



Tracheostomy Timing in Adult Patients with Head Injury at King Abdulaziz Medical City Hospital, Riyadh, Saudi Arabia (Cross Sectional-Retrospective Study)

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Authors' contributions

This work was carried out in collaboration among all authors. Author FA was the principal investigator of the research project, accountable for designing of the entire work. Authors HHA, RAA and RNA were responsible for the data collection, data management and assisted in collection of literature and write up. Authors PDT, WP and NNM were liable for data analysis and for the write up. Authors PDT and NNM assisted in writing and attending to comments of the referees and rewriting some parts of the manuscript. They were responsible to correspond with the journal. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Tracheostomy is one of the most common procedures that done to critical patients such as head injury ones to improve their situation. It is done by creating an anterior stoma in the neck and inserting a short tube to maintain stoma open.

Objective: The objective of this study was to determine if there were benefits of early tracheostomy and the following components: ICU stay, hospital stay, ventilation- associated-pneumonia, weaning from Mechanical Ventilator, Glasgow Coma Scale, and decannulation.

Methods: This study was done retrospectively, and non-random sampling involved 56 head injury patients with a tracheostomy who were admitted to ICU in King Abdulaziz medical city (KAMC). Out of 56 head injury patients who underwent an early tracheostomy (≤ 12 days) were 25 patients and late tracheotomy (>12 days) were 31 patients. Using data collection form which contains demographic data, intubation duration, tracheostomy, decannulation, MV, Glasgow coma scale, VAP, ICU, and hospital stay.

Results: Total of 56 head injury patients with tracheostomy; their age ranges from 18-80 years with the mean 41.77years, height 168.95cm, and weighs 69.07kg. Head injury patient in this paper was classified according to the day that was done the procedure on after the injury occurred. Which result in 25 patients had early tracheostomy ≤ 12 days with a mean of (9.8 days) and median (10), whereas 31 patients had late tracheostomy >12 with mean of (17.677 days) and median (16).Patients with early tracheostomy showed significant (P-value <0.05) less length stay in ICU (22.68 days), MV duration (15.16 days), decannulation (27.80 days) compared with late trach ICU stay (33.10 days), MV duration (28.10 days), decannulation (47.03 days). VAP incidence among patients with a late trach was 12.90% and there were no VAP with an early trach. The median in early tracheostomy patients did not show any improvement in GCS (6 before trach,7 after trach) while in the late trach (7 before thrach,8 after trach). The hospital stays showed an insignificant p-value which means there were no differences between the early and late tracheostomy.

Conclusion: Early tracheostomy for head injury patients associated with less MV time, less VAP, shorter ICU stay, and faster decannulation. However, there was no significant effect on hospital stays period and no improvements on GCS.

Keywords: Tracheostomy; head Injury; VAP; ICU stay.

1. INTRODUCTION AND BACKGROUND

Tracheostomy is a surgical or percutaneous procedure which means creating an artificial airway by opening in the anterior of the neck and insert a tube in to maintain the airway open [1,2]. It is one of the main procedures that is done in intensive care units ICU or the operating room. It especially has done for critically ill patients who suffer from certain upper airway obstruction or require mechanical ventilation (which is a helpful device that assists or act as the same as a function of a normal lung for patients who have difficulty in breathing) for a prolonged time [3]. This procedure has become very useful and has a successful impact in reducing problems that affect critically ill patients with respiratory issues if they did it at an optimal time.

The major issues that tracheostomy reduced in critically ill patients are complications of

endotracheal tube ETT, the sedation requirement, the hazard of frequent suctioning for excessive secretion, diseases that related to prolonged use of mechanical ventilation and the ICU stay [4,5,6]. Correspondingly, severe head injury patients considered as a critically ill patient who needs special care and to be on MV for a long time also some of them cannot maintain their airway patent for a lifetime [7]. Therefore, to reduce the ventilator stay tracheostomy intervention should be considered at an appropriate time. Therefore, the early tracheostomy does not have a specific definition until now due to the decision is depending on the physician's point view of the patient's state and the severity of their situation [8,9,10]. According to that in this study has defined that early tracheostomy was a procedure done ≤ 12 days from intubation day after injury, whereas the late tracheostomy that occurring >12 days from intubation after injury.

1.1 The Aim

This study has conducted to find the benefits that can be obtained from doing early tracheostomy intervention for head injury patients.

2. METHODS

This study approved by King Abdullah International Medical Research Center (KAIMRC), Riyadh. This study performed at ICUs in King Abdulaziz medical city (KAMC). From July 2016 to September 2018, data retrospectively and non-random sampling involved 56 head injury patients with tracheostomy. Inclusions of this study were all males and females whose age was in between 18 to 80 years old, all patients who had evidence close or open head injury and received tracheostomy for airway management. Whereas, this study excluded the patients who had already tracheostomy before head injury, patients who required chronic ventilator support, and who came from other hospitals or continued their treatment in another hospital. In this study, the early tracheostomy procedure has been defined as a procedure done ≤ 12 days from intubation day after head injury occurred, whereas the late tracheostomy that occurring >12 days from intubation after head injury. The data for this study collected from the day of intubation until decannulation from the RT chart of the best care system used in KAMC. Using data collection form which contains demographic data, the day of intubation, tracheostomy, decannulation, mechanical ventilation, Glasgow coma scale, ventilation associated-pneumonia, hospital stay, mortality rate, and ICU stay. After collecting data in this study, the data were organized in an excel program then expressed to SPSS software to do the statistical analysis of the data. Also, the tables and figures used to represent the results. Frequency and percentage used for categorical variables. Mean and SD expressed continuous variables. Pearson Chi-square and independent T-test used to find the relationship between variables. The p-value that set for this study was $p < 0.05$.

3. RESULTS

In this study there were 56 patients the majority 50(89%) were males and 6(11%) females; their age ranges from 18-80 years with the mean age 41.77years, height 168.95cms, and weighs 69.07kg. Out of 56 head injury patient who underwent tracheostomy was classified

according to the day of the procedure that was done on after the injury occurred. Which result in 25 patients had early tracheostomy ≤ 12 days with a mean of (9.8 days) and median [10], whereas 31 patients had late tracheostomy >12 with mean of (17.677 days) and median (16) (Table 1). Early tracheostomy patients had significantly fewer ventilatory days, time of decannulation, and ICU than late tracheostomy. For the hospital stay that we can see in (Table 2), there was no significant p-value which means that was no different between performing early or late tracheostomy in those type of patients. That because there is plenteous caution is necessary to observe and understand after weaned off the tracheostomy. Also, there were no patients who underwent early tracheostomy had VAP. However, in late tracheostomy patients, there were 4 patients who got VAP. And regarding the GCS, we measured the GCS in two-point which are one-day prior tracheostomy procedure and one day after for both groups of patients (early tracheostomy and late tracheostomy group), then we have extracted the median to compare between them. We can see in (Table 3) there are no improvements in the GCS of the early tracheostomy group.

4. DISCUSSION

Head injury patients are considered one of the most patients who need quick therapeutic interventions, and one of the most important interventions is the tracheostomy, which helps improve the patient's condition. The improvements that will occur when making the tracheostomy are reducing the requirement of anesthesia, facilitation of nursing care, and reducing the chance of getting an infection related to ETT placement for a long time. And all these factors will contribute to reducing the number of stay in ICU, hospital, and requiring MV. For this reason, in this paper, we concentrated on the time of tracheostomy and the benefits that will produce from.

Prolonged stay on Mechanical Ventilation is related to many complications, but the major one is VAP. Also, VAP can result in increasing the risk of undesirable complications that keep patients in the hospital. Previous studies compared the outcome of early and late tracheostomy to show that patients with early tracheostomy had less incidence of VAP and less stay on MV [1,3]. In contrast, some studies showed no relationship between the timing of tracheostomy and neither shorter stay with MV or

Table 1. Type of tracheostomy early or late and the mean, median

Tracheostomy	Number	Mean	Median
Ealy Tracheostomy	25	9.8	10
Late tracheostomy	31	17.677	16

Table 2. Timing of tracheostomy and ICU, MV, hospital, tracheostomy tube duration

	Time of trach	N	Mean	Std. deviation	T test	P value
Period of tracheostomy	Early	25	27.80	13.805	-2.522	0.016
	Late	31	47.03	39.585		
period of ICU	Early	25	22.68	6.878	-3.656	0.001
	Late	31	33.10	13.893		
Period of MV	Early	25	15.16	5.505	-2.823	0.008
	Late	31	28.10	24.769		
Period of hospital	Early	25	86.52	56.339	-1.244	0.220
	Late	31	105.13	55.102		

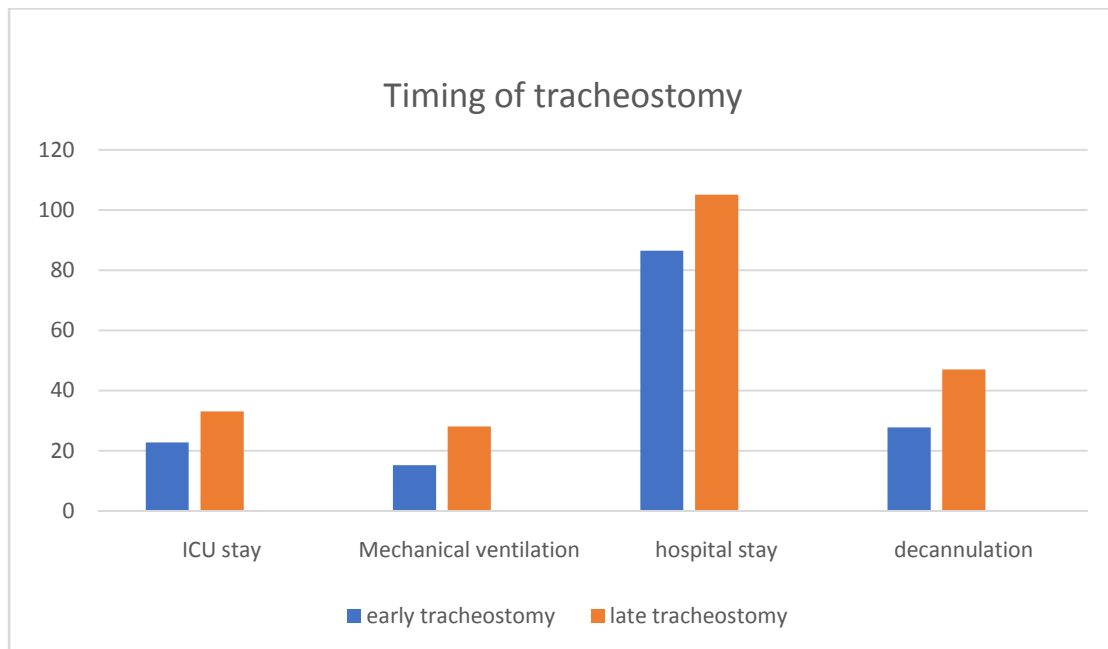


Fig. 1. Timing of tracheostomy and the mean for these variables

Table 3. The GCS score between two groups (early tracheostomy and late tracheostomy) one day prior and one day after the procedure

GCS		N	Median
GCS before tracheostomy	Early	25	6
	Late	31	7
GCS after tracheostomy	Early	25	7
	Late	31	8

incidents of VAP [11,12]. In this research, it was found that patients with early tracheostomy had a shorter stay in MV and fewer incidents of VAP because there were no patients out of the early tracheostomy sample who got VAP. On the other hand, there were 12.9% of patients with late

tracheostomy had VAP due to prolonged stay in MV.

Decannulation is a process of removing the Tracheostomy Tube when a patient no longer in needs. The indication is related to the

improvement of patient status. Moreover, prolongs TT placement may lead to late complications such as tracheal necrosis [6]. There were studies presented which state that patients with late tracheostomy had delayed removing the TT [13]. This study demonstrated that early tracheostomy associated with faster decannulation than late tracheostomy, which means that we can prevent many complications of prolonging TT placement.

For early discharge from ICU, previous studies exploited that the optimal time for performing tracheostomy procedure for head injury patients is early as possible which will help in a quicker discharge from the ICU [14,15]. However, Studies shown that the decision is differ from case to another because it depends on physician decision, patient status, and disease severity [4]. In this paper, we agreed with these studies based on the research outcomes that we found.

5. CONCLUSION

Based on this comparison between early and late tracheostomy outcomes, early tracheostomy appears to reduce the number of ventilator days, time to decannulation, ICU stay, the chance to development of VAP. However, it did not show any GCS improvement in early trach group. Also, this study did not show any differences the period of staying in the hospital between both groups. It is being suggested that in head injury patients who need immediate intervention for placement of TT should be considered as soon as possible. Furthermore, we encourage future researches to focus on demonstrating the difference in mortality rate between both groups and prompt them to do more research in the benefits of the type of tracheostomy percutaneous over surgical in head injury patients.

6. LIMITATIONS

According to previous studies, there was no definition of early and late tracheostomy timing until now. It is remaining unclear in critically ill patients. Based on that, this paper-faced, some limitation in determining the specific time to consider the patient underwent early or late tracheostomy. In addition, it was found there was no improvement in the GCS level in the early tracheostomy group as it has other factors that affect its improvements such as level of sedation and the trauma severity. According to

that, there were limitations in demonstrating the early tracheostomy has better improvement in GCS level over the group who underwent late tracheostomy. Also, it was being obliged to exclude patients who referred from another hospital because their data were not found. Depending on that the sample size of this research reduced.

7. STRENGTH

Even though the limitations that occurred in this research, there were points of strength that appeared. The first strength was the p-value is significant for variables except for the hospital stay that was insignificant due to the head injury patients were critically ill who suffered from severe conditions which affected their length of stay in the hospital. Second strength is the was no VAP occurrence in early group which give a suggestion to do the tracheostomy on an optimal time to lower the chance of getting VAP. Because of that, this paper focused to demonstrate the benefits of early tracheotomy including reducing the number of ventilator days, time to decannulation, ICU stays, the chance to development of VAP. Otherwise, the other variables (GCS and hospital stay) did not show any improvement according to the timing tracheostomy.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT AND ETHICAL APPROVAL

Before conducting this study, it was approved by King Abdullah International Medical Research Center (KAIMRC), Riyadh. Furthermore, the decision to do the procedure takes time since every patient has the consideration of their medical condition and severity. The consent of the patient's relative takes time due to the lack of knowledge in our culture about the procedure and its benefits so the tracheostomy procedure is the last choice in the interventions for those patients.

COMPETING INTERESTS

Authors have declared that no competing interests exist.


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APPENDIX

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King saud bin abdulaziz university for health sciences (Riyadh)
King abdulaziz medical city in Riyadh
Research methodology I (COMS 411)
Respiratory therapy department
The Benefits of Early Tracheostomy Vs Late Tracheostomy in Adult Patient with Head Injury at King
Abdulaziz Medical City Hospital.



Data collection sheet

Demographic data:

SL.NO: _____ Date of hospital admission: _____

Gender: _____ Date of hospital discharge : _____

Age (years): _____ Height (cm): _____ Weight (kg): _____

Date of ICU admission: _____ Date of ICU discharge: _____

Intubation:

Intubation date: _____ ETT size : _____ Lip level: _____

Glasgow coma scale:

The GCS when admission to ER: _____

One day prior tracheostomy: _____ One day after tracheostomy: _____

Tracheostomy:

Date of tracheostomy: _____ Type of tracheostomy procedure : _____
Type of tracheostomy tube : _____

TT size : _____

Ventilation-associated-pneumonia:

Date of culture collected: _____ Organism: _____

Mecahnical ventilation:

Date of starting MV: _____ Date of successful PSV trail: _____

Decannulation:

Number of decannulation trial given: _____ Date of decannulation: _____

Did the patient survive?

Yes No, if no when and why? _____

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