronic obstructive pulmonary disease, APACHE: Acute physiology, age and chronic health evaluation, ICU: Intensive care unit, NS: Not significant

We found that mortality in the VAP cases was significantly higher (87,5 %) than non-VAP cases (7,9 %, p<0,001). Total ICU stay and also IPPV hours in VAP cases were significantly longer than non-VAP patients. COPD, reintubation, tracheostomy, steroid treatment and coma in patients with VAP were significantly higher than non-VAP cases. However, presence of emergent surgery, naso-gastric canul, prior antibiotic usage and APACHE II score were similar in both groups.

Microorganisms recovered from the 8 patients with VAP were shown in Table 3. In 7 of 8 VAP patients gram negative microorganisms were recovered via endotracheal aspirate. Acinetobacter species were the most common pathogen (in 5 of 8 patients, 62,5 %) associated with VAP. The second most common pathogen was the Pseudomonas aeruginosa (in 2 of 8 patients, 25%).

Figure 3

Table 3: Microorganisms recovered from the 8 patients with VAP.

Microorganism recovered	Patients with VAP (n)	(%)
Gram-negative	7	87,5
Pseudomonas aeruginosa	2	25
Acinetobacter species	5	62.5
Gram-positive	1	12,5
Staphylococcus aureus	1	12.5

DISCUSSION

We investigated the incidence, risk factors, outcome and pathogens of VAP in the intensive care unit. Nosocomial pneumonia was diagnosed in 8 (5.93 %) of the 135 patients in our study. The estimated prevelance of nosocomial pneumonia in intensive care units ranges from 10-65% with mortality rates of 13 to 55% ([1,2]). Patients who develop VAP require longer ICU and hospital stays ([3,4,5,6,7]). In this study, total ICU stay for VAP (8/135) was significantly higher as compared with non-VAP.

Our study have shown a significant relation between tracheostomy and VAP. Some studies have suggested that tracheostomy is associated with an increased risk of VAP ([5,6,7,8]).

Emergency operations also contribute to postoperative morbidity, because the patients who undergo emergency operations are hemodynamically unstable and require longer ventilatory support ([9]). This explains its significant association with VAP. However, in our study emergency operations were not found as a risk factor for developing of VAP.

In our study it was found that 50 % of patients with VAP were on steroid treatment, so these patients receving steroids

might be more prone to develope VAP. In another study it was shown that steroids had significant independent effect on VAP ([2]).

In our study patients with VAP had significantly higher incidence of reintubation (12,5%) and COPD (62,5%) than non-VAP patients (3% and 12,6%). Also, number of patients having coma in VAP group was significantly higher (87,5%) than non-VAP group (24,4%). Patients who were reintubated and were on prolonged IPPV are at a higher risk for VAP ([3,7,10]).

We found that gram negative bacilia were responsible for most of the cases (87,5%) with VAP, while in a small percentage of them gram positives were in role (12,5%). The most common pathogen was Acinetobacter species (62,5%), while the Pseudomonas aeruginosa was the second common pathogen (25%) in VAP cases.

Mortality in our VAP cases was very high (7 patient of 8, 87,5%) than the non-VAP cases (10 patients of 127, 7,9%).

In summary, VAP is a leading cause of morbidity and mortality in ICU patients, leading to lengthened ICU and hospital stays and higher health care costs. The mortality caused by VAP increases if it is caused by gram negative bacilli. Good management strategies for VAP like adequate infection control practices, early and accurate diagnosis, and more specific antimicrobial use may significantly improve patients outcome.

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