International Journal of Otorhinolaryngology and Head and Neck Surgery
Mohanty S et al. Int J Otorhinolaryngol Head Neck Surg. 2025 Feb;11(1):6-9
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937
DOI: https://dx.doi.org/10.18203/issn.2454-5929.ijohns20250111

Original Research Article

Audit of surgical tracheostomy in ICU setting: an institutional study

Sanjeev Mohanty*, Sudha Balasubramanian, Deepthi Padmanabhan, Balaji Kumaragurubaran, Gunakeerthana Ramesh

Institute of ENT, Head and Neck Surgery, MGM Healthcare, Chennai, Tamil Nadu, India

Received: 04 September 2024
Accepted: 06 December 2024

***Correspondence:**
Dr. Sanjeev Mohanty,
E-mail: drsanjeevmohanty@gmail.com

ABSTRACT

Background: The aim of the study was to assess the indication, timing of the procedure, immediate, early and late complication of surgical tracheostomy in intensive care unit.
Methods: The study was done on patients who are in need for surgical tracheostomy in intensive care unit at MGM Healthcare hospital for a period of 4 years from the year July 2019 to June 2023. All patients were taken up for surgical tracheostomy at the operation theater under monitored anaesthetic care. All patients were followed up for 1 year in the postoperative period.
Results: This is a retrospective study, conducted in the Department of ENT, Head and Neck Surgery, A total of 78 patients were taken into study. Among them, the major indication for tracheostomy was the need for prolonged ventilation accounting for 76 patients and diaphragmatic palsy accounting for 2 patients. Early tracheostomy was done for 14 patients within 1-7 days of intubation and late tracheotomy were done for rest 64 patients between 8 to 14 days of intubation. Early Complication like hemorrhage occurred in 7 patient, surgical emphysema in 3 patients.
Conclusion: Prolonged intubation is the main indication for surgical tracheostomy, performed after 1 week of intubation. Complications of tracheostomy can be life threatening and should be carefully monitored. Ideally, the procedure performed in operating room results in better outcomes. However, in case of acute airway compromise and emergency situations ICU settings and bed side procedures can avoid morbidity and mortality stand points in post operative period.

Keywords: Surgical tracheostomy, Percutaneous tracheostomy, Intensive care unit tracheostomies, Complications of tracheostomy

INTRODUCTION

Tracheostomy is one of the most common surgical procedures performed in the intensive care unit.[1] The indications for tracheostomy are respiratory obstruction, to clear retained secretions in the tracheo-bronchial tree and when there is a need for prolonged ventilation.

Tracheostomy in intensive care unit is generally performed for prolonged ventilation. Though there is an option of lesser invasive percutaneous tracheostomy, it is more of a blind procedure, needs expertise as there is higher chance of injuring the major structures of the neck. On the other hand, surgical tracheostomy dates back to 1909, which involves placement of tracheostomy tube under direct vision performed by ENT, Head and Neck surgeon, is a safe procedure in comparison with the percutaneous tracheostomy.[1]

The decision of type of tracheostomy to be performed, indication, timing of the procedure, type of anesthesia in intensive care unit is always been a matter of debate.[2] The aim of the study was to assess the indication, timing of the procedure, intraoperative, early and late complications of surgical tracheostomy in intensive care unit.

METHODS

This is a retrospective study, conducted in Department of ENT, Head and Neck Surgery with patient requiring surgical tracheostomy in intensive care unit at MGM Healthcare hospitals for a period of 4 years from the year July 2019 to June 2023. All the intensive care unit patients who are in need of surgical tracheostomy, are assessed for pre- anesthetic checkup. The procedure is done under monitored anesthetic care. A total of 78 patients were taken for the study. Tracheostomy indication, timing of tracheostomy, intraoperative, early and late complication were recorded for the study. All the patients were followed up for 12 months post operatively.

Sample size was calculated using Andrew Fisher's formula. Sampling technique used was simple random sampling. Data were entered in excel sheet and Microsoft Word. Data analysis was done using SPSS software. The study was submitted for Ethical committee approval on 28.08.2024, with reference cited – IEC 28/AUG/05 and committee approved the article

Surgical technique

Surgical tracheostomy is a procedure done by creating an opening in the anterior wall of trachea and placement of tracheostomy tube under direct vision. Informed written consent is taken from all the patient/attenders before the surgery. The patient is placed in supine position with neck extended with a shoulder roll. Head is stabilized with a head ring. Under aseptic precautions, parts painted and draped. Horizontal incision given 2 cm above the suprasternal notch. Skin and subcutaneous tissue plane elevated. Strap muscles dissected in the midline. Isthmus of thyroid gland retracted superiorly. Incision made on the anterior wall of trachea at the level of 2nd and 3rd trachea ring.

Tracheostomy tube of appropriate size inserted and placed in position. Correct placement of tube is confirmed by the end-tidal CO2 tracing. Incision wound is sutured on either side of the tracheostomy tube. Stay sutures are placed through the flange ends, tie is secured around the neck. Post procedure chest X-ray is done to confirm its location. Post operative tracheostomy care like suctioning every 2nd hourly, changing of inner cannula every 8th hourly is done to prevent accumulation of respiratory secretions and regular cuff pressure monitoring were followed.

RESULTS

A total of 78 patients were taken into study. Out of 78 patients, 53 patients were male and 25 patients were female. The age of the patients ranges from 7 months of age to 95 years of age. Among them, the major indication for tracheostomy was the need for prolonged ventilation accounting for 76 patients and diaphragmatic palsy accounting for 2 patients. Early tracheostomy was done for 14 patients with 1-7 days of intubation and late tracheotomy were done for rest 64 patients between 8 to 14 days of intubation. There were no intraoperative complications. Early complication like hemorrhage at the stoma site occurred in 7 patients which was managed by mostly by compression dressing and re-suturing were required in 2 patients. Surgical emphysema occurred in 3 patients which settled within 24 hours. There were no reported late complications till date.

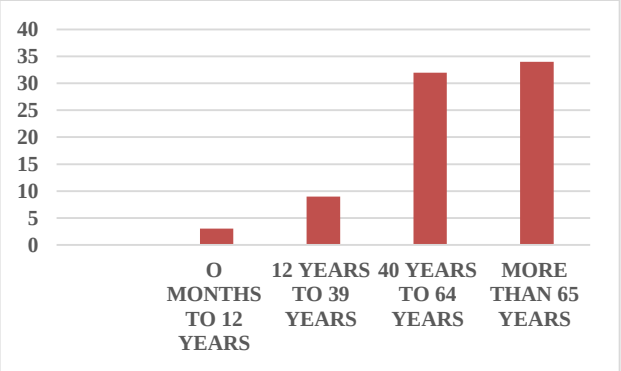

Figure 1: Age distribution.

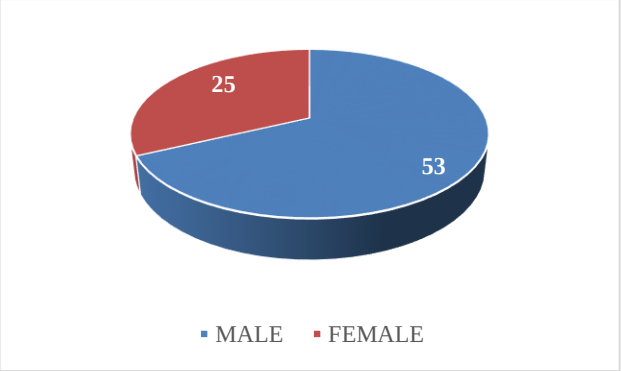

Figure 2: Sex distribution.

DISCUSSION

Patients requiring long term mechanical ventilation because of various reason such as respiratory failure, for weaning from mechanical ventilator support, tracheostomy is the treatment of choice. Tracheostomy can be temporary or permanent. Though there is an option of percutaneous tracheostomy that can be done bedside with a smaller incision, there are lots of risk associated with it like tracheal damage injury to the surrounding structures. It cannot be performed on infants, morbid obesity with short neck, individuals with cervical spine injury, thyroid pathologies and aberrant blood vessels.

Most of the time, percutaneous tracheostomies are performed by intensive care duty doctors or by trained physician assistants. Whereas, surgical tracheostomy dates back to 1909, are done by ENT surgeon with an extensive knowledge about the structures of the neck.[1]

This is the major reason for non-displacement of tracheostomy tube or in other words, insertion of tube in false tract. Though there is a debate on percutaneous tracheostomy and surgical tracheostomy, the later tops the list for obvious reasons. The endotracheal intubation is converted into tracheostomy usually at 7-14 days. Vargas et al, reported that timing of tracheostomy in an international and national survey was between 7 to 15 days.[3,5] It is generally done early, if the patient is suffering from severe traumatic brain injury, neurological disorders like guillain barre syndrome, severe respiratory distress.[3] Terragni et al, consider tracheostomy as early as 4 days of intubation to prevent pneumonia in mechanically ventilated adult ICU patients.[4]

The complications of tracheostomy are divided into intraoperative, early and late.[6] Intraoperative complications include hemorrhage, damage to nearby structures, air embolism, aspiration, hypoxaemia, hypercarbia and death. Early complications which occur within 7 days of procedure includes hemorrhage, obstruction due to blood clot or mucus plug, accidental decannulation, displacement of tube, subcutaneous emphysema, stomal infection, pneumomediastinum and pneumothorax. The late complications occurring beyond 7 days of procedure, includes tracheal stenosis, granulation tissue, pneumonia, tracheo-oesophageal fistula, tracheo-innominate artery fistula and tracheomalacia.[7,8]

Post surgical care of tracheostomy by suctioning every 2nd hourly and changing inner cannula every 8th hourly, is utmost important, in keeping the tube patent. The results of our study showed that the prime indication of tracheostomy in ICU patients is prolonged intubation. There were few early complications like surgical emphysema, hemorrhage and there were no reported late complications leading to prolonged morbidity post operatively.

Limitations of the study is that it is a single referral centre study. All the patients are from ICU setting. All airway compromised patients were initially managed with intubation and elective ventilation which obviated the need for tracheostomy.

CONCLUSION

Tracheostomy is a lifesaving procedure and one of the most common surgical procedures in intensive care unit. Prolonged intubation is the main indication for surgical tracheostomy. Early tracheostomy is usually done when the patient is need for long term ventilation. Complications of tracheostomy can be life threatening and should be dealt with utmost care. In the present health care industry guidelines, a safe bet is to perform the surgical tracheostomy in operating room under controlled clinical environment. The standalone equipment, skilled personnel and clinical help across disciplines ensures good outcomes.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. 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;21(1):33-7.
2. Muralidhar K. Tracheostomy in ICU: An insight into resent concepts. Indian J Anaesthesia. 2008;52(1):28-37.
3. Vargas M, Sutherasan Y, Antonelli M. Tracheostomy procedures in the intensive care unit: an international survey. Crit Care. 2015;19(1):291.
4. Terragni PP, Antonelli M, Fumagalli R , et al. Early vs late tracheotomy for prevention of pneumonia in mechanically ventilated adult ICU patients: a randomized controlled trial. JAMA. 2010;303(15):1483-9.
5. Vargas M, Servillo G, Arditi E. Tracheostomy in intensive care unit: a national survey in Italy. Minerva Anestesiol. 2013;79 (2):156-64.
6. Lee M, Wilson H. Complications of tracheostomy. Shanghai Chest. 2021;5:42.
7. Durbin CG. Early complications of tracheostomy. Respir Care. 2005;50:511-5.
8. Epstein SK. Late complications of tracheostomy. Respir Care. 2005;50:542-9.
9. Barry BN. The role of tracheostomy in ICU, Anaesthesia Intensive Care Med. 2004;5(11):375-8.
10. Chinsky KD. Varying approaches to tracheostomy. Chest Editorials. 2005;4:127:4.
11. Flaatten H, Gjerde S, Heimdal JH, Aardal S. The effect of tracheostomy on outcome in intensive care unit patients. Acta Anaesthesiol Scand. 2006;50(1):92-8.
12. Whitmore KA, Townsend SC, Laupland KB. Management of tracheostomies in the intensive care unit: a scoping review. BMJ Open Respir Res. 2020;7:45-9.
13. Gupta S, Dixit S, Choudhry D. Tracheostomy in adult intensive care unit: An ISCCM expert panel practice recommendations. Indian J Crit Care Med. 2020;24(1):31-42.
14. Cheung NH, Napolitano LM. Tracheostomy: Epidemiology, indications, timing, technique, and outcomes. Respir Care. 2014;59(6):895–919.
15. Meng L, Wang C, Li J, Zhang J. Early vs late tracheostomy in critically ill patients: a systematic review and meta-analysis. Clin Respir J. 2016;10:684-92.
16. Friedman Y, Fildes J, Mizock B, Samuel J, Patel S, Appavu S, et al. Comparison of percutaneous and surgical tracheostomies. Chest. 1996;110:480–5.
17. Melloni G, Muttini S, Gallioli G, Carretta A, Cozzi S, Gemma M, et al. Surgical tracheostomy versus percutaneous dilatational tracheostomy: a

prospective- randomized study with long-term follow-up. J Cardiovasc Surg. 2002;43:113–21.
18. Griffiths J, Barber VS, Morgan L, Young JD. Systematic review and meta-analysis of studies of the timing of tracheostomy in adult patients undergoing artificial ventilation. BMJ. 2005;330(7502):1243.
19. Wang F, Wu Y, Bo L, Lou J, Zhu J, Chen F, et al. The timing of tracheotomy in critically ill patients undergoing mechanical ventilation: a systematic review and meta-analysis of randomized con- trolled trials. Chest. 2011;140(6):1456–65.
20. Moller MG, Slaikeu JD, Bonelli P, Davis AT, Hoogeboom JE, Bonnell BW. Early tracheostomy versus late tracheostomy in the surgical intensive care unit. Am J Surg. 2005;189(3):293–6.
21. Hosokawa K, Nishimura M, Egi M, Vincent JL. Timing of tracheotomy in ICU patients: a systematic review of randomized controlled trials. Crit Care. 2015;19:424.
22. Jackson C. Tracheostomy. Laryngosc. 1909;19(4):285-90.

Cite this article as: Mohanty S, Balasubramanian S, Padmanabhan D, Kumaragurubaran B, Ramesh G. Audit of surgical tracheostomy in ICU setting: an institutional study. Int J Otorhinolaryngol Head Neck Surg 2025;11:6-9.