pISSN 2454-5929 | eISSN 2454-5937

Original Research Article

DOI: https://dx.doi.org/10.18203/issn.2454-5929.ijohns20205069

Retrospective clinical study of tracheostomy among intubated patients of respiratory intensive care unit

Sudhakar Rao M. S., Bipinkumar*

Department of Otorhinolaryngology and Head and Neck Surgery, Vijayanagar Institute of Medical Sciences, Bellary, Karnataka, India

Received: 02 September 2020 **Accepted:** 29 October 2020

*Correspondence: Dr. Bipinkumar,

E-mail: nekarbipinkumar03@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Tracheostomy is a common surgical procedure performed in upper airway obstruction to establish alternate airway, to ease the access for secretion removal and protect lower airways and to wean in critically ill, ventilator-dependent patients. This retrospective clinical study emphasises on the indications and clinical outcome of tracheostomy procedure among intubated patients of varied clinical diagnosis in respiratory intensive care unit (RICU).

Methods: This is a retrospective clinical study of intubated patients of RICU who underwent tracheostomy between Jan 2014 to Dec 2019. The case sheets of patients who fulfilled the inclusion criteria of this study and whose records were available in medical records department (MRD) of our institute for the study period were analysed for the indications for tracheostomy, timing of tracheostomy and its clinical outcome among them.

Results: A total of 33 patients were included in this study and their case sheets were analysed. Most common indication for the tracheostomy was found to be prolonged intubation secondary to the chemical poisoning. The mean days of intubation before the tracheostomy was 7 days. The mean days of stay in RICU after tracheostomy among survived and dead patients was 21 and 7 days respectively which was highly significant (p=0.00).

Conclusion: This retrospective study concludes that conditional survival after the tracheostomy among the previously intubated patients is found to be more after three weeks whereas the mortality is likely to be in the first week of post tracheostomy period. Hence the number of days of stay after the tracheostomy among these patients, there need not be a linear decrease in survival and should not be the reason for being despondent.

Keywords: Tracheostomy, Prolonged intubation, RICU, Conditional survival

INTRODUCTION

Tracheostomy is one of the age old and most commonly performed lifesaving surgical procedure. Its first recorded description dates back nearly 5000 years. ¹⁻³ In the intensive care unit, 10% of the patients on mechanical ventilation needs prolonged mechanical ventilation. ^{4,5} Prolonged mechanical ventilation leads to increased risk of mucus impaction and serious laryngeal and tracheal injuries and increased risk of ventilator associated pneumonia (VAP). ⁶⁻⁸ Hence tracheostomy in these cases

may avoid the complications associated with prolonged ventilation and may improve outcome of patients.

Failure of weaning from mechanical ventilation often results from an imbalance between respiratory muscle capacity and the work load imposed on breathing system. Tracheostomy in these patients know to decrease the resistance in breathing system, decreases the dead space significantly. Hence accelerates the weaning from mechanical ventilator and enables the ventilator

dependent patients to transfer from RICU to step down facilities.

In prolonged intubated patients, endotracheal tube (ET) allows the aspiration of contaminated oropharyngeal secretions into the lungs which contributed to tracheal colonisation and subsequent development of VAP. In addition to this ET tube allows the formation of bacterial biofilm on its surface which are carried to the lungs by ventilator air flow leading to VAP.¹¹ Changing the tracheostomy tube cannula once a week could reduce the VAP significantly.⁷

In addition to above, tracheostomy has some other advantages over ET tube like improved patient comfort, need for less sedation, promotion of oral hygiene and ease in pulmonary toileting. 10,12,13

However, it has some complications which can be intraoperative (hypoxia, bleeding, pneumothorax); early (bleeding, infection, subcutaneous emphysema, neck hematoma, tracheal ring fracture, injury to the lining of the trachea or oesophagus); and late (stenosis of trachea, trachea-oesophageal fistula, tracheomalacia). 14-16

This retrospective clinical study emphasises on the indications and clinical outcome of tracheostomy procedure among intubated patients of varied clinical diagnosis in RICU.

METHODS

This clinical study was conducted retrospectively in Vijayanagar institute of medical sciences (VIMS), Bellary, Karnataka, India from January 2014 to December 2019. All patients whose records were available in MRD of the institution from above study period who fulfilled inclusion and exclusion criteria were included in our study.

Inclusion criteria included intubated patients of RICU who underwent tracheostomy during study period among both the genders and of all the age groups.

Exclusion criteria excluded patients of RICU who underwent tracheostomy without prior intubation.

Total of 33 cases were included in this study. Demographic details of the patients, Indication for intubation, indication for tracheostomy, day of tracheostomy after intubation, complications of tracheostomy, co-morbidities, day of discharge/death post tracheostomy were recorded.

This study was approved by the ethical committee and institutional review board of VIMS, Bellary.

Statistical analysis carried out by qualitative data represented in the form of frequency and percentage. Association between qualitative variables was assessed

by chi square test and Fisher's exact test where the cell count was small.

Mean and SD value was calculated for continuous variables. Means between two groups were analysed by using student's t test unpaired.

A p<0.05 was considered statistically significant. Statistical analysis was done with IBM SPSS version 22 for windows.

RESULTS

During 6 years study period, a total of 33 patients included in our study. The mean age of the patients was 39 years (12-67 years). There were 18 (55%) males and 15 (45%) females. Most common age group was 20-49 years in males and 20-29 years in females (Figure 1).

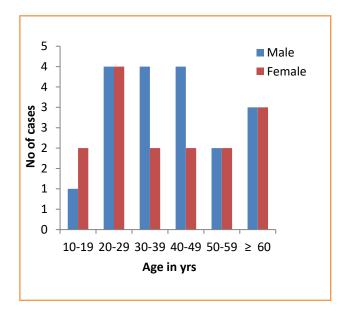


Figure 1: Age and gender distribution.

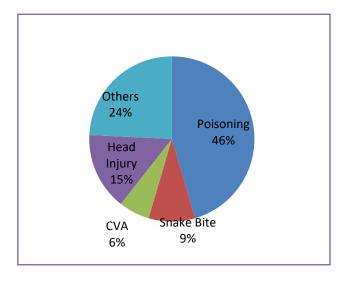


Figure 2: Indications for prolonged ventilation in the study.

Most common indication for tracheostomy among intubated patients were chemical poisoning 15 (45.5%) cases, followed by head injury 5 (15.2%), snake bite 3 (9.1%), cerebrovascular accident 2 (6.1%), and others 8 (24.2%). Others included acute renal failure with pulmonary oedema (n=1), acute left ventricular failure with pulmonary oedema (n=1), acute renal failure with multiorgan dysfunction syndrome (n=1), acute respiratory distress syndrome with bilateral pneumonia (n=1), pyogenic meningo-encephalitis (n=1), Ca oesophagus post transthoracic esophagectomy with distant metastasis (n=1) and antepartum eclampsia (n=1) (Figure 2).

Mean days of intubation before tracheostomy was 7 days with minimum of 1 and maximum of 20 days (Table 1).

The average post tracheostomy period of stay in our study population was 12 days. Maximum duration of stay period after the tracheostomy was 35 days.

Mean days of post tracheostomy stay of the patients who got discharged from the RICU was found to be 21 days and the mean period in which the patients got succumbed to death was found to be 7 days (p=0.00) (Table 1).

Mean age among survived and dead patients was 33 years and 43 years respectively which was statistically insignificant with the outcome.

Mean duration of intubation prior to tracheostomy among survived and dead patients was 6 days and 8 days respectively which was statistically insignificant with the outcome (Table 1).

Among 13 survived patients, 2 had comorbidity and non among dead patients had any comorbidity. There was no statistical significance between the comorbidity and the clinical outcome (Table 2).

Table 1: Effects of different variables on outcome of patients.

Variables	Outcome	N	Mean	SD	P (unpaired t test)	Significance
Age (Year)	Discharged	13	32.69	15.89	0.065	NS
	Died	20	43.20	15.09		
Day of requisition	Discharged	13	6.23	5.25	- 0.33	NS
	Died	20	7.85	4.13		
Day of	Discharged	13	6.38	5.35	0.382	NS
tracheostomy	Died	20	7.85	4.13		
Day in RICU post	Discharged	13	20.77	9.02	0.000	HS
tracheostomy	Died	20	6.45	5.44		

NS=Not Sig, HS=Highly Sig

Table 2: Effects of gender and comorbidity on outcome of patients.

Parameters		Outcome Discharged	Died	Chi square test P value	Significance
Gender	Male	6	12	0.435	NS
	Female	7	8	0.435	
Comorbidity	Present	2	4	0.727	NS
	Absent	11	16	0.737	

NS=Not Sig

DISCUSSION

RICU admissions are the most challenging to manage for doctors/interventionist and most worrisome for the patient attenders. Higher chance of survival is the key justification for RICU admission.¹⁷ Hence treating doctor should be able to assess the conditional survival of the patients. Conditional survival implies probability of future survival of the patient after a defined period of treatment. It provides description of how prognosis evolves over time.¹⁸

A study by Lin et al, shows that the tracheostomy is associated with lower in hospital mortality and higher successful weaning rates in ICU among patients on prolonged ventilation.¹⁹

In a study done by King et al, they say tracheostomy in mechanically ventilated patients should be performed after assessing risk vs benefits which should be individualised to the patients. Patients who require longer duration of ventilation could be offered tracheostomy, and when the duration cannot be predicted, patients can be re-evaluated on a daily basis.²⁰

Exact timing to perform tracheostomy procedure among intubated patients is the most debated aspect of tracheostomy. ^{16,21,22} In our study mean days of intubation before tracheostomy was 7 days. A meta-analysis by Adly et al, shows that in patients with prolonged intubation, tracheostomy done within 7 days of intubation significantly reduces the incidence of mortality and duration on mechanical ventilation. ²³

According to the study by King et al, maximum patients weans off from mechanical ventilator by 7-10 days. So, if they need ventilation beyond 10 days, then tracheostomy can be considered.²⁰

The main finding in our study is that the mean days of stay in RICU post tracheostomy among survived patients was 21 days and mean days of stay in RICU post tracheostomy among dead patients was 7 days which was statistically significant (p=0.00). Conditional survival of our study population was less during the first week post tracheostomy and increased after third week.

Frutos-Vivar et al performed an observational cohort study among mechanically ventilated patients who required tracheostomy which shows that the patients with tracheostomy had longer ICU stay but the mortality in ICU was low among them.⁵

CONCLUSION

This retrospective study concludes that conditional survival after the tracheostomy among the previously intubated patients is found to be more after three weeks whereas the mortality is likely to be in the first week of post tracheostomy period. Hence the number of days of stay after the tracheostomy among these patients, there need not be a linear decrease in survival and should not be the reason for being despondent.

ACKNOWLEDGEMENTS

Authors would like to thank Dr. G. Shankar, professor and HOD, department of otorhinolaryngology and head and neck surgery, Vijayanagar institute of medical sciences, Bellary, for his constant encouragement, support and guidance.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

REFERENCES

- 1. Charles G, Durbin J. Tracheostomy: why, when, and how? Respir Care. 2010;55:1056-68.
- 2. Barquist ES, Amortegui J, Hallal A, Giannotti G, Giannotti G, MacLeod J. Tracheostomy in ventilator dependent trauma patients: a prospective, randomized intention to treat study. J Trauma. 2006;60(1):91-7.
- 3. Diaz-Prieto A, Mateu A, Gorriz M, Ortiga B, Truchero C, Sampietro N et al. A randomized clinical trial for the timing of tracheotomy in critically ill patients: factors precluding inclusion in a single center study. Critical Care. 2014;18(5):585.
- 4. Carson SS. Outcomes of prolonged mechanical ventilation. Curr Opin Crit Care. 2006;12:405-11.

- 5. Frutos-Vivar F, Esteban A, Apezteguia C, Anzueto A, Nightingale P, Gonzalez M et al. Outcome of mechanically ventilated patients who require a tracheostomy. Crit Care Med. 2005;33(2):290-8.
- 6. Whited RE. A prospective study of laryngotracheal sequelae in long-term intubation. Laryngoscope. 1984;94(3):367-77.
- 7. Gaynor EB, Greenberg SB. Untoward sequelae of prolonged intubation. Laryngoscope. 1985;95(12):1461-7.
- 8. Nseir S, Di Pompeo C, Jozefowicz E, Cavestri B, Brisson H, Nyunga M et al. Relationship between tracheotomy and ventilator-associated pneumonia: a case control study. Eur Respir J. 2007;30:314-20.
- 9. Lessard MR, Brochard LJ. Weaning from ventilatory support. Clin. Chest Med. 1996;17:475-89.
- Diehl JL, El Atrous S, Touchard D, Lemaire F, Brochard L. Changes in the work of breathing induced by tracheotomy in ventilator-dependent patients. Am J Respir Crit Care Med. 1999;159(2):383-8.
- 11. American Thoracic Society; Infectious Diseases Society of America. Guide-lines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. Am J Respir Crit Care Med. 2005;171(4):388-416.
- 12. Freeman BD, Morris PE. Tracheostomy practice in adults with acute respiratory failure. Crit Care Med. 2012;40:2890-6.
- 13. King C, Moores LK. Controversies in mechanical ventilation: when should a tracheotomy be placed? Clin Chest Med. 2008;29:253-63.
- 14. Pearson FG, Patterson GA. Tracheostomy. In: Pearson FG, Patterson GA, Cooper J. (eds). Pearson's thoracic and oesophageal Surgery. 3rd ed. New York: Churchill Livingstone. 2008:344-52.
- 15. Guarino A. Percutaneous tracheostomy: patient outcomes. It is time to improve our care. Minerva Anestesiol. 2009;75:602-3.
- 16. Rumbak MJ, Newton M, Truncale T, Schwartz SW, Adams JW, Hazard PB. A prospective, randomized, study comparing early percutaneous dilational tracheostomy to prolonged translaryngeal intubation (delayed tracheostomy) in critically ill medical patients. Crit Care Med. 2004;32(8):1689-94.
- 17. Escher M, Ricou B, Nendaz M, Scherer F, Cullati S, Hudelson P et al. ICU physicians' and internists' survival predictions for patients evaluated for admission to the intensive care unit. Ann Intensive Care. 2018;8(1):108.
- 18. Marshall DC, Hatch RA, Gerry S, Young JD, Watkinson P. Conditional Survival with Increasing Duration of ICU Admission: An Observational Study of Three Intensive Care Databases. Crit Care Med. 2020;48(1):91-7.
- 19. Lin WC, Chen CW, Wang JD, Tsai LM. Is tracheostomy a better choice than translaryngeal intubation for critically ill patients requiring mechanical ventilation for more than 14 days? A

- comparison of short-term outcomes. BMC Anesthesiol. 2015;15:181.
- 20. King C, Moores LK. Controversies in mechanical ventilation: when should a tracheotomy be placed? Clin Chest Med. 2008;29(2):253-63.
- 21. Pasqua F, Nardi I, Provenzano A, Mari A. Weaning from tracheostomy in subjects undergoing pulmonary rehabilitation. Multidiscip Respir Med. 2015;10(11):35.
- 22. Blot F, Similowski T, Trouillet JL, Chardon P, Korach JM, Costa MA et al. Early tracheotomy versus prolonged endotracheal intubation in

- unselected severely ill ICU patients. Intensive Care Med. 2008;34(10):1779-87.
- 23. Adly A, Youssef TA, El-Begermy MM, Younis HM. Timing of tracheostomy in patients with prolonged endotracheal intubation: a systematic review. Eur Arch Otorhinolaryngol. 2018;275(3):679-90.

Cite this article as: Sudhakar RMS, Bipinkumar. Retrospective clinical study of tracheostomy among intubated patients of respiratory intensive care unit. Int J Otorhinolaryngol Head Neck Surg 2020;6:2253-7.