

A Hospital-Based Comparison of Extended Tracheostomy and Extended Endotracheal Intubation in Toxicology ICU Patients Needing Extended Mechanical Ventilation at Tertiary Care Facility

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Abstract

Background: There is disagreement about the relative benefits of tracheostomy vs intubation for patients in the resuscitation unit. Our study's primary goal is to determine if tracheostomy, as opposed to extended intubation, reduces the death rate, the mean length of ventilation, the incidence of nosocomial pneumopathy, and the mean period of hospitalisation in the intensive care unit. To emphasise the dangers of prolonged translaryngeal intubation and to evaluate the advantages of early vs late tracheostomy. **Material and Methods:** Twenty-five patients of both sexes, aged 15 to 75, are included in our study. Because their Glasgow Coma Scale (GCS) is less than 8, these individuals are intubated. From the date of admission to the date of release, the average number of days spent in the hospital is computed and compared between the two research groups. SPSS version 16.0 was used to analyse the data, and a P value of <0.05 was considered statistically significant. **Results:** Our analysis revealed that the mean age, gender, and GCS on the first and second days were not statistically significant. However, amongst the various interventions, reintubation, the length of mechanical ventilation, and hospital stays in the intensive care unit were statistically significant. Compared to 75% of the LT group, 24 patients in the ET group improved, accounting for 87.5% of the total. Two patients in the ET group and one in the LT group passed away. In contrast, three out of fourteen patients in the extended intubation group—or 21.42% of the total—died, and one patient in each of the ET and LT groups had persistent paralysis. With a p-value of 0.49, it is not statistically significant. **Conclusion:** Tracheostomy was linked to a reduced death rate compared to extended intubation in severely sick individuals. The date of the tracheostomy, whether it was done early or later, did not affect mortality.

Keywords: Early tracheostomy, Late tracheostomy, Prolonged ventilation, critically ill patients, ICU.

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INTRODUCTION

The most common operation for severely unwell patients is tracheostomy.^[1] It is performed on individuals who need continuous breathing. Tracheostomy is superior to prolonged intubation because it requires less sedation, causes less damage to the larynx and oropharynx, improves airway secretions clearance, reduces the time spent on mechanical ventilation, and shortens hospital and intensive care unit stays. Tracheostomy shortens the time of artificial breathing, improves patient comfort, lessens the need for sedatives, and promotes pulmonary hygiene.^[2,3] Although there is no evidence to support the procedure, many doctors advocate for early tracheostomy in severely sick patients who need continuous mechanical breathing. Despite several trials, the therapeutic advantages of early tracheostomy in the general intensive care unit (ICU) population are still unknown.^[4,5] Compared to patients who had early tracheostomy, those who had longer tracheal intubation—and as a result, some of them had late tracheostomy—had more serious problems, including ventilator-associated infections and airway injury. Our study's primary goal is to determine whether tracheostomy, rather than extended intubation, reduces the

mortality rate, the mean duration of ventilation, the incidence of nosocomial pneumonia, and the mean length of intensive care unit hospitalisation. To emphasise the dangers of prolonged translaryngeal intubation and to evaluate the advantages of early vs late tracheostomy.

MATERIALS AND METHODS

50 patients in the critical care unit who needed continuous mechanical breathing at Shree Kalyan Government Medical College in Sikar, Rajasthan, India, participated in this hospital-based prospective research over the course of a year. Before beginning the trial, each patient signed a permission form and

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received information about the experimental methodology.

Criteria for inclusion:

1. Being older than 15
2. The male and female sexes
3. The need for extended mechanical ventilation

Criteria for exclusion:

1. Under 15 years old
2. Trauma to the larynx
3. Malignant growth of the larynx

Methods:

Fifty patients, both male and female, ages 15 to 75, are enrolled in our research. These patients' Glasgow Coma Scale (GCS) drops below, and they are intubated. Eight. The purpose of this scale is to evaluate the degree of brain damage. It consists of the following elements: movement, speech, and eye-opening evaluation.

Brain damage is classified as mild if GCS is more than or equal to 13, moderate if GCS is between 9 and 12, and severe if GCS is fewer than 8. This evaluation should be conducted carefully to assess the patient's ability to maintain his airway independently and to determine his prognosis. On the third day, a spontaneous breathing trial (SBT) was tried. The capacity to sustain spontaneous breathing and be ready for extubation is known as SBT. This depends on the patient's breathing pattern, gas exchange volume, haemodynamic stability, and level of comfort. If he or she can endure SBT for 30 to 120 minutes, they are deemed fit. Reintubation has been performed in a small number of patients due to respiratory weakness concealed by pressure support, inadequate coughing, excessive secretions, poor airway reflexes resulting in aspiration, increased upper airway resistance, and the onset of new pathology. Intubation is either prolonged, or a tracheostomy is scheduled if SBT is unsuccessful. We have divided tracheostomy patients into two categories based on Griffiths and Barber et al.'s definitions: early tracheostomy (surgery done within a week of intubation) and late tracheostomy (surgery done beyond a week of intubation).

Procedure: Under local anaesthesia, a tracheostomy is performed when the patient is supine and has a sandbag placed under their shoulders. The Jackson's safety triangle, which is defined by the lower border of the cricoid cartilage

as the upper limit and the anterior borders of the sternocleidomastoid on each side, shows local infiltration. From the lower edge of the cricoid cartilage to the suprasternal notch, a vertical incision is created. Strap muscles, subcutaneous tissue, and skin were located and separated from the midline. Dissection of the deep cervical fascia investing layer. The thyroid isthmus was located and pulled back from above—verified tracheal position. A tracheal window was then created to separate the second and third tracheal rings. A low-pressure, high-volume Portex tracheostomy tube of the proper size is introduced, and the bulb is inflated. Total haemostasis was achieved. Layers of the wound closed.

The bilateral airway was examined and confirmed to be sufficient. Per-operative problems, such as haemorrhage, abrupt desaturation, tube displacement, tube in the wrong track, etc., are discussed. The average number of days spent in the hospital is calculated and compared between the two study groups from the date of admission to the date of discharge.

Videolaryngoscopy (VLS) is performed on these patients within 1 month of discharge and repeated 6 months later. The immediate result at the time of release is also investigated. As a result, patients' outcomes are evaluated after 6 months. Statistical analysis: The data was analysed using SPSS version 16.0, and a P value of less than 0.05 was deemed statistically significant. Categorical data were shown as percentages and frequencies, whereas continuous variables were shown as mean ± SD (standard deviation).

RESULTS

Our study showed that, gender-wise, the mean GCS on days 1 and 2 was not statistically significant. But reintubation, mechanical ventilation duration, and ICU stay were statistically significant between the interventions [Table 1]. Reintubation attempts are thus less frequent in the early tracheostomy group and more frequent in the protracted intubation group, followed by the LT group. Compared to 75% of the LT group, 24 patients in the ET group improved, accounting for 87.5% of the total.

Two patients in the ET group and one in the LT group passed away, while three out of fourteen patients in the extended intubation group—or 21.42% of the total—died; one patient in each of the ET and LT groups had persistent paralysis. [Table 2] shows that the P-value is 0.49, which is not statistically significant.

Table 1: Comparison of mean value of variables in different intervention

Variables	Intervention			P-value	
	Early (N=24,48%)	Late (N=12, 24%)	Prolonged (N=14,28%)		
Mean age (yrs)	40.35±10.5	46.48±12.7	48.24±13.6	>0.05	
Sex	Male	17 (70.83%)	8 (66.66%)	10 (71.42%)	>0.05
	Female	7 (29.17%)	4 (33.33%)	4 (28.58%)	
GCS on day 1st	7.16±1.32	6.85±1.03	6.92±1.01	0.74	
GCS on Day 3rd	6.35±1.08	6.03±0.87	6.63±2.13	0.48	
Reintubation	Yes	4 (16.66%)	6 (50%)	7 (50%)	<0.05*
	No	20 (83.33%)	6 (50%)	7 (50%)	
Duration of mechanical ventilation (in days)	10.35±4.66	21.23±7.68	7.74±3.51	<0.05*	
Hospital days in ICU	13.78±6.98	27.21±10.52	8.96±3.96	<0.05*	

Table 2: Immediate outcome (at the time of discharge)

Immediate outcome	Intervention			P-value
	Early (N=24,48%)	Late (N=12, 24%)	Prolonged (N=14,28%)	
Complication	0 (0%)	1 (8.33%)	1 (7.14%)	>0.05
Residual Paralysis	1 (4.16%)	1 (8.33%)	0 (0%)	
Improved	21 (87.5%)	9 (75%)	10 (71.42%)	
Expired	2 (8.33%)	1 (8.33%)	3 (21.42%)	

DISCUSSION

In the intensive care unit, tracheostomy is a common procedure. It is advised to: reduce laryngeal ulceration; improve movement and speech; improve respiratory mechanics, nutrition, patient comfort, and secretion clearance; and permit patient care outside the intensive care unit.^[6] There is still debate over the best timing to conduct a tracheostomy. When severely sick patients are ventilated for 14 days, an early tracheostomy may be far more beneficial than a delayed one. These include decreases in mortality rate, pneumonia incidence, time spent in critical care, and mechanical ventilation duration.^[7] Bouderka found that early tracheostomy reduces the overall number of ventilator days and mechanical ventilatory duration after pneumonia in patients with isolated severe head injuries in the intensive care unit. It did not lower death, pneumonia rates, or ICU stays.^[8] At the time of intubation, the ET group's mean GCS score was 7.16, but the LT and extended intubation groups' scores were 6.85 and 6.92, respectively. At 0.65, the p-value is not significant. To investigate the predictive validity of the GCS for tracheostomy, Lanza et al,^[9] conducted a retrospective analysis of 47 patients with head injuries. Thirteen individuals had a GCS > 7, whereas 34 patients had a GCS below 7. They discovered that tracheostomy is much more likely in individuals with a GCS < 7. Ross and colleagues (2010) found that an alveolar-arterial oxygen gradient (A-a O₂) ≥ 100-150, a GCS < 7, and age > 40 years were all reliable indicators of extended mechanical ventilatory support. According to Gurkin et al. (2011), tracheostomy is predicted by GCS ≤ 8 on presentation and an Injury Severity Score > 25. In our research, reintubation attempts are most prevalent in the extended intubation group, followed by the LT group, and least common in the early tracheostomy group. This is like a retrospective study conducted by Koh et al. (12, who found that 20 of the patients were victims of trauma and required admission to the neurosurgical ICU.

Among the ET group, 24 patients improved, contributing to 87.5% compared to 75% of the LT group. 2 among the ET group and one in the LT group expired, whereas 3 out of 14 patients of the prolonged intubation group, contributing to 21.42% died; one patient each in the ET and LT groups had residual paralysis. The p-value is 0.49, which is not statistically significant in our study. As a result, the two research groups' death rates are identical. Similar findings were reported by Arabi et al,^[13] who observed no difference in total hospital mortality between the ET and LT groups (17 vs. 14%). Similar differences were discovered by Kollef et al,^[14] (13.7 vs. 26.4). Compared to the late tracheostomy group, which had a mean ventilation length of 21.23 days, the early tracheostomy group had a mean ventilation duration

of 10.35 days. The statistical significance of the p-value is 0.001. This result is comparable to the Rumbak et al. study.^[7] As a result, they had to stay on the ventilator for a longer period than patients who had tracheostomies earlier, which had results comparable to those in our research. Lesnik and colleagues,^[15] conducted a retrospective analysis of 101 blunt multiple trauma patients. Thirty-two individuals received tracheostomies within 4 days following intubation. They found that the ET group had a shorter duration of mechanical ventilation and a reduced incidence of nosocomial pneumonia. Similar findings of shorter ICU and hospital stay, as well as less time spent on mechanical breathing, were reported by Rodriguez et al,^[16] in the early tracheostomy group. In a comparison tour research, Meng L. and colleagues,^[17] discovered that although ET may be able to shorten the duration of sedation, it did not change the mortality, incidence of VAP, duration of MV, or length of ICU stay.

CONCLUSION

We concluded that tracheostomy was linked to a lower death rate than extended intubation in critically sick individuals. The date of the tracheostomy, whether it was done early or later, did not affect mortality. In patients in the medical intensive care unit, tracheostomy reduces ventilation time, delay the onset of nosocomial pneumonia without altering its incidence, and not change the average length of hospital stay or mortality.

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Conflicts of interest

There are no conflicts of interest.

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