

Endotracheal Intubation versus Tracheostomy in Critically ICU Patients Requiring Prolonged Mechanical Ventilation: A Comparative Study

Shilpika Kakoty¹, Debolina Sarkar², Madhusmrita Ghosh³, Karuna Kumar Das⁴

Corresponding Author: Shilpika Kakoty

Room no 16, 200 bedded PG Girls Hostel, Assam Medical College College & Hospital, Dibrugarh, Assam – 786002, India

Email: [shilpikakakoty\[at\]gmail.com](mailto:shilpikakakoty[at]gmail.com)

Abstract: ***Aim:** To compare prolonged endotracheal intubation with tracheostomy in critically ill icu patients requiring prolonged mechanical ventilation. **Methods:** he study design was prospective and retrospective, comparative study, including 100 patients aged between 18 - 70 years on prolonged mechanical ventilation. These patients were divided into patients on prolonged intubation and patients requiring tracheostomy, depending on timing of tracheostomy, if done within one week after intubation they are considered as early tracheostomy group and late tracheostomy group if done after one week of intubation. These patients are assessed on parameters like total duration of mechanical ventilation, length of ICU stay and mortality rate. **Results:** It is observed that early tracheostomy has reduced the duration of mechanical ventilation than late tracheostomy, In hospital mortality rate is high among patients on prolonged intubation than patients on tracheostomy. Early tracheostomy patients has decreased length of ICU stay, consequently shortened length of hospital stay when compared to late tracheostomy group. **Conclusion:** Early tracheostomy (done within 1 week after intubation) has significantly increased the number of ventilator free days, reduced ICU and overall length of hospital stay.*

Keywords: Endotracheal Intubation, Tracheostomy, Critical Ill ICU Patients, Hospital Stay, ICU Stay.

1. Introduction

Tracheostomy is performed primarily in critically ill patients with acute respiratory failure who require prolonged mechanical ventilation and/or in whom multiple attempts to wean from mechanical ventilation have been unsuccessful for 14 to 21 days¹. A tracheostomy is the creation of a stoma at the skin surface of the neck which leads into the tracheal lumen. ²The benefits of tracheostomy over prolonged intubation are: lessen use of sedation, less trauma to the oropharynx and larynx, reduced work of breathing and improved clearance of secretions from airway, shorten periods of mechanical ventilation and eventually decreased length of ICU and hospital stay³.

Aims:

To compare prolonged endotracheal intubation with tracheostomy in critically ill ICU patients requiring prolonged mechanical ventilation.

Objectives:

To compare prolonged endotracheal intubation with tracheostomy in critically ill ICU patients requiring prolonged mechanical ventilation.

2. Materials and Methods

Study Place: Assam Medical College & Hospital

Study Design: Retrospective and Prospective Comparative study

Study Period: December 2021 - December 2022

Subject Selection: Central ICU, AMCH

Inclusion Criteria:

- 1) Age above 18 years
- 2) Both sexes (male and female)
- 3) Requiring prolonged mechanical ventilation

Exclusion Criteria:

- 1) Age less than 18 years
- 2) Laryngotracheal trauma
- 3) Malignant growth larynx

Ethical Committee Approval:

Ethical clearance was taken from the Institutional Ethics Committee (H), AMCH. All patients were given information outlining the experimental protocol and all the patients signed a consent form prior to entering the study.

Methodology

It is a retrospective and prospective comparative study of 100 intensive care unit patients requiring prolonged mechanical ventilation. After getting approval from the ethical committee, this study was conducted. it was carried out in our tertiary care hospital affiliated to a teaching Institute. The period of the study is from December 2021 to December 2022.

The total number of patients included in our study are 100, between the age group of 18 - 70 years of both sexes. These patients are intubated as their Glasgow Coma Scale (GCS) falls less than 8.

3. Statistical Analysis & Results

- Data was analysed using SPSS software version 16.0 and P value less than 0.05 was considered statistically significant. Continuous variables were presented as mean \pm SD (standard deviation) and categorical variables were represented as frequencies and percentages.
- Mean was compared by student T - test and ANOVA test.
- Categorical variables were analysed by Chi - square test.

4. Results

Table 1: Gender Distribution

| Gender | Early (n) | Early (%) | Late (n) | Late (%) | Prolonged (n) | Prolonged (%) |
|--------|-----------|-----------|----------|----------|---------------|---------------|
| Male | 33 | 70.21 | 16 | 64.00 | 21 | 75.00 |
| Female | 14 | 29.79 | 9 | 36.00 | 7 | 25.00 |
| Total | 47 | 100.00 | 25 | 100.00 | 28 | 100.00 |

Of the 100 patients, 70 were male and the remaining 30 were female. In early tracheostomy group, males contribute to 70% in comparison to 64% of late tracheostomy group. Females were 29% in Early Tracheostomy (ET) group when compared to 36% in Late Tracheostomy (LT). In prolonged intubation group also males are 75% when females were 25%.

Table 2: Age Distribution

| Age | Early (n) | Early (%) | Late (n) | Late (%) | Prolonged (n) | Prolonged (%) |
|---------|-----------|-----------|----------|----------|---------------|---------------|
| <20 | 2 | 4.26 | 0 | 0.00 | 3 | 10.71 |
| 20 - 30 | 10 | 21.28 | 4 | 16.00 | 10 | 35.72 |
| 30 - 40 | 12 | 25.52 | 7 | 28.00 | 8 | 28.57 |
| 40 - 50 | 6 | 12.77 | 4 | 16.00 | 1 | 3.57 |
| 50 - 60 | 11 | 23.40 | 8 | 32.00 | 6 | 21.43 |
| 60 - 70 | 6 | 12.77 | 2 | 8.00 | 0 | 0.00 |
| Total | 47 | 100.00 | 25 | 100.00 | 28 | 100.00 |

Of the total study group majority of patients around 26% lie in the age group of 30 - 40 years followed by 50 - 60yrs age group. In prolonged intubation group much of the patients around 35% were in age group between 20 - 30 yrs. In early tracheostomy group not much of the difference between age groups noted whereas in LT group 32% of patients lie in the age group of 50 - 60 years.

Table 3: Duration of Mechanical Ventilation

| | Early | Late | Prolonged |
|-----------|---------------------|-------|-----------|
| Mean | 10.42 | 20.86 | 7.33 |
| SD | 4.72 | 8.30 | 3.62 |
| p - value | 0.001 (significant) | | |

Among the early tracheostomy group, mean duration of ventilation is 10 days when compared to 20 days of late tracheostomy group. p value is 0.001, which is statistically significant.

Table 4: Days Stay in ICU

| | Early | Late | Prolonged |
|-----------|--------------------|-------|-----------|
| n | 42 | 21 | 15 |
| MEAN | 13.07 | 27.00 | 8.80 |
| SD | 7.07 | 10.62 | 4.02 |
| p - value | 0.00 (significant) | | |

ET group had to stay 13 mean days when compared to 27 mean days of LT group. p value is 0.000, which is statistically significant.

Table 5: Days Stay in Hospital

| | Early | Late | Prolonged |
|-----------|--------------------|-------|-----------|
| n | 41 | 20 | 21 |
| MEAN | 19.29 | 32.60 | 13.95 |
| SD | 8.76 | 10.59 | 9.53 |
| p - value | 0.00 (significant) | | |

ET group patients had to stay on an average 19 days when compared to 32 mean days for LT group. p value is 0.000, which is statistically significant.

5. Discussion

The present study was conducted from December 2021 to December 2022. 100 patients of both sexes were included in the study. Males are more common contributing 70% to the total study group. Age group ranged from 18 - 70 years with mean age 40 ± 10 years. Of the total study group majority of patients around 26% lie in the age group of 30 - 40 years followed by 50 - 60yrs age group. In prolonged intubation group much of the patients around 35% were in age group between 20 - 30 yrs in early tracheostomy group not much of the difference between age groups noted whereas in LT group 32% of patients lie in the age group of 50 - 60 years. Of the total 100 patients, tracheostomy was done in 72 patients of which, early tracheostomy (within one week of intubation) was done in 47 patients and late tracheostomy (done anytime after one week) was done in 25 patients. Remaining 28 patients continued to be intubated. p value is 0.17, not significant. So once patient is anticipated of prolonged ventilation, immediate tracheostomy should be done as we know that tracheostomy has the advantages of reducing dead space ventilation, reducing airway resistance, decreasing the work of breathing thereby it promotes weaning of mechanical ventilation at the earliest allows patient to talk, swallow and reduces the risk of aspiration promoting easy withdrawal from ventilator. Immediate outcome at the time of discharge. Among ET group 42 patients improved contributing to 89.36% compared to 72% of LT group. 4 among ET and 5 among LT group expired, whereas 6 out of 28 patients of prolonged intubation group contributing to 21.43% died, one each of ET and LT group had residual paralysis. p value is 0.41, statistically not significant. Thus there is no difference in mortality rate between two study groups. Among the early tracheostomy group, mean duration of ventilation is 10 days when compared to 20 days of late tracheostomy group. p value is 0.001, which is statistically significant. ET group had to stay 13 mean days in ICU when compared to 27 mean days of LT group. p value is 0.000, which is statistically significant. This is similar to Rumbak et al study where they found reduced length of stay in intensive care patients after early tracheostomy (4.8 ± 1.4 versus 16.2 ± 3.8 days).⁴

6. Limitation

Lack of prospective, randomized controlled trials, physician bias and patient's comorbidities, that further confound the decisions regarding the exact timing of tracheostomy.

7. Conclusion

(delayed tracheotomy) in critically ill medical patients.
Critic.

The study population was divided into prolonged intubation, early tracheostomy and late tracheostomy groups.

From the study it has been concluded that

- 1) GCS <7 appears to be a predictable indicator for patients requiring prolonged mechanical ventilation
- 2) Common causes for repeated intubation are found to be sudden desaturation, tube block and excessive tracheal secretions. In turn it causes airway injury like supraglottic laryngeal injury glottic injury and ulceration supraglottic stenosis, mucosal ulceration and oedema of epiglottis, vocal cord paralysis, subglottic stenosis, tracheal stenosis and ventilator associated pneumonia.
- 3) In hospital mortality rate is high among prolonged intubation group than other groups, however long term mortality rate remains the same between the study groups.
- 4) Tracheostomy tube block is seen in the immediate post operative period and this could be avoided by adequate knowledge about suctioning.
- 5) Patients on prolonged intubation for more than 7 - 10 days are more prone for airway injuries such as supraglottic and glottic injuries and end up in long term complications like tracheal stenosis. Cuffed tubes should be of appropriate size and the cuff pressure to be maintained within 20mmHg. there are cuff pressure monitors available, which should be routinely used to avoid above complications.
- 6) From the study it is analysed that tracheostomy performed within 7 days after intubation was associated with shortened duration of mechanical ventilation and length of ICU and hospital stay than late tracheostomy group.
- 7) The earlier withdrawal of Mechanical Ventilation, thereby decreasing the exposure of patients to its risks, is the prime factor responsible for the longer survival among the patients undergoing early tracheostomy
- 8) Tracheostomy should be carried out as soon as the need for prolonged airway support is expected.
- 9) Surgical tracheostomy should be planned by 7 - 10 days if patient could not be extubated.

References

- [1] Rana S, Pendem S, Pogodzinski MS, Hubmayr RD, Gajic O. Tracheostomy in critically ill patients. In Mayo Clinic Proceedings 2005 Dec 1 (Vol.80, No.12, pp.1632 - 1638). Elsevier.
- [2] Watinton JC CR. No Title. In: Scotts - Brown's Otorhinolaryngology and Head and Neck Surgery: Volume 3: Basic Sciences, Endocrine Surgery.2018. p.12: 104.
- [3] Zirpe KG, Tambe DV, Deshmukh AM, Gurav SK. The impact of early tracheostomy in neurotrauma patients: a retrospective study. Indian Journal of Critical Care Medicine: Peer - reviewed, Official Publication of Indian Society of Critical Care Medicine.2017 Jan.
- [4] Rumbak MJ, Newton M, Truncala T, Schwartz SW, Adams JW, Hazard PB. A prospective, randomized, study comparing early percutaneous dilational tracheostomy to prolonged translaryngeal intubation

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