



Indications for tracheostomy in MICU patients in a tertiary care hospital

Dr. Deepalakshmi Tantry

Dr. Gururaj Tantry

Dr. Abhinandan. J. Shriyan (Corresponding Author)

Dr. Shivprasad Karanth

1ST Author : Associate professor ,Department of ENT ,AJIMS ,Mangalore

2nd Author : Professor ,Department of Anesthesia , AJIMS, Mangalore

3rd Author and Corresponding author : 3rd year Postgraduate , Department of ENT,AJIMS ,Mangalore

4th Author : 2nd year Postgraduate , Department of ENT, AJIMS ,Mangalore

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ABSTRACT

Introduction: Tracheostomy is the commonest surgical procedure in intensive care units. It not only provides stable airway and facilitates pulmonary toilet and ventilator weaning, but also decreases the direct laryngeal injury of endotracheal intubation and improves patient comfort and daily living activity.

Materials and Methodology: A retrospective study of 32 consecutive tracheostomy procedure performed in MICU patients in our institution during the past six months (March 2020 to September 2020) is presented. We collected patient information, history and examination details and studied the indications for surgery.

Results: Out of 32 MICU patients who have undergone tracheostomy procedure, indication for tracheostomy in patients was prolonged intubation in 22 patients. Diaphragmatic paralysis in 7 patients and stridor with traumatic laryngeal ulcers in 3 patients. All tracheostomies were done by the open approach technique. Tracheostomy for prolonged intubation was done within 14 - 18 days after intubation with a median of 16 days.

Conclusion: Among 32 MICU patients who underwent tracheostomy procedure in our institution, the most common indication for tracheostomy is prolonged intubation. These patients were taken for tracheostomy procedure after 2 weeks of intubation.

Keywords: Tracheostomy, indications, prolonged ventilation, ICU, Mangaluru

I. INTRODUCTION

Tracheostomy is an elective or emergent surgical procedure to facilitate respiration by creating an opening in the anterior trachea¹. It is the one of the oldest surgical procedures dating back to

2000 BCE (Before common era) where it is documented in the old Hindu scriptures². Since then, the procedure has undergone various modification and standardization for effective management of airway³. While there are lacunae in the data regarding the global rate of tracheostomy procedures, it is estimated that around 2,50,000 tracheostomies are done annually in resource rich countries⁴. Among 10% of these procedures are done in children⁴. In comparison, lower number of procedures done in low- and middle-income countries are lesser⁴. However, it is one of the commonest surgical procedures conducted in an Intensive care unit (ICU) setting, done primarily to provide stable airway and for ventilatory weaning⁵. A systemic review and meta-analysis in Iran noted 21 indications for tracheostomy procedures with decreased mental status and respiratory diseases leading the cause⁶. There is an increased trend of tracheostomy use in India too. Hence a pan India multicentric observational study was conducted by Indian Society of critical care medicine (ISCCM) to assess the situation and they noted that percutaneous dilatational tracheostomy was preferred over surgical tracheostomy in Indian ICU⁷ and had shorter duration of procedure and higher ventilator free days. Moreover, ISCCM provided their first recommendations for tracheostomy in adult intensive care unit in 2020⁸. Hence, there is a keen interest in the medical fraternity in India towards understanding and standardization of tracheostomy in India⁹⁻¹⁰. The current study is an attempt towards the same with the objective of assessing the indications for tracheostomy in a tertiary care hospital and the common type of tracheostomy procedure in the study setting.



II. MATERIALS AND METHODOLOGY

A retrospective record-based study was conducted among patients who underwent tracheostomy procedure in MICU in A.J. Institute of Medical Sciences and Research Hospital, Mangaluru, during the last 6 months from March 2020 to September 2020. The study included patients of all age group and gender. The study included 32 consecutive tracheostomy procedure performed during the study period. Patients who underwent tracheostomy in other hospitals and were referred to the study institute for further management were excluded from the study. The permission to conduct the study was taken from the institutional ethical committee. Patient's data was recovered from their medical records. Sociodemographic characteristics (Age and gender), indication for the procedure was noted down. Type of procedure was divided into emergency or elective surgeries and further subdivided into surgical and percutaneous procedure. Indication for tracheostomy was also

noted along with complications, if any. The data was entered in MS Excel and analysed using IBM-SPSS 20 version software.

III. RESULTS

The study included 32 patients who underwent tracheostomy. Majority of participants belonged to the age group of 40-60 years (12, 37.5%) and the mean age of participants was 46.2 ± 12.4 years. Majority of the cases were male (23, 71.8%) and the rest were females (9, 28.2%)(**Table No.1**). Elective surgery constituted for 78.1% cases (25 cases) and the rest underwent emergency procedure (7, 21.9%). Majority of cases were done under local anaesthesia (26, 81.2%)(**Table No.2**). Out of 32 MICU patients who have undergone tracheostomy procedure, indication for tracheostomy in patients was prolonged intubation in 22 patients (68.8%). Diaphragmatic paralysis in 7 patients (21.8%) and stridor with traumatic laryngeal ulcers in 3 patients (9.4%)(**Graph No.1**). All tracheostomies were done by the surgical open approach technique



(100%). Tracheostomy for prolonged intubation was done between 14 - 18 days after intubation with a median of 16 days.

IV. DISCUSSION

Tracheostomy is one of the common procedures done in adult ICU and is showing an increasing trend in neonatal and paediatric care¹¹. It is one of the life-saving procedures commonly offered to the most critically ill. While the main use of the procedure is to provide stable airway with reduced ventilatory support¹², it also provides other benefits like improved patient comfort, oral hygiene with lesser dental and tracheal injury, oral nutrition, better pulmonary toilet and lower airway resistance¹³. In addition, early tracheostomy decrease duration, ICU stay and mortality in patients requiring prolonged mechanical ventilation¹⁴⁻¹⁵. However, it is associated with complications like infections, scarring, tubal blockage and long-term airway injury¹⁴⁻¹⁶. Hence the discussion to consider tracheostomy is based on weighing the risks and benefits of the procedure based on the patients' condition, and there are needs to assess the indications of tracheostomy in various study settings.

The current study included 32 cases who underwent tracheostomy procedure in the study period. The mean age of the participants was 46.2 ± 12.4 years with males constituting for majority of cases. Similarly in a study done by Sreelekshmi K in Andhra Pradesh¹⁷, comparing elective and emergency tracheostomy in ICU settings, noted that majority of cases belonged to 20-40 years (56%) followed by 20-40 years (35%), and were male (65%)¹⁷. Similarly, Khan S and Ingale A in Bellary¹⁸ noted that male constituted for 77.3% of cases, and majority belonged to the age group of above 60 years (28%)¹⁸. A systemic review and meta-analysis by Alidad A et al in Iran⁶, noted that the average age for tracheostomy was 49.2 years, and it was 40.7 ± 13.4 years in Egypt⁴. Hence, there is a wide age distribution for tracheostomy across the globe.

In the current study, majority of the patients underwent elective procedure (78.1%). This was lower than in studies done in Andhra Pradesh¹⁷ (49%), Bellary¹⁸ (28%) and Kerala (48%)¹⁹. This could be due to the fact that our major indication for tracheostomy was prolonged mechanical ventilation, and hence was planned for tracheostomy before arising of complications. Menon AM et al¹⁹ had noted that complication rates were higher in elective procedures compared to elective procedures. Hence, planned elective procedures may reduce complications. 82.1% of

our cases were done under local anaesthesia. Similarly, majority of cases in Kerala (58%)¹⁹ and Bellary (65.4%)¹⁸ were done under local anaesthesia. In the current study, all cases had surgical tracheostomy. Similar results were noted in Egypt⁴. The type of procedure depends on various factors like patient condition, expertise of the treating doctors and available facilities. However, it should be noted that French expert panel on tracheostomy²⁰ prefers percutaneous dilatational tracheostomy over open surgical approach. However, altered neck anatomy and coagulopathy are conditions where surgical approach is preferred⁷.

The main objective of the current study was to know the common indications for tracheostomy in the study setting and it was noted that prolonged ventilation (68.8%). Diaphragmatic paralysis (21.8%) and stridor with traumatic laryngeal ulcers (9.4%) as the common indications. Moreover, Tracheostomy for prolonged intubation was done between 14 - 18 days after intubation with a median of 16 days. Similarly, a recent update on tracheostomy by Lewith H and Athanassaglou V²¹ noted that prolonged mechanical ventilation, pulmonary toilet, airway protection, upper airway obstruction and part of laryngectomy as the most common indications for tracheostomy. In comparison, a study done in Bellary¹⁸ noted upper airway obstruction (63.3%), prolonged ventilation (26.3%) and part of other surgeries (10.4%) as the common indications for tracheostomy. And in a study done in Andhra Pradesh¹⁷, head injury with RTA and post-operative intracranial space occupying lesions (ICSOL) as the most common causes. However, they didn't mention whether these were planned for prolonged ventilation. Finally, a study conducted in Kerala¹⁹ noted that upper airway obstruction following neoplasm and trauma as the most common causes. Mechanical ventilation-prolonged ventilation constituted for only 21% of cases. Hence, it is noted that the indications for tracheostomy vary across the regions. And there is a need to conduct similar studies in different study settings to provide evidence-based data regarding the same for better understanding of the situations and future actions and recommendations towards it.

The current study is not devoid of limitations. The major limitation of the study is of the retrospective study design and the small sample size. Moreover, the study doesn't mention the complications associated with tracheostomy. Hence, future prospective study in the study setting is recommended for reduce these limitations. The study was done only in MICU. This was another



limitation of the research. This can lead to missing out of other cases, including cases in Paediatric and neonatal ICU. Hence further studies included these areas is also recommended. Finally, the causes of prolonged ventilation weren't assessed. This could have further explained the indications for tracheostomy in study settings. However, the current study provides evidence-based research on indications of tracheostomy in a tertiary care hospital. It is one of the earliest studies in the study

area and can provide base information for further research.

V. CONCLUSION

Most cases of tracheostomy in the study setting are elective procedures for prolonged ventilation. These patients were taken for tracheostomy after a minimum of 2 weeks of mechanical ventilation.

Tables and graphs

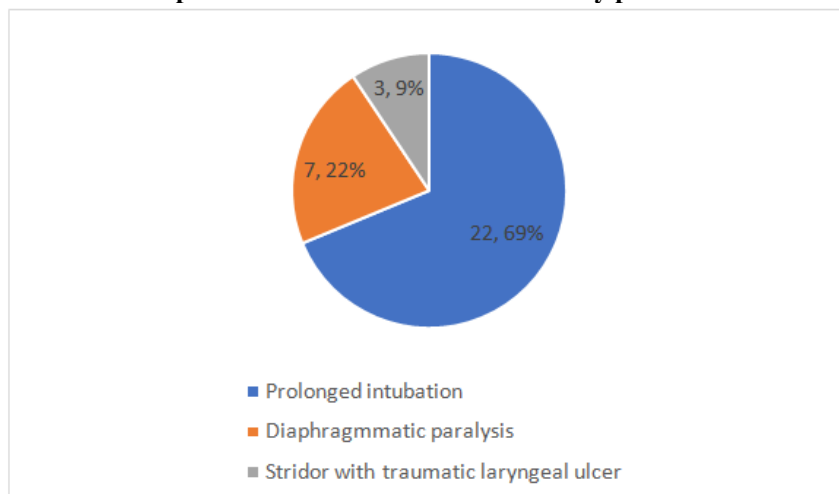
Table No.1: Distribution of cases according to Socio-demographic characteristics (Name and gender)

Characteristics	Frequency	Percentage
Age (years)		
0-20	5	15.6
21-40	5	15.6
41-60	12	37.5
Above 60	10	31.3
Gender		
Male	23	71.8
Female	9	28.2
Total	32	100

Table No.2: Distribution of cases according to tracheostomy procedure

Characteristics	Frequency	Percentage
Type of procedure		
Elective	25	78.1
Emergency	7	21.9
Technique		
Surgical	32	100
Percutaneous	0	0
Type of anaesthesia		
Local	26	81.2
General	6	18.8
Total	32	100

Graph No.1: Indications for tracheostomy procedure





REFERENCES

- [1]. Raimonde AJ, Westhoven N, Winters R. Tracheostomy. [Updated 2023 Jan 3]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK559124/>
- [2]. Ezri T, Evron S, Hadad H, Roth Y. Tracheostomy and endotracheal intubation: a short history. *Harefuah*. 2005 Dec;144(12):891-3, 908. Hebrew. PMID: 16400793.
- [3]. Brenner MJ, Pandian V, Milliren CE, Graham DA, Zaga C, Morris LL, et al. Global Tracheostomy Collaborative: Data-driven improvements in patient safety through multidisciplinary teamwork, standardisation, education, and patient partnership. *British Journal of Anaesthesia*. 2020;125(1). doi:10.1016/j.bja.2020.04.054
- [4]. El-Anwar MW, Nofal AA, Shawadfy MA, Maaty A, Khazbak AO. Tracheostomy in the Intensive Care Unit: a University Hospital in a Developing Country Study. *Int Arch Otorhinolaryngol*. 2017 Jan;21(1):33-37. doi: 10.1055/s-0036-1584227. Epub 2016 Jul 26. PMID: 28050205; PMCID: PMC5205538.
- [5]. Masood MM, Farquhar DR, Biancanello C, Hackman TG. Association of Standardized Tracheostomy Care Protocol Implementation and Reinforcement With the Prevention of Life-Threatening Respiratory Events. *JAMA Otolaryngol Head Neck Surg*. 2018;144(6):527-532. doi:10.1001/jamaoto.2018.0484
- [6]. Alidad A, Aghaz A, Hemmati E, Jadidi H, Aghazadeh K. Prevalence of Tracheostomy and Its Indications in Iran: A Systematic Review and Meta-Analysis. *Tanaffos*. 2019 Apr;18(4):285-293.
- [7]. Gupta S, Tomar DS, Dixit S, Zirpe K, Choudhry D, Govil D, Mohamed Z, Chakraborty N, Gurav S, Wanchoo J, Gupta KV. Dilatational Percutaneous vs Surgical Tracheostomy in Intensive Care Unit: A Practice Pattern Observational Multicenter Study (DISSECT). *Indian J Crit Care Med*. 2020 Jul;24(7):514-526. doi: 10.5005/jp-journals-10071-23441.
- [8]. Gupta S, Dixit S, Choudhry D, Govil D, Mishra RC, Samavedam S, Zirpe K, Srinivasan S, Mohamed Z, Gupta KV, Wanchoo J, Chakraborty N, Gurav S. Tracheostomy in Adult Intensive Care Unit: An ISCCM Expert Panel Practice Recommendations. *Indian J Crit Care Med*. 2020 Jan;24(Suppl 1):S31-S42. doi: 10.5005/jp-journals-10071-G23184.
- [9]. Kumar A, Kohli A, Kachru N, Bhadoria P, Wadhawan S, Kumar D. Fiber-optic Bronchoscope-guided vs Mini-surgical Technique of Percutaneous Dilatational Tracheostomy in Intensive Care Units. *Indian J Crit Care Med*. 2021 Nov;25(11):1269-1274. doi: 10.5005/jp-journals-10071-24021.
- [10]. Kumar VAK, Kiran NAS, Kumar VA, Ghosh A, Pal R, Reddy VV, Agrawal A. The Outcome Analysis and Complication Rates of Tracheostomy Tube Insertion in Critically Ill Neurosurgical Patients; A Data Mining Study. *Bull Emerg Trauma*. 2019 Oct;7(4):355-360. doi: 10.29252/beat-070403.
- [11]. Watters KF. Tracheostomy in infants and children. *Respiratory Care* June 2017, 62 (6) 799-825; DOI: <https://doi.org/10.4187/respcare.05366>
- [12]. Hebert LM, Watson AC, Madrigal V, October TW. Discussing Benefits and Risks of Tracheostomy: What Physicians Actually Say. *Pediatr Crit Care Med*. 2017 Dec;18(12):e592-e597. doi: 10.1097/PCC.0000000000001341.
- [13]. Tseng K-L, Shieh J-M, Cheng K-C, Chiang K-H, Chiang S-R, Ko S-C, et al. Tracheostomy versus endotracheal intubation prior to admission to a respiratory care center: A retrospective analysis. *International Journal of Gerontology*. 2015;9(3):151-5. doi:10.1016/j.ijge.2014.04.004
- [14]. Bice T, Nelson JE, Carson SS. To Trach or Not to Trach: Uncertainty in the Care of the Chronically Critically Ill. *Semin Respir Crit Care Med*. 2015 Dec;36(6):851-8. doi: 10.1055/s-0035-1564872.
- [15]. Fickers BG. Tracheostomy [Internet]. Mosby; 2009 [cited 2023 Jun 6]. Available from: <https://www.sciencedirect.com/science/article/abs/pii/B9780323028448500196>
- [16]. Kumar VAK, Kiran NAS, Kumar VA, Ghosh A, Pal R, Reddy VV, Agrawal A. The Outcome Analysis and Complication Rates of Tracheostomy Tube Insertion in Critically Ill Neurosurgical Patients; A Data Mining Study. *Bull Emerg Trauma*.



- 2019 Oct;7(4):355-360. doi: 10.29252/beat-070403.
- [17]. Sreelakshmi K. A Comparative Study on Elective and Emergency Tracheostomies in a Tertiary Hospital of Andhra Pradesh. *Int J Sci Stud* 2018;6(8):184-192.
- [18]. Khan S, Ingale A. A study on tracheostomy and its indications amongst patients admitted at tertiary care teaching hospital, Bellary, Karnataka, India. *MedPulse International Journal of ENT*. September 2019; 11(3): 63-66. <https://www.medpulse.in/ENT/>
- [19]. Menon AM, Deepa R, Balakrishnan E, Aswin Mukundan, Anupama Anisseril. Tracheostomy: A hospitalbased descriptive study. *MedPulse International Journal of ENT*. February 2017; 1(2): 31-39. <https://www.medpulse.in/ENT/> (accessed 14 February 2017)
- [20]. Trouillet JL, Collange O, Belafia F, Blot F, Capellier G, Cesareo E, et al. Tracheotomy in the intensive care unit: Guidelines from a French expert panel. *Annals of Intensive Care*. 2018;8(1). doi:10.1186/s13613-018-0381-y
- [21]. Lewith H, Athanassaglou V. Update on management of tracheostomy. *BJA education*. November 2019;19(11):370-6. DOI:<https://doi.org/10.1016/j.bjae.2019.08.002>