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Original Research Article

EARLY TRACHEOSTOMY MIGHT DECREASE THE DURATION OF HOSPITALIZATION AMONG ICU PATIENTS

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ABSTRACT

Background: *Prolonged invasive mechanical ventilation in critically ill patients can result in adverse outcomes, prompting consideration of tracheostomy (TQT) as a potential intervention. However, the optimal timing for TQT remains uncertain, necessitating further investigation into the clinical characteristics of patients undergoing early versus late TQT.* ***Objectives:*** *To compare outcomes, including duration of mechanical ventilation, ICU and hospital stays, and mortality rates, between patients undergoing early TQT (within approximately ten days of oro-tracheal intubation) and those undergoing late TQT (after ten days).* ***Study Design:*** *This study utilised a retrospective cohort design.* ***Setting:*** *Data were collected from patients admitted to Bahria International Hospital's ICU.* ***Duration of Study:*** *Data collection occurred between January 2022 and December 2023.* ***Material and Methods:*** *Patients were stratified based on the timing of TQT placement, and clinical outcomes were analysed accordingly. Parameters assessed included duration of mechanical ventilation, ICU and hospital stays, and mortality rates.* ***Results:*** *Patients in the early TQT group demonstrated shorter ICU and hospital stays (20 ± 17 vs. 33 ± 23 days, p = 0.03; 43 ± 33 vs. 53 ± 49 days, p = 0.01, respectively), reduced duration of mechanical ventilation (18 ± 15 vs. 31 ± 19 days, p < 0.001), and a higher ICU survival rate (64% vs. 55%).* ***Conclusion:*** *Early tracheostomy placement, performed within ten days of mechanical ventilation initiation, appears to confer benefits in shorter ICU and hospital stays, reduced mechanical ventilation duration, and improved ICU survival rates. These findings highlight the importance of timely TQT placement in critical care management strategies.*

Keywords: Tracheostomy, Mechanical Ventilation, Intensive Care Units, Critical Illness, Patient Outcomes

INTRODUCTION

Tracheostomy (TQT) is a frequent surgical technique in severely unwell long term ventilated patients hospitalized in intensive care units (ICUs) (Park et al., 2021b). The literature is still lacking in clarity regarding when to do and which surgical approach is better, who qualifies for it, and how long it should take to decannulate the patient. (1).

If a patient requires ventilatory assistance for more than six hours per day or for more than 21 days, their IMV is deemed required (2). The following side effects are conceivable with IMV use: diaphragmatic malfunction (3), critically sick polyneuropathy (4-6), pneumonia linked to IMV(3, 7), prolonged ICU and hospitalizations, and increased healthcare expenses (5, 6). Furthermore, there is proof that TQT is a distinct indicator of reduced ICU and hospital stays and lower healthcare expenses. This technique has been employed to reduce IMV duration(6).

Even though tracheostomies are often used, the best time to execute one is still a topic of significant debate in the scientific literature. Recommendations differ depending on the most varied periods for IMV usage, particularly when defining terms like early and late tracheostomy(8, 9). In the Cochrane study(8), Andriolo et al. employed an arbitrary cut-off time of 10 days since, typically, the patient becomes subjected to tracheostomy after the 14th day following orotracheal intubation. Concerning the relationship between early (~10 days) and late (> ten days) tracheostomy and mortality, duration of stay in the intensive care unit, duration of hospitalization, and days without mechanical ventilation, there is still disagreement in the literature.

The present research aimed to examine these clinical results over a year in critically sick patients at our hospital.

METHODOLOGY

This retrospective study was conducted from January 2022 to December 2023 at the Bahria International Hospital in Lahore. Patients hospitalized in the ICU throughout the study timeframe who were given tracheostomy were included. Individuals below 18 years old or with insufficient medical records were rejected.

The following information was gathered about the patients: anthropometric measurements, the diagnosis made at the point of the ICU admission, the date and result of the ICU discharge, the date and result of the hospital's discharge, the comorbidity index computation (10), the date of the tracheostomy, the duration of the intensive care unit (ICU) stay, and the scores from the Acute Physiology and Chronic Health Evaluation II (APACHE II) and Sequential Organ Failure Assessment (SOFA) that were determined at the time of the patient's admission. Based on the cutoff point used for classification, the patients were split into two groups: early TQT (ET) and late TQT (LT), which represented ten days of orotracheal intubation measured from the date of occurrence. Patients were tracked until their death or discharge from the hospital, and information was gathered from the electronic database maintained by the organization and the patient's medical file. The patient's intensivist chose the time of the tracheostomy based on the needs of the patient and the nature of the service. The Institutional Ethics and Research Committee acknowledged the research. Consent was not taken due to the retrospective nature of the study.

Data was analyzed using SPSS program 21. The findings are presented as the mean as well as the standard deviation (SD). We utilized the chi-square test for comparing categorical data & the Mann-Whitney test in order to analyze early and late TQT groups. We employed univariate and multivariate logistic regression techniques to

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identify potential mortality risk factors. The threshold of statistical significance used was $p < 0.05$.

RESULTS

During the research period, 55 patients who had undergone tracheostomy and were admitted to the intensive care unit were incorporated into the study population. Because complete information for analysis was not available for five patients, fifty patients were investigated in this study.

The early tracheostomy (ET) group consisted of 25 patients (15 males) with an average age of 59 ± 19 years. The late tracheostomy (LT) group of 25 patients (17 males) with an average age of 57 ± 21 years. The study found that patients in the LT category had higher SOFA index scores (p = 0.01) but comparable comorbidities (p = 0.06) than those in the ET group. (Table 1)

Table 2 compares clinical variables between patients undergoing early tracheostomy (n=25) and late tracheostomy (n=25). Notably, early tracheostomy correlates with shorter ICU and hospital stays (20 ± 17 days vs. 33 ± 23 days, P = 0.03; 43 ± 33 days vs. 53 ± 49 days, P = 0.01 respectively), reduced time on mechanical ventilation (<0.0001), and more extended periods off mechanical ventilation (P = 0.04) (Figure 1). Although there's a trend towards improved survival in the early tracheostomy group in both ICU (64% vs. 56%, P = 0.05) and hospital settings (56% vs. 52%, P = 0.08), these differences aren't statistically significant. The PaO2/FiO2 ratio, an indicator of oxygenation, doesn't significantly differ between the groups (P = 0.01). These findings suggest that early tracheostomy may confer benefits in terms of shorter ICU and hospital stays and reduced time on mechanical ventilation, potentially influencing patient outcomes, though further research is needed to validate these observations.

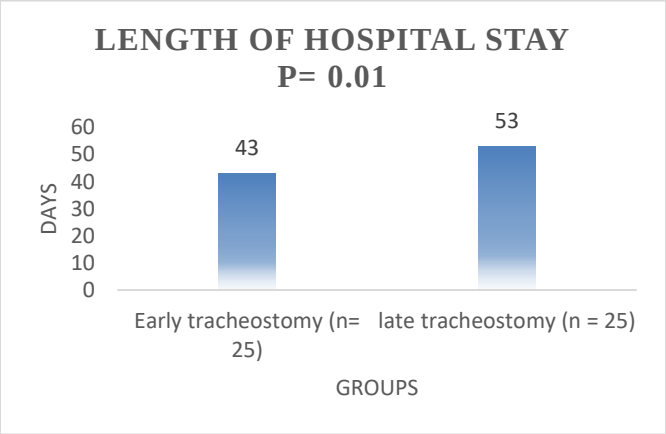

Figure 1: Comparison of length of hospital stay between

Table 1 Patient's demographics

Variable	Total	Early tracheostomy (n= 25)	late tracheostomy (n = 25)	P value
Sex (F/M)	18/32	10/15	8/17	0.54
Age (years)	58 ± 20	59 ± 19	57 ± 21	0.14
Performing a tracheostomy (days)	12 ± 13	6 ± 4	19 ± 21	0.02
SOFA	10 [7–13]	10 [8–12]	11 [9–13]	0.01
APACHE II	26 [21–33]	26 [21–32]	27 [21–34]	0.21
Number of comorbidities	3 [1–4]	6 [2–8]	8 [3–8]	0.06

Table 2 compares the duration of stay and results of the early and late tracheostomy groups.

Variable	Total	Early tracheostomy (n= 25)	Late tracheostomy (n = 25)	P value
ICU duration of stay (days)	26 ± 21	20 ± 17	33 ± 23	0.03
Hospital duration of stay (days)	48 ± 43	43 ± 33	53 ± 49	0.01
Time spent on mechanical ventilation	24 ± 19	18 ± 15	31 ± 19	<0.0001
Time off mechanical ventilation	24 ± 39	26 ± 29	22 ± 48	0.04
ICU outcome (survival/death	32/18	64% / 36%	56% / 44%	0.05
Hospital outcome (survival/death	27/23	56% /44%	52% / 48%	0.08
PaO2/FiO2 ratio	249 [184–325]	243 [176–321]	256 [193–323]	0.01

DISCUSSION

The present research adds to the scientific literature by supporting early tracheostomy in severely sick patients receiving extended IMV. It showed benefits when the TQT was done before ten days of orotracheal intubation.

The SOFA tool evaluation revealed that patients in the early (ET) and late (LT) tracheostomy groups differed in terms of organ dysfunction and the variety of comorbidities linked to the primary diagnosis. Specifically, the ET group showed fewer comorbidities and lower organic dysfunction. These findings partially support the literature since studies highlight the advantages of early tracheostomy despite variations in the scores between the groups under study (11-13). There were no differences in hospital mortality across the groups when comparing the hospital outcomes, and early tracheostomy installation had no effect on the hospital survival rate. These results align with the previous research (14-16)**.** The benefits of early tracheostomy still need to be taken into account when making clinical decisions, even though mortality is a highly significant outcome in clinical practice, and there is no difference between the early and late groups. Health costs must be evaluated when factors like hospital and ICU days are examined. In the current study, along with a systematic review conducted by Cochrane that was published in 2015 by Andriolo et al. (8), a comparison using the arbitrary cut-off mark of the early and late TQT of ten days was reported, Similar to what was reported in this study, the authors of that review showed that patients having early tracheostomy stay in the ICU and hospital for shorter periods and are on IMV for fewer days overall. The PaO2/FiO2 ratio shows a statistical difference between the groups, although this difference is not clinically significant because both groups experience moderate hypoxemia. Therefore, the current study supports the scientific literature suggesting early tracheostomy in severely sick patients—a subject still requiring more research.

There are many limitations related to this research that should be kept in mind while evaluating the results of this study. The current study is brief and comprises a limited number of participants, and it is retrospective.

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CONCLUSION

Although there are no differences in the in-hospital death rate, tracheostomy surgery performed on critically sick patients within ten days following oro tracheal intubation results in a shorter duration of admission in the hospital and the ICU and less time spent on invasive mechanical ventilation.

DECLARATIONS

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned.
Consent for publication
Approved
Funding
Not applicable

CONFLICT OF INTEREST

The authors declared absence of conflict of interest.

AUTHOR CONTRIBUTION

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