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Original Research Article

Incidence of ventilator associated pneumonia in tracheostomised and non tracheostomised patients

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ABSTRACT

Background: Pneumonia is the most common hospital acquired infection in the intensive care unit. One of the causes for hospital acquired pneumonia is ventilator associated pneumonia. Tracheostomy is known to prevent occurrence of ventilator associated pneumonia as it decreases the respiratory dead space, assists in better clearance of secretions and prevents chances of aspiration. Generally, tracheostomy is done after 2 weeks of endotracheal intubation to prevent tracheal complications. The aim of this study is to identify the incidence of ventilator associated pneumonia in tracheostomised and non tracheostomised patients and to see if early tracheostomy can prevent development of ventilator associated pneumonia.
Methods: The study was conducted at a tertiary care hospital during a period of four years. 100 patients who were on mechanical ventilation for more than 7 days where taken up for the study. APACHE 4 scoring system was used. The incidence of Ventilator associated pneumonia in tracheostomised and non tracheostomised patients was studied.
Results: In our study the total incidence of VAP was 44 %. In our study out of the 42 patients who had undergone tracheostomy 13 (30.95%) patients had ventilator associated pneumonia. Among the non-tracheostomised patients 31 (53.44%) out of 58 patients developed ventilator associated pneumonia. In our study the incidence of ventilator associated pneumonia was much lesser (12%) in patients who underwent tracheostomy in the period 7 to 10 days after mechanical ventilation, whereas in those who underwent tracheostomy after 11 days incidence of ventilator associated pneumonia was much higher.
Conclusions: Our study showed that the incidence of ventilator associated pneumonia was much higher among non tracheostomised patients compared to patients who underwent tracheostomy. Hence patients undergoing earlier tracheostomy had a clear advantage than those undergoing tracheostomy late or non tracheostomised patients in preventing ventilator associated pneumonia.

Keywords: APACHE 4 scoring system, Tracheostomy, VAP-ventilator associated pneumonia

INTRODUCTION

Pneumonia is the most common hospital acquired infection in the intensive care unit. It is one of the leading causes for morbidity and mortality among the patients undergoing intensive care in hospitals.[1,2] One of the causes for hospital acquired pneumonia is ventilator associated pneumonia. Ventilator associated pneumonia is pneumonia that develops 48 hours or longer after mechanical ventilation.[3,4] The prevalence of ventilator associated pneumonia varies depending upon the demography and hospital associated factors. In studies conducted worldwide prevalence of ventilator associated pneumonia were reported to be ranging from 15 to 27%.[5-7] However, the prevalence of ventilator associated pneumonia in Indian studies have shown to be 47%.[8,9] Hence ventilator associated pneumonia is a major concern among patients on mechanical ventilation, so

much so that the mortality and morbidity associated with ventilator associated pneumonia seems to be much higher than due to the underlying condition for which the patient was originally admitted. Hence all possible precautions should be taken to prevent occurrence of ventilator associated pneumonia. Tracheostomy is known to prevent occurrence of ventilator associated pneumonia as it decreases the respiratory dead space, assists in better clearance of secretions and prevents chances of aspiration. Generally, tracheostomy is done after 2 weeks of endotracheal intubation to prevent tracheal complications. However prolonged endotracheal intubation with mechanical ventilation is known to be associated with high incidence of ventilator associated pneumonia. The aim of this study is to identify the incidence of ventilator associated pneumonia in tracheostomised and non tracheostomised patients and to see if early tracheostomy can prevent development of ventilator associated pneumonia.

METHODS

The study was conducted at a tertiary care hospital during a period of four years. 100 patients who were on mechanical ventilation for various conditions requiring mechanical ventilation for more than 7 days for varying conditions such as COPD with respiratory failure, carcinoma lung, cerebro vascular accidents, patients with head injury, post-operative neurosurgical cases etc where taken up for the study. APACHE 4 scoring system was used to identify changes in patients' physiological balance and short-term risk of death. This scoring system generates a point score ranging from 0 to 286 based on various physiological variables, age and underlying health. Those patients with APACHE 4 score less than 200 were only included as these patients could be studied for a longer period of time with no immediate risk of death as this would prevent drop outs of candidates from the study group which could alter the findings.

The patients selected where then categorized into two groups. First group included patients who underwent tracheostomy and the second group comprised of those who were not tracheostomised. Clinical pulmonary infection score was used to diagnose occurrence of ventilator associated pneumonia.[10,11] This scoring system serves as a tool to assist in diagnosis of ventilator associated pneumonia. The clinical pulmonary infection score is calculated on the basis of points assigned for various signs and symptoms of pneumonia. The incidence of ventilator associated pneumonia among the two groups where then compared. Other parameters like timing of tracheostomy and its association with occurrence of ventilator associated pneumonia where also analyzed.

Patients having pre-existing pneumonia prior to mechanical ventilation, patients with pulmonary edema and patients having ARDS where excluded from the study. Ethical clearance was taken from the institutional ethics committee. Consent was taken from the patients legal care takers for including patient in the study.

RESULTS

Total 100 patients where studied during the period of 4 years. Out of 100 patients that where studied 68 (68%) where males and 32 (32%) where females.

Out of 100 patients that where studied 42 (42%) patients underwent tracheostomy. Out of 42 patients who underwent tracheostomy 30 (71.4%) were males and 12 (28.57%) were females. Out of 100 patients studied 58 (58%) did not undergo tracheostomy. Out of 58 non-tracheostomised patients 38 (65.5%) were males and 20 (34.48%) were females (Table 1).

Table 1: Sex distribution.

Group	Males	Females	Total
Tracheostomised patients	30	12	42
Non tracheostomised patients	38	20	58

Of the 100 patients studied 14 (14%) patients where in age group of 18-25 years. Of these 6 patients (42.85%) underwent tracheostomy. 16 (16%) patients belonged to age group 26-35 of which 7 patients (43.75%). A 17 (17%) patients where in age group of 36-45 years of which 5 patients (29.41%) underwent tracheostomy. 24(24%) patients belonged to age group 46-55 years out of which 7 patients (29.16%) underwent tracheostomy. In the age group 66-75 there were 19 patients (19%) out of which 11 patients (57.89%) underwent tracheostomy. A 10 (10%) patients belonged to age group 76-85 years out of which 6 patients (60%) underwent tracheostomy. As per data depicted in table above majority of the patients (60%) were in the age group 36 to 75 years (Table 2).

Table 2: Age distribution.

Age in years	Tracheostomised patients	Non tracheostomised patients
18-25	6	8
26-35	7	9
36-45	5	12
46-55	7	17
66-75	11	8
76-85	6	4
Total	42	58

Out of 42 patients that underwent tracheostomy 23 (54.76%) patients underwent tracheostomy between 7-10 days of mechanical ventilation. A 11 (26.19%) patients underwent tracheostomy between 11-14 days after mechanical ventilation. Eight patients (19.04%) underwent tracheostomy after 14 days of mechanical ventilation. Majority of the patients (54.76%) underwent tracheostomy within 7 to 10 days of mechanical ventilation. As depicted in Table 3 majority of patients

(80.95%) that underwent tracheostomy underwent tracheostomy between 7 to 14 days after mechanical ventilation.

Table 3: Timing of tracheostomy.

Days on mechanical ventilation	No. of tracheostomised patients
7-10	23
11-14	11
>14	8

In our study, out of 100 patients studied 44 patients went on to develop ventilator associated pneumonia. Hence the total incidence of VAP was 44%. Out of the 42 patients who had undergone tracheostomy 13 (30.95%) patients had ventilator associated pneumonia. Among the non-tracheostomised patients 31 (53.44%) out of 58 patients developed ventilator associated pneumonia. Hence the incidence of ventilator associated pneumonia was much higher (22.49% higher incidence rate) among non tracheostomised patients compared to patients who underwent tracheostomy (Table 4).

Table 4: Incidence of ventilator associated pneumonia.

Group	Number of ventilator associated pneumonias
Tracheostomised patients	13 (30.95%)
Non tracheostomised patients	31 (53.44%)
Total	44 (44%)

Table 5: Timing of tracheostomy and incidence of ventilator associated pneumonias.

Days of mechanical ventilation prior to tracheostomy	Number of ventilator associated pneumonias
7-10	3 (12%)
11-14	5 (50%)
>14	5 (71.4%)

As shown in the Table 5 the incidence of ventilator associated pneumonia was much lesser (12%) in patients who underwent tracheostomy in the period 7 to 10 days after mechanical ventilation whereas in those who underwent tracheostomy after 11 days where much higher. Hence patients undergoing earlier tracheostomy had a clear advantage than those undergoing tracheostomy late or non tracheostomised patients in preventing ventilator associated pneumonia.

DISCUSSION

A total of 100 patients were included in our study. Out of 100 patients that where studied 68 where male and 32 where females. Out 42 patients who underwent tracheostomy 30 were males and 12 were females. Out of 58 non tracheostomised patients 38 were males and 20 were females.

It was found that majority of our patients (60%) were in the age group 36 to 75 years**.** In our study majority of the patients (54.76%) underwent tracheostomy within 7 to 10 days of mechanical ventilation which was similar to the studies done by Chaari et al and Huang et al.[12,13]

In our study, the total incidence of VAP was 44%. In our study out of the 42 patients who had undergone tracheostomy 13 (30.95%) patients had ventilator associated pneumonia which was similar to the study done by Chaari et al.[12] Among the non tracheostomised patients 31 (53.44%) out of 58 patients developed ventilator associated pneumonia. This shows that the incidence of ventilator associated pneumonia was much higher among non tracheostomised patients compared to patients who underwent tracheostomy in the present study.

In our study, the incidence of ventilator associated pneumonia was much lesser (12%) in patients who underwent tracheostomy in the period 7 to 10 days after mechanical ventilation, whereas in those who underwent tracheostomy after 11 days where much higher which was similar to the study done by Huang et al.[13] Hence patients undergoing earlier tracheostomy had a clear advantage than those undergoing tracheostomy late or non tracheostomised patients in preventing ventilator associated pneumonia.

CONCLUSION

Ventilator associated is a major cause for mortality and morbidity among patients on long term mechanical ventilation. All possible measures should be taken to taken prevent occurrence of ventilator associated pneumonia. From our studies it is evident that tracheostomy done earlier around 7-10 days post mechanical ventilation can effectively reduce the incidence of ventilator associated pneumonia. Hence early tracheostomy should be considered in patients who require long term mechanical ventilation.

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