



INDICATIONS AND COMPLICATIONS OF TRACHEOSTOMY – A LONGITUDANAL STUDY

Dr. Mita Mariam Sabu	PG, Department of Otorhinolaryngology, SRM Medical College Hospital and Research Centre, SRM Nagar, Kattankulathur, Kancheepuram- 603203, Tamil Nadu, India
Dr. P. K. Purushothaman	Professor & HOD, Department of ENT, SRM Medical College Hospital & Research Centre, SRM Nagar, Kattankulathur, Kancheepuram- 603203, Tamil Nadu, India
Dr. Sweta Mary Sabu*	PG, Department of Otorhinolaryngology, SRM Medical College Hospital and Research Centre, SRM Nagar, Kattankulathur, Kancheepuram- 603203, Tamil Nadu, India *Corresponding Author

ABSTRACT **Introduction:** Tracheostomy now emerges as a procedure replacing intubation due to its decreased morbidity and mortality outcome. The indications and complications of this life saving procedure should be made clear. The study was done for the indications of tracheostomy occurring in hospitalized patients and also about the complications among these patients after the procedure.

Materials and Methods: This was a longitudinal study among 144 ICU patients admitted in a tertiary care hospital who had undergone tracheostomy. The clinical profile of the patient at the time of tracheostomy (indication) and the follow up period complications after decannulation was assessed.

Results: Out of the 144 subjects, 80(55.6%) were males and mean (SD) age of the population was 42.72(13.22) years. In our study we found that major indication tracheostomy was for prolonged intubation needing ICU admission. The major cause for ICU admission was Road Traffic Accident (RTA) 45(31.3%) which was followed by Polytrauma 33 (22.9%) and septic shock 17(11.81%) In our study most of the subjects had granulation 31(21.53%), ulceration with slough 16(11.1%) and ulceration of subglottis 6(4.17%) as early complication. And there was granulation at tracheostomy site 19(13.19%), subglottic stenosis 11(7.64%) and vocal cord palsy 6(4.17%) as late complications.

Conclusion: The study described the variation in indication and complication in terms of different hospitals. Delay in decision in case of such procedure can lead to increase in mortality and morbidity.

KEYWORDS : Complication, Indication, Tracheostomy

INTRODUCTION

Tracheostomy is the most common procedure in critically ill patients. It has been routinely done from the middle of 19th century (van Heurn & Brink, 1996) Though the word literally means making an opening in trachea, has become a viable alternative to prolonged endotracheal intubation, with the benefits of improving patient comfort, reducing need for sedation, lowering airway resistance, and allowing for easier airway care (Heffner & Hess, 2001) General indications for the placement of tracheostomy include acute respiratory failure with the expected need for prolonged mechanical ventilation, failure to wean from mechanical ventilation, upper airway obstruction, difficult airway, and copious secretions (De Leyn et al., 2007) Also currently the indication of long term or permanent tracheostomy as in cases of severe respiratory distress, sleep apnoea syndrome and terminal malignant neoplasm are also increasing.

Despite the advantages complications of the procedure either leads turns into a life threatening event or treatment failure. The after effects of the procedure depend on the time at which it is conducted. The best time is when the engaging medical practitioner thinks about it in a particular situation. ("Scott-Browns Otorhinolaryngology: Head and Neck Surgery 7Ed: 3 volume set - CRC Press Book," n.d.) Elective tracheostomy is much more favorable than waiting for the situation to become emergency. The after effects are not always due to the procedure itself but also depends on different conditions like age, general health status, surgeon skill, timing, quality of the instruments used and the post care for the patient (Gilmore & Mickelson, 1986)

Different studies have put forward the tracheostomy procedure and management. In this study we aimed to identify the indications of tracheostomy occurring in hospitalized patients and also about the complications among these patients after the procedure.

MATERIALS AND METHODS

A longitudinal study was conducted among Intensive Care Unit patients who had undergone tracheostomy admitted in the Department of otorhinolaryngology in SRM medical college hospital, Potheri, Tamil Nadu. The patients were selected by convenient sampling. The study was conducted for a period of 18 months (March 2017 to September 2018).

Assuming a 50% prevalence of complications in the tracheostomy procedure using the sample size formula $n = z^2 pq/d^2$ where d, absolute deviate=10% and a non response rate of 10% the minimum sample size came up to 110. We included ICU patients on endotracheal intubation receiving mechanical ventilation, Patients on endotracheal intubation who is not receiving mechanical ventilation, Patients of either sex and Patients above 16yrs of age. We excluded Patient who is already on a tracheostomy tube from an outside hospital and Previous laryngeal pathology. The subjects were followed up after one month and three month of decannulation.

Data was entered in Micro Soft Excel and analyzed using statistical software. Descriptive details were presented as frequencies, means, medians, interquartile range and standard deviations. Inferential statistical methods were used to find any significant association. P value less than 0.05 was considered as significant.

RESULTS

Out of the 144 subjects, 80(55.6%) were males and mean (SD) age of the population was 42.72(13.22) years. The minimum age was 18 years and maximum was 78 years.

The major indication of tracheostomy was prolonged intubation requiring ICU care. The major cause for ICU admission was was Road Traffic Accident (RTA) 45(31.3%) The other indication is summarized in table 1. Poisoning included both organo phosphorus and snake bite poisoning. Chronic disease complications included due to hypertension, renal, cardiac and liver complications. Brain related disorders included were seizures, cerebrovascular infarcts and encephalopathy. Infections included were dengue and encephalitis.

The median (IQR) duration patient spend before and after tracheostomy was 5 (4, 9) and 29.50 (23, 40) days respectively. In our study tracheostomy complications like crusting, blocked tube and aspiration pneumonia was present in 57(39.6%), 53(36.8%) and 20(13.9%) respectively.

Table 1: Indications for tracheostomy among the study population

INDICATIONS	FREQUENCY	PERCENTAGE
Road Traffic Accident(RTA)	45	31.3
Polytrauma	33	22.9
Septic shock	17	11.81
Poisoning	11	7.64
Complication of Chronic diseases	9	6.25
Respiratory failure	7	4.86
Soft tissue neck injury	6	4.17
Brain related disorders	6	4.17
Infections	5	3.47
Bilateral abductor palsy	3	2.08
Sub glottic stenosis	2	2.08

We have done endolaryngoscopy for the patients after decannulation (within a month) and the findings are represented in a figure 1

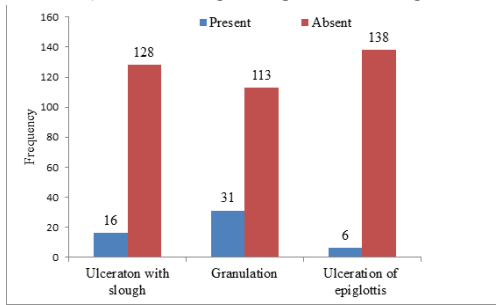


Figure1: Endolaryngoscopy findings among the study population

The status of larynx also checked after decannulation (after one month) which is described in the table 2

Table 2: Status of larynx after decannulation among the study population

Vocal cord status	Frequency	Percentage
Normal	108	75
Oedema	9	6.25
Paralysis with no flickering movements	2	1.39
Granulation	8	5.56
Paralysis with flickering movements	16	11.11
Thickening	1	0.69

Arytenoid subluxation was found in 19 (13.19%) of the subjects after decannulation In the study the subjects were followed up after three months to assess the voice status and also using endolaryngoscopy. After decannulation 34 (23.6%) and 13(9%) had change in voice and dyspnoea respectively. Also endolaryngoscopy was done for the patients and the findings were given in the figure 2.

The preoperative duration (before tracheostomy) and post operative (after tracheostomy) duration was associated with gender (Kruskal Wallis test) and age (Spearman correlation) to see any significance. That shows a significant (p value 0.03) increase in preoperative duration in male gender [6.50 (4, 10) days] compared to female gender [31(23.25, 43) days]. The association between postoperative duration and gender was not significant. Correlation statistics done with age and duration (both pre and post operative) was not significant.

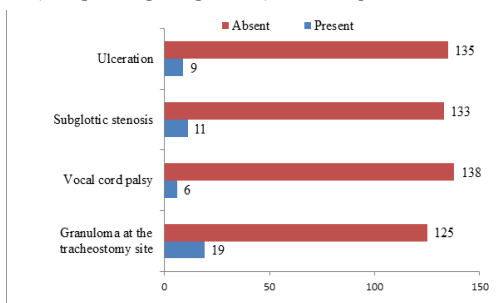


Figure 2: Endolaryngoscopy findings (after three month) among the study population

DISCUSSION

In this study we aimed to identify the indications and complications in tracheostomy patients. Out of the 144 subjects, 80(55.6%) were males

and mean (SD) age of the population was 42.72(13.22) years. This result is comparable to another study(Buche, Gawarle, Kawale, Keche, & Bhat, 2017) where average age of the patients was 37.8 years with 75% male patients among the population. The mean age shows a trend towards younger age group which can be attributed to the indications. Also gender disparity may be a coincidence along with indications.

The major indication for prolonged intubation requiring ICU intubation care and tracheostomy was Road Traffic Accident (RTA) 45(31.3%) which was followed by Polytrauma 33 (22.9%) and septic shock 17(11.81%). This result is comparable to other studies where trauma was the major indication for tracheostomy.(Adoga & Ma'an, 2010; Muralidhar, 2008; Olton, Hariharan, & Chen, 2009) In a systematic review conducted for 10 years the indication for tracheostomy was upper airway obstruction secondary to aero digestive tract tumors in 60.5%, then trauma in 26.3%.(Alabi et al., 2018) In another study done in Nigeria showed the most common indication as upper airway obstruction with laryngeal tumor as the major cause (32.7%) and trauma (25%).(Adedeji, Idowu, Olaosun, & Tobih, 2014) Also in a study done in India most common indication for tracheostomy was assisted ventilation (68.60%) and in those maximum cases was prolonged intubation due to respiratory muscle paralysis due to organo-phosphorus poisoning. (Buche et al., 2017) This difference in indication can be attributed to type of hospital and the admission policies. Also our study was done in a shorter period which attributed to the increase in trauma cases.

In our study most of the subjects had granulation 31(21.53%), ulceration with slough 16(11.1%) and ulceration of subglottis 6(4.17%) as early complication. And there was granulation at tracheostomy site 19(13.19%), subglottic stenosis 11(7.64%) and vocal cord palsy 6(4.17%) as late complications. Tracheostomy complications can be divided into immediate, early, and late.(Durbin & Faarc, 2005)(Epstein, 2005) The complication rates have been quoted in many studies from 6% to 66%(Gilyoma, Balumuka, & Chalya, 2011; Rashid & Taous, 2016) Also most common complication can be tracheostomy dependence and found mostly in children.(Adedeji et al., 2014) In the study 34 (23.6%) and 13(9%) had change in voice and dyspnoea respectively. These late outcomes are comparable with other studies (Cobean, Beals, Moss, & Bredenberg, 1996; Fischler, Cantieni, Frutiger, & Kuhn, 1995; Norwood et al., 2000) where hoarseness of voice, tracheal abnormalities and dyspnoea were the major changes noted after decannulation.

CONCLUSION

In our study we found that major indication for prolonged intubaion requiring ICU intubation care of tracheostomy was Road Traffic Accident (RTA) 45(31.3%) which was followed by Polytrauma 33 (22.9%) and septic shock 17(11.81%) In our study most of the subjects had granulation 31(21.53%), ulceration with slough 16(11.1%) and ulceration of subglottis 6(4.17%) as early complication. And there was granulation at tracheostomy site 19(13.19%), subglottic stenosis 11(7.64%) and vocal cord palsy 6(4.17%) as late complications.

The study was useful to ascertain certain indications and complications of tracheostomy. Also it had shown a difference in opinion based on the indication in terms of complication. The approach of hospital towards admission of patients imparts a significant variation in this study compared to other studies. The limitation of our study was the omission of disparities between selective and emergency tracheostomy. Also we didn't study about the difference an early and late tracheostomy makes in terms of indication and complication. Further studies in this field to evaluate the effectiveness of selective tracheostomy to reduce complications shave to be entertained.

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REFERENCES

1. Adedeji, T., Idowu, J., Olaosun, A., & Tobih, J. (2014). Indications and outcomes of tracheostomy: An experience in a resource-limited environment. *Journal of Health Research and Reviews*, 1(2), 40. <https://doi.org/10.4103/2394-2010.150795>

2. Adoga, A. A., & Ma'an, N. D. (2010). Indications and outcome of pediatric tracheostomy: results from a Nigerian tertiary hospital. *BMC Surgery*, 10(1), 2. <https://doi.org/10.1186/1471-2482-10-2>
3. Alabi, B. S., Afolabi, O. A., Dunmade, A. D., Omokanye, H. K., Ajayi, I. O., Ayodele, S. O., & Busari, N. O. (2018). Indications and outcome of tracheostomy in Ilorin, North Central Nigeria: 10 years review. *Annals of African Medicine*, 17(1), 1–6. https://doi.org/10.4103/aam.aam_130_16
4. Buche, A., Gawarle, S. H., Kawale, M. A., Keche, P. N., & Bhat, S. V. (2017). A prospective study of complications of tracheostomy and management in tertiary care hospital in rural area. *International Journal of Otorhinolaryngology and Head and Neck Surgery*, 3(3), 687. <https://doi.org/10.18203/issn.2454-5929.ijohns20173048>
5. Cobean, R., Beals, M., Moss, C., & Bredenberg, C. E. (1996). Percutaneous dilatational tracheostomy. A safe, cost-effective bedside procedure. *Archives of Surgery (Chicago, Ill. : 1960)*, 131(3), 265–271. <https://doi.org/10.1001/ARCHSURG.1996.01430150043008>
6. De Leyn, P., Bedert, L., Delcroix, M., Depuydt, P., Lauwers, G., Sokolov, Y., ... Belgian Association of Pneumology and Belgian Association of Cardiothoracic Surgery. (2007). Tracheostomy: clinical review and guidelines. *European Journal of Cardio-Thoracic Surgery*, 32(3), 412–421. <https://doi.org/10.1016/j.ejcts.2007.05.018>
7. Durbin, C. G., & Faarc, J. (2005). Early Complications of Tracheostomy, 511–515.
8. Epstein, S. K. (2005). Late complications of tracheostomy. *Respiratory Care*, 50(4), 542–549. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/15807919>
9. Fischler, M. P., Cantieni, R., Frutiger, A., & Kuhn, M. (1995). Late outcome of percutaneous dilatational tracheostomy in intensive care patients. *Intensive Care Medicine*, 21(6), 475–481. <https://doi.org/10.1007/BF01706200>
10. Gilmore, B. B., & Mickelson, S. A. (1986). Pediatric tracheostomy. Controversies in management. *Otolaryngologic Clinics of North America*, 19(1), 141–151. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/3951870>
11. Gilyoma, J. M., Balumuka, D. D., & Chalya, P. L. (2011). Ten-year experiences with Tracheostomy at a University teaching hospital in Northwestern Tanzania: A retrospective review of 214 cases. *World Journal of Emergency Surgery*, 6(1), 38. <https://doi.org/10.1186/1749-7922-6-38>
12. Heffner, J. E., & Hess, D. (2001). Tracheostomy management in the chronically ventilated patient. *Clinics in Chest Medicine*, 22(1), 55–69. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/11315459>
13. Muralidhar, K. (2008). Tracheostomy in ICU: an insight into the present concepts. *Indian Journal of Anaesthesia*, 52(February), 28–37. Retrieved from <http://www.ijaweb.org/article.asp?issn=0019-5049;year=2008;volume=52; issue=1; spage=28;epage=28;aulast=K>
14. Norwood, S., Vallina, V. L., Short, K., Saigusa, M., Fernandez, L. G., & McLarty, J. W. (2000). Incidence of tracheal stenosis and other late complications after percutaneous tracheostomy. *Annals of Surgery*, 232(2), 233–241. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/10903603>
15. Olton, S., Hariharan, S., & Chen, D. (2009). Outcome evaluation of patients requiring tracheostomy in an intensive care unit in Trinidad. *The West Indian Medical Journal*, 58(2), 173–178. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/21866604>
16. Rashid, M. H. O., & Taous, A. (2016). Comparative study on complications of emergency and elective tracheostomy. *Bangladesh Journal of Otorhinolaryngology*, 21(2), 69–75. <https://doi.org/10.3329/bjo.v21i2.27642>
17. Scott-Brown's Otorhinolaryngology: Head and Neck Surgery 7Ed: 3 volume set - CRC Press Book. (n.d.). Retrieved March 12, 2019, from <https://www.crcpress.com/Scott-Brown's-Otorhinolaryngology-Head-and-Neck-Surgery-7Ed-3-volume-set/Gleeson-Clarke/p/book/9780429167492>
18. van Heurn, L. W., & Brink, P. R. (1996). The history of percutaneous tracheostomy. *The Journal of Laryngology and Otology*, 110(8), 723–726. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/8869602>