ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

A CLINICAL STUDY OF 50 CASES OF VENTILATOR ASSOCIATED PNEUMONIA

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Manuscript Info

Manuscript History:

Received: 15 June 2014
Final Accepted: 26 July 2014
Published Online: August 2014

Key words:

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Abstract

Introduction

Ventilator associated pneumonia is one of the most common ICU acquired infections in mechanically ventilated patients. VAP continues to complicate the course of 8-28% of patients receiving mechanical ventilation for linger than 48 hours{1}. Because of the large disease burden and the resultant attributable morbidity and mortality there is great interest in accurately diagnosing, treating and preventing this complication. There are patient related, infection control related and intervention related risk factors for VAP. The most common mode for development of VAP is aspiration of oropharyngeal secretions containing potentially pathogenic organisms{2}. VAP is classified in to early onset and late onset VAP depending on the duration of mechanical ventilation at the time of onset of VAP and commonly isolated microorganisms in these two groups are distinct{3}. The detection of the causative organisms is necessary for guiding an appropriate therapy as there is strong evidence of the adverse effect of inadequate empirical treatment on outcome. The bronchoscopic methods BAL and PSB are well standardized and widely accepted invasive diagnostic techniques for identifying the etiological pathogen of VAP{4}. In the future it will be possible to diagnose VAP accurately and rapidly and to reduce mortality by initial appropriate antibiotic therapy. Identifying of risk factors associated with VAP will help to reduce the incidence ofVAP in future by avoiding the risk factors{2}.

AIMS AND OBJECTIVES

1. To study the clinical profile of the patients with VAP
2. To study the risk factors associated with VAP
3. To study the role of modified CPIS in the diagnosis of VAP
4. To study the microbiological organism profile in early and late onset VAP
5. To study the appropriateness of antibiotic therapy and outcome of patients with VAP

METHOD :

The present study was carried out in a teaching hospital and the patients who have received mechanical ventilation for more than 48 hours with clinical suspicious of VAP were evaluated. The particulars of the patients like age, sex, diagnosis, indications for MV, details of clinical examinations and investigations were noted with calculation of CPIS score. Clinically suspected VAP was defined as the presence of new and/ or progressive infiltrates in the chest radiograph with no other obvious cause and presence of any two of the following: temperature >38*or <36*, WBC

>11000 or <4000, purulent tracheal secretions. These patients were to undergone for FOB with collection of BAL which was cultured and culture positive patients were included in the study. In our institute 250 patients were admitted and put on ventilator in ICU. Out of these 250, 96 were clinically suspected VAP and out of 96 patients 50 were confirmed VAP by BAL culture. These patients were followed till discharged from the hospital or until death.

RESULTS:

TABLE 1
AGE WISE DESTRIBUTION OF 50 CASES OF VAP

AGE GROUP	NO. OF PATIENTS	PERCENTAGE (%)
≤20	3	6
21-30	5	10
31-40	9	18
41-50	16	32
51-60	7	14
>60	10	20
TOTAL	50	100

TABLE 2
SEX WISE DESTRIBUTION OF 50 CASES OF VAP

SEX	NO.OF PATIENTS	PERCENTAGE(%)
MALE	35	70
FEMALE	15	30
TOTAL	50	100

TABLE 3
DESTRIBUTION OF PATIENTS ACCORDING TO INDICATION OF MECHANICAL VENTILATION.

CATEGORIES	NO.OF PATIENTS	PERCENTAGE(%)
(a) CNS	25	50
1. CVA	5	
2. HEAD INJURY	2	
3. MENINGITIS/ENCEPHALITIS	2	
4. GBS	7	
5. SNAKEBITE(NEUROPARALYTIC)	4	
6. CERVICAL SPONDYLOSIS	2	
7. BULBARMYESTHENIA	3	
(b) TROPICAL PROBLEMS	19	38
1. FULMINANT TETANUS	6	
2. OP POISENING	8	
3. CEREBRAL MALARIA	5	
(c) RESPIRATORY DISORDERS	6	12
1. ACUTE EXACERBATION OF COPD	2	
2. MILLIARY TUBERCULOSIS	1	
3. BRONCHIAL ASTHMA	3	

TABLE 4
DURATION OF MV AT THE TIME OF ONSET OF VAP

DAYS OF MV	NO. OF VAP CASES	PERCENTAGE (%)
3-5(EARLY ONSET)	18	36
6-10	18	36
11-15	8	16
16-20	3	6

21-25	2	4
26-30	1	2
TOTAL	50	100

TABLE 5
CLINICAL FEATURES OF VAP

CLINICAL FEATURES	CASES	PERCRNTAGE (%)
FEVER	36	72
PURULENT TRACHEAL SECRETIONS	30	60
RALES ON CHEST EXAMINATION	30	60
LEUCOCYTOSIS	36	72
LEUCOPENIA	4	8
HYPOTHERMIA	1	2

TABLE 6
MODEFIED BASELINE CPIS IN VAP

NO. OF PATIENTS	MODEFIED BASELINE CPIS	PERCENTAGE(%)
4	4	8
6	5	12
24	6	48
12	7	24
3	8	6
1	9	2
0	10	0
50	TOTAL	100

TABLE 7
MICROORGANISMS ISOLATEDIN 50 CASES OF VAP

MICROORGANISMS	NO. OF ORGANISMS ISOLATED	PERCENTAGE(%)
GRAM NEGATIVE BACILLI		
PSEUDOMONAS AERUGINOSA	22	40.0
ESCHERICHIA COLI	5	9.09
KLEBSIELLA PNEUMONIAE	3	5.45
ENTEROBACTER	0	0
SERRATIA	0	0
PROTEUS	1	1.8
ACENATOBACTER	5	9.09
GRAM POSITIVE COCCI		
STAPHYLOCOCCUS AUREUS	15	27.27
MSSA	8	14.5
MRSA	7	12.7
STREPTOCOCCUS PNEUMONIA	4	7.2

TABLE 8
MICROORGANISMS ISOLATEDIN EARLY AND LATE ONSET VAP

ORGANISMS	TOTAL NO (%)	EARLY ONSET VAP TOTAL NO (%)	LATE ONSET VAP TOTAL NO (%)
GRAM NEGATIVE BACILLI			
PSEUDOMONAS AERUGINOSA	22(40.0)	1(1.8)	21(38.18)

ESCHERICHIA COLI	5(9.09)	0(0)	5(9.09)
KLEBSIELLA PNEUMONIAE	3(5.45)	0(0)	3(5.45)
ENTEROBACTER	0(0)	0(0)	0(0)
SERRATIA	0(0)	0(0)	0(0)
PROTEUS	1(1.8)	0(0)	1(1.8)
ACENATOBACTER	0(0)	0(0)	0(0)
GRAM POSITIVE COCCI			
MSSA	8(14.5)	8(14.5)	0(0)
MRSA	7(12.7)	0(0)	7(12.7)
STREPTOCOCCUS PNEUMONIA	4(7.2)	4(7.2)	0(0)
TOTAL	55(100)	18(32.7)	37(67.3)

TABLE 9
POLYMICROBIAL INFECTION IN VAP

POLYMICROBIAL INFECTION IN VAP	NO.OF PATIENTS	PERCENTAGE(%)
NO. OF VAP PATIENTS	50	100
NO.OF MICROORGANISMS ISOLATED	55	
MONOMICROBIAL VAP	45	90
POLYMICROBIAL VAP	5	10

TABLE 10
MORTALITY IN EARLY AND LATE ONSET VAP

	TOTAL NO. OF PATIENTS	NO. OF PATIENTS EXPIRED	MORTALITY(%)
EARLY ONSET VAP	18	3	16.6
LATE ONSET VAP	32	15	46.8
TOTAL	50	18	36

TABLE 11
MORTALITY IN RELATION TO APPROPRIATENESS OF ANTIBIOTIC THERAPY IN VAP

NO. OF PATIENTS(%)	NO. OF PATIENTS EXPIRED(%)	NO. OF PATIENTS SURVIVED(%)
TOTAL NO. OF PATIENTS N=50(100)	18(36)	32(64)
APPROPRIATELY TREATED PATIENTS n = 30(100)	8(26.6)	22(73.4)
INAPPROPRIATELY TREATED PATIENTS N = 20 (100)	10(50)	10(50)

TABLE 12
MORTALITY IN PATIENTS WITH VAP AND INDICATION OF MV

CATEGORIES	TOTAL NO. OF PATIENTS	NO. OF PATIENTS EXPIRED
(a) CNS	25	11(44)
1. CVA	5	3(60)
2. HEAD INJURY	2	2(100)
3. MENINGITIS/ENCEPHALITIS	2	1(50)
4. GBS	7	2(28.5)

5. SNAKEBITE(NEUROPARALYTIC)	4	1(25)
6. CERVICAL SPONDYLOSIS	2	1(50)
7. BULBARMYESTHENIA	3	1(33.3)
(b) TROPICAL PROBLEMS	19	6(31.5)
1. FULMINANT TETANUS	6	4(66.66)
2. OP POISENING	8	1(12.5)
3. CEREBRAL MALARIA	5	1(20)
(c) RESPIRATORY DISORDERS	6	1(16.6)
1. ACUTE EXACERBATION OF COPD	2	1(50)
2. MILLIARY TUBERCULOSIS	1	0(0)
3. BRONCHIAL ASTHMA	3	0(0)

TABLE 13
RISK FACTORS OF VAP

PARAMETER	VAP(n = 50)	NON VAP (n = 46)
TRACHEOSTOMY	32	20
REINTUBATION	28	14
COPD	2	3
TUBERCULOSIS	1	3
BRONCHIAL ASTHMA	3	1
ARDS	3	1
RENAL FALIURE	5	4
DIABETES	8	3
HYPERTENSION	7	6
MALIGNANCY	2	1
IMMUNOSUPRESSION	5	3
PRIOR ANTIBIOTIC THERAPY	8	3
COMA	10	9
STRESS ULCER PROPHYLAXIS	24	15
SMOKING	15	16
TRAUMA/SURGERY	3	4
MODS	8	6
DIALYSIS	3	2
SINUSITIS	4	2

DISCUSSION :

In the present study out of 50 patients maximum no. Of patients were in 4^{th} to 6^{th} decades of life which suggests VAP is more common with advancing age. Among these 70% of patients were male and 30% female showing male to female ratio 2.33:1. The indications for mechanical ventilation in 50% patients were neurological conditions, in 38% tropical conditions and 12% with respiratory conditions. Neurological conditions were most common conditions for mechanical ventilation followed by tropical conditions. Various studies have mentioned cns disorders as one of the risk factor for VAP.

In the present study the duration of MV at the time of onset of VAP ranged from 3-30 days. Early onset VAP (≤5 days) found in 18 patients (36%), while the late onset VAP developed in 64 % of patients. In 88% of patients VAP developed within 15 days ofinitiation of MV so the onset of VAP was most common during the first 15 days of initiation of MV.

In the present study feve was present in 72%, leucocytosis in 72%, rales on chest examination in 60%, purulent tracheal secretion in 60%, leucopenia in 8% and hypothermia in 2%. So such features should raise suscpision of VAP and further investigation should be done to diagnose VAP as early as possible and to reduce the mortality by appropriate antibiotic treatment.

The clinical pulmonary infection score (CPIS) was developed in 1991 based on 6 variables; temperature, leucocyte count, tracheal secretions, chest xray infiltrates, oxygenation (PaO2/FiO2mmhg) and microbiological culture of tracheal aspirates. The modified baseline CPIS was calculated from the first five variables. Modified baseline CPIS

≥6 was present in 80% of patients and <6 in 20%. So in a mechanically ventilated patients if CPIS is ≥6, chances of VAP is hogh but CPIS <6 does not rule out VAP. This score is very important to diagnose VAP.

In present study, in 50 cases of VAP 55 microorganisms wereisolated. We could not isolate anaerobic and fungal organisms in our setup due to restrain in technology to isolate them. Common organisms found were pseudomonas auregenosa(40%), staph. Aureus(27.27%), acenatobacter (9.09%) and e coli in (9.9%). Monomicrobial VAP was present in 90% and polymicrobial VAP in 10% of patients. In the present study among gram negative bacilli, pseudomonas was the leading eitiological agent and among gram positive cocci s.aureus was the leading eitiological agent. These two organisms have become more frequent and more antibiotic resistant. Microorganisms causinf VAP may defer according to patients in ICU, duration of ICU stay, diagnostic method, underlying medical problems. In early onset VAP there is high incidence of S.pneumoniae. acenatobacter, enterobacteriae while in late onset VAP ther is high incidence of pseudomonas , MRSA, MDR GNB. Each institute should have antibiotic polices to overcome rampant, inappropriate, inadequate, unethical use of antibiotics giving rise to MDR organism in ICU setting which increases moratilty, morbidity and increases health cost of society as awhole.

Appropriate treatment is defined as administration of antibiotic drugs that are active against all lower respiratory isolates or those isolated in significant concentration by invasive methods. Mortality in inappropriately treated patients was significantly higher (50%), than that of appropriately treated patients (26.6%). So the treatment of VAP must be started promptly with adequate and appropriate antibiotics to reduce the mortality.

In present study mortality in VAP is highest in CNS disorders(44%) fillowed by tropical diseases (31.5%). This is attributed to longer duration of stay, resistant organism and altered level of consciousness which increases chances of aspiration.

Out of 96 clinically suspected VAP patients 50 were confirmed by BAL culture. Tracheostomy, reintubation, diabetes, prior antibiotic therapy, stress ulcer prophylaxis, sinusitis, MODS were significantly associated with VAP patients while COPD, asthma, coma, renal failure, tuberculosis, immunosupression were almost equal in both group of patients.

This study was compared with the following studies done previously and all the findings were in concordance with them: Craven study{5}, Fagon study{6}, Rakshit study{7}.

CONCLUSIONS:

No patients in ICU is immune to develop VAP. Proper ICU discipline must be maintained and all patients admitted in ICU should have their baseline CPIS score calculated on the day of admission and subsequently according to need. Each ICU should have antibiotic policies with regard to common organisms prevalent in that ICU with their drug sensitivity data. This ultimately decreases the mortality, morbidity and hospital stay.

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