

Study On Microbiological Profile of Endotracheal Secretions in Patients on Mechanic Ventilators

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Abstract

Background: Respiratory infections in critically ill patients are associated with high morbidity and mortality. Rapid diagnosis and initiation of appropriate antibiotic therapy is essential for better outcomes. Patients who are intubated and mechanically ventilated are further at risk of acquiring respiratory infections due to complex interplay between the endotracheal tube, host immunity and virulence of invading bacteria, which may lead to Ventilator Associated Pneumonia (VAP). **Subjects and Methods:** 307 total numbers of cases were included. Among all 209 cases did not develop respiratory infection & 98 cases developed respiratory infection. This study conducted in the Department of TB & Chest in Geetanjali Medical College, Udaipur, Rajasthan, India. The duration of study was over a period of six month. **Results:** In this study 307 total numbers of cases were included. Among all 209 cases did not develop respiratory infection & 98 cases developed respiratory infection. Out of 98 cases 47.9% were male & 52.1% were female who developed respiratory infection. In this study we suggested that 50% gram negative bacteria followed by 43.8% gram positive bacteria were found & 6.2% fungus isolate from the 98 cases. **Conclusion:** This study concludes that, Culture of ET aspirate is an easy, cost-effective procedure which helps in identifying the organism. If there are any delays in antibiotic treatment, it may lead to poor outcomes.

Keywords: Endotracheal Secretions, Microbiological Profile, Isolates.

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Introduction

It is certainly an irony that advanced medicine has brought a frequent botheration of nosocomial infections. The extensive use of tracheal intubation and mechanical ventilation to support critically ill has defined an increasing number of patients, at high risk of nosocomial pneumonia (NP). It has been reported that patients who are intubated and mechanically ventilated have 6 to 20 times more risk of pneumonia.^[1] In these patients, the incidence of NP has been reported to range between 9 – 27%.^[1] Ventilator-associated pneumonia (VAP) is defined as pneumonia that develops more than 48 hours after initiation of mechanical ventilation or conceptually, as an inflammation of the lung parenchyma caused by infectious agent/s not present or incubating at the time, mechanical ventilation was started.^[1] These infections are closely related to a significant rise in morbidity and mortality. Apart from this, the emergence of multi-drug resistant (MDR) pathogens is an additional problem. Various factors like new mutations, selection of resistant strains and use of high-level antibiotics influence the rapid spread of MDR microbes in the ICU.^[2] Frequent colonization, through either endogenous or exogenous origin, has been reported in patients on mechanical

ventilation with intubation.^[3]

For the diagnosis of nosocomial infection, endotracheal aspiration is common in 9 ICU patients. Thus, it is recommended to the clinicians to have updated knowledge of local epidemiological and susceptibility profile for the appropriate use of antibiotics. It has become compulsory along with adequate clinical diagnosis and bacterial 10 confirmations. Therefore, the aim and objective of the present study were to analyze the microbiological profile of endotracheal secretions in patients on mechanic ventilators.

Subjects and Methods

Study Population

307 total numbers of cases were included. Among all 209 cases did not develop respiratory infection & 98 cases developed respiratory infection.

Study Area

This study conducted in the Department of TB & Chest in Geetanjali Medical College, Udaipur, Rajasthan, India.

Study Duration

The duration of study was over a period of six month.

Data Collection

This cross sectional study of endotracheal secretions in patients on mechanic ventilators. The sample was sent to department of microbiology for culture and sensitivity and data were collected.

Inclusion Criteria

1. Febrile illness (more than 38^o C temperature).

Exclusion Criteria

1. Congenital anomalies of respiratory tract
2. Steroid and chemotherapy

Data Analysis

Data were analysed by using Microsoft excel.

Results

In this study 307 total numbers of cases were included. Among all 209 cases did not develop respiratory infection & 98 cases developed respiratory infection. Out of 98 cases 47.9% were male & 52.1% were female who developed respiratory infection. In this study we suggested that 50% gram negative bacteria followed by 43.8% gram positive bacteria were found & 6.2% fungus isolate from the 98 cases, which showed in [Table 5, 6, 7]

Table 1: Distribution of gender according to developed respiratory infection.

Did Not Developed Respiratory Infection	No. Of Cases	Percentage
Male	131	62.6%
Female	78	37.4%
Total	209	100%

Table 2: Distribution of gender according to developed respiratory infection.

Developed Respiratory Infection	No. Of Cases	Percentage
Male	47	47.9%
Female	51	52.1%
Total	98	100%

Table 3: Distribution of cases according to clinical feature.

Clinical Feature	Clinical Sepsis (Who Did Not Develop Respiratory Infection)	Positive Blood Culture Sepsis (Who Develop Respiratory Infection)
Respiratory Distress	92(44.1%)	48(48.9%)
Lethargy	132(63.1%)	62(63.2%)
Hypothermia	50(23.9%)	25(25.6%)
Hyperthermia	19(3.1%)	6(6.2%)
Apnea	26(12.5%)	11(11.3%)

Table 4: Distribution of cases according to isolates.

Isolates	No. Of Cases	Percentage
Gram Positive Bacteria	43	43.8%
Gram Negative Bacteria	49	50%
Fungal	6	6.2%
Total	98	100%

Table 5: Distribution of cases according to gram negative isolates

Gram Negative Isolates	No. Of Cases	Percentage
Klebsiella spp.	32	66.7%
E. colli	7	14.3%
Pseudomonas spp	6	12.3%
Proteus	4	8.1%
Total	49	100%

Table 6: Distribution of cases according to gram positive isolates.

Gram Positive Isolates	No. Of Cases	Percentage
CONS	18	41.1%
Staphylococcus aureus	21	48.8%
Streptococcus pneumoniae	4	9.3%
Total	43	100%

Table 7 : Distribution of cases according to fungal isolates.

Fungal	No. Of Cases	Percentage
Candida	6	100%
Total	6	100%

Discussion

To prevent respiratory failure, endotracheal intubation and mechanical ventilation are life-saving procedures. Clinical conditions like a life-threatening infection, sepsis, and acute respiratory distress syndromes, neurological dysfunctions due to poisoning, drug toxicity, cerebrovascular accidents, and trauma, etc. need for ventilatory support.

Though mechanical ventilation helps to prevent deaths due to respiratory failure, yet it poses a great threat, to life-threatening lung infections.^[4] These infections may lead to the ongoing growth of an agent that existed before intubation. Hence on the first day of intubation to identify the organisms that already existed at the time of intubation, endotracheal secretions were sent for bacteriological culture and sensitivity in the present study. It would help in initiating antibiotic therapy appropriately and in preventing the occurrence of ventilator-associated pneumonia (VAP).

In this study, the most common isolate with Klebsiella was gram-negative enteric bacteria. It was the most common organism followed by Pseudomonas and Acinetobacter which were sensitive to aminoglycosides. Whereas normal lungs were found in most female patients and patients ventilated for other than respiratory causes.

A study by Ferrer et al found airway colonization by potentially pathogenic microorganisms on admission was related with failure of non-invasive ventilation for exacerbation of COPD.^[5] In contrast, in a study by Drakulovic MB et al found that patients admitted to a respiratory intensive care unit, initial tracheal colonization was not associated with mortality or length of stay in hospital.^[6] In another study of patients with community-acquired pneumonia, Ortqvist et al observed that respiratory tract colonization was related to a significantly increased mortality and length of stay but was not a risk factor for nosocomial pneumonia.^[7-8] Corne P et al studied the role of nasal carriage of staphylococcus aureus in respiratory tract infections of critically ill patients by molecular evidence.

They revealed that *S. aureus* strain isolated from nares was genetically identical to that isolated from the bronchial sample of the same patient in 15 out of 16 cases.^[9] Similar results were found by Garrouste- Orgeas M et al.^[10]

Most of the studies showed a relationship between the organism causing VAP and pre-existing colonizing microbe. Koeman M et al found that topical oral decontamination with either chlorhexidine (CHX, 2%) or CHX/colistin (CHX/COL, 2%/2%) reduces the incidence of VAP.^[11]

Conclusion

This study concludes that, with an empiric antibiotic treatment, de-escalation is the key to decrease the emergence of resistance. Culture of ET aspirate is an easy, cost-effective procedure which helps in identifying the organism. If there are any delays in antibiotic treatment, it may lead to poor outcomes. Inadequate and inappropriate antibiotic treatment may lead to the emergence of MDR pathogens.

Therefore, the microbiological profile & sensitivity pattern of the local community certainly helps in framing the appropriate institutional antibiotic policy for better outcomes.

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