

Tracheostomy in Intensive Care Unit: Indications and Outcomes at a Teaching Hospital

Yogeshwar Chandrashekar, Borlingegowda Viswanatha*, Shashikala Ballur Srinivasan,
Roopashri Tarikere Jayaram, Maliyappanahalli Siddappa Vijayashree

Otorhinolaryngology Department, Bangalore Medical College & Research Institute, Bangalore, India

Abstract **Objective-** To study the various underlying disease aspects of indications and the outcomes of tracheostomy in intensive care unit at a teaching hospital. **Methods-** This study was done at Intensive care units (ICU) in medical college hospital. Data collection was done to know the various disease indications for tracheostomy during the period of 3 years (January 2010 – January 2016). Patient details (age and sex), complete clinical history pertaining to the cause of prolonged intubation/ indication of tracheostomy, timing and complications was compiled and analyzed. **Results-** Out of 100 patients mean age was 46.3 years, male: female ratio of 1.56:1 and most common indication for tracheostomy following prolonged intubation were cerebro vascular accidents (36%) and organo phosphorous compound poisoning (27%). Tracheostomy was performed within 10-12 days of endotracheal intubation. The complication rate was 14%, most common complication were hemorrhage (7%) and late wound infection (4%). Out of 100 patients, 98 patients had successful decanulation and there was no mortality due to tracheostomy. **Conclusions-** Tracheostomy in ICU is an important and safe procedure if prolonged endotracheal intubation is advised for varying underlying causes. An Otolaryngologist should be familiar with the complications of tracheostomy and its management.

Keywords Tracheostomy, Intensive care unit

1. Introduction

Tracheostomy is described as the creation of a stoma at the skin surface which leads into the trachea [1] which was at the earliest performed in ancient Egypt and is also included in many ancient medical texts like The Rig Veda (2000 to 1000 BCE) [2].

Tracheostomy is performed in about 24% of all patients in intensive care units (ICU) [3, 4]. Tracheostomy has many advantages over endotracheal intubation in ICU setting including protection of the larynx and the upper airway from prolonged intubation which may lead to tracheal stenosis [5], improved patient comfort, less requirement for sedation [6], faster weaning leading to reduce ICU and hospital stay and reduced incidence of ventilator associated pneumonia if done early [7].

Indications are mainly prolonged intubation for various conditions, acute or chronic neuromuscular diseases, poor cardio- respiratory reserve, brain injury and upper airway obstruction [8]. While the timing of tracheostomy differs for these indications and its recommended for consideration only if extubation did not occur by 21 days in prolonged

cases [8] but in selected patients with severe multi-trauma and/or head injury with low Glasgow coma score, tracheostomy at the earliest, within 3–4 days of intubation is advocated [9].

Tracheostomy has been considered a safe procedure in ICU but has been found to lead to life-threatening complications intra and post operatively like hypoxia, cardiac arrest, injury to structures immediately adjacent to the trachea, pneumothorax, haemothorax, incision site bleeding and stoma infection [10].

Techniques of tracheostomy include open surgical technique, earlier performed routinely and percutaneous dilatational tracheostomy (PDT) advocated by Ciaglia [11], which is commonly performed in recent days in ICU because of its various advantages over the former, but PDT is not routinely practiced in our institution.

The objective of present study is to study the various underlying disease aspects of indications and the outcomes of tracheostomy in ICU at a teaching hospital.

2. Methods

This study was done at Intensive care units (ICU) in medical college hospital. Data collection was done by retrospective analysis of inpatient details of 100 patients who underwent elective open tracheostomy in the ICU by ENT surgeons for various indications during the time period of

* Corresponding author:

drbviswanatha@yahoo.co.in (Borlingegowda Viswanatha)

Published online at <http://journal.sapub.org/otolaryn>

Copyright © 2016 Scientific & Academic Publishing. All Rights Reserved

5years (January 2010 – January 2016). Patient details (age and sex), complete clinical history pertaining to the cause of prolonged intubation/ indication of tracheostomy, timing and complications was compiled and analyzed.

3. Results

3.1. Age Distribution

Out of 100 patients, with respect to age ranged from 8 years (youngest) to 80 years (oldest) with a mean age of 46.3 years and majority belonged to age group of 21-30 years (28%) as shown in table 1.

Table 1. Showing the age distribution of patients

Age (years)	No. of Patients
0-10	2
11-20	7
21-30	28
31-40	15
41-50	21
51-60	12
61-70	14
71-80	4
Total	100

3.2. Sex Distribution

Among 100 patients 61 were male and 39 were female with a male: female ratio of 1.56:1 as shown in figure 1.

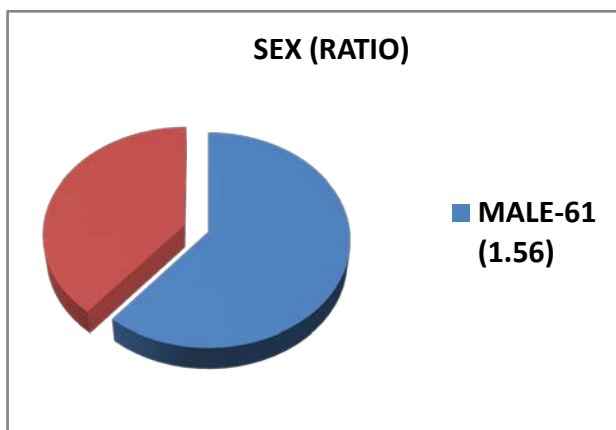


Figure 1. Showing the sex distribution of patients

3.3. Indications

Table 2 shows the various indications of tracheostomy following prolonged intubation for all the cases out of which most common indication being CVA (36%) and 2nd commonest is OPCP (27%).

3.4. Timing of Surgery

Patients usually underwent tracheostomy within 10-12 days of endotracheal intubation on an average. Earliest being

for maxiofacial trauma on 5th day and delayed for up to 15 days in a case of OPCP.

Table 2. Showing the underlying diseases in patients who underwent tracheostomy

Indication	No. of Patient	Percentage
Cerebrovascular accident (CVA)	36	36
Op compound poisoning (OPCP)	27	27
Gullian barrie syndrome	10	10
Post abdominal surgery	7	7
Head injury following Road traffic accident(RTA)	7	7
Pulmonary disease	6	6
Post thyroid surgery	4	4
Maxiofacial trauma	3	3
Total	100	

3.5. Complications and Outcomes

In this study out of 100 tracheostomies 14 patients (14%) had complications and most common was hemorrhage (7%). Others complications were wound infection (4%), surgical emphysema (3%) and tube displacement (1%) as shown in table 3.

Table 3. Showing the complications (n=100)

Complication	No. of Patients
Hemorrhage	7
Wound Infection	4
Surgical Emphysema	3
Tube Displacement	1
Total	14

98 patients were successfully decanulated over a varying length of time based on their underlying disease while 2 patients could not be decanulated due tracheal stenosis in one patient and absence of swallowing reflex in a patient of Gullian barrie syndrome.

4. Discussion

Tracheostomy is a common procedure done in ICU having its own merits and demerits. In this study 100 cases of tracheostomy in the ICU were studied retrospectively and the patient demographics, indications, timing of tracheostomy, complications and outcomes were analyzed and compared with similar studies.

In this study age of patients ranged from 8 to 80 years with a mean age of 46.3 years and the highest frequency between 21-30 years (28%). On comparison to a similar study by Muddassir et al. [12] mean age was found 44.30 years, more in the age group 41-50 years (32.5%). Sex distribution in our study had a male predominance [61 cases out of 100 cases] with sex ratio of 1.56:1. Comparing it to the latter study [12],

26 cases were male and 14 cases were female with male to female ratio of 1.85:1 similar to our study.

The study revealed that most common indication for tracheostomy following prolonged intubation in ICU was CVA (36%) and followed by OPCP (27%). Other indications were GBS (10%), post abdominal surgery(7%), head injury due to RTA (7%), pulmonary disease(6%) including Pneumonia and acute respiratory distress syndrome(ARDS), post thyroid surgery(4%) for patients who went in to stridor and maxiofacial trauma(3%). In study by Muddassir et al. [12] head injury with history of RTA (27.5%), followed by post-operative case of intracranial space occupying lesion (25%), GBS (15%), cerebrovascular accident (12.5%), Maxillofacial trauma (5%), RTA with cervical spinal cord injury (5%), and post-operative pneumonia (5%) were the indications. In this study CVA and OPCP were commonest underlying disease aspect for prolonged intubation leading to tracheostomy as ours is a teaching tertiary care hospital.

In study by Olton et al 48 patients who had tracheostomy within 10 days had a significantly lesser predicted mortality and shorter ICU length of stay than those who had it after ten days ($p = 0.01$) [13]. In our study almost all patients had tracheostomy by 10-12 days of prolonged intubation for various causes with earliest being for maxiofacial trauma on 5th day and delayed for up to 15 days in a case of OPCP.

Complication rates quoted in the literature range between 6 and 66 percent for surgical tracheostomy [14]. Choudhury et al. [15] in their study on 30 patients noted the frequency of complication for elective tracheostomy was 9.99% while in this study complication rate is 14% with most common being hemorrhage (7%) which was controlled by intraoperative pressure over bleeders and ligation. Other complications being wound infection (4%) which was treated by regular dressing of wound and appropriate antibiotics, surgical emphysema (3%) managed by removal of tight sutures and tube displacement (1%). In a similar study by Mahmud et al. [11] the rate of complication was 10% with surgical emphysema (5%) being the commonest. Another study by Vargas et al [16] in an international survey found that surgical tracheostomy was mainly performed in ICU ($n=166$) by ENT specialists, where bleeding controlled by compression and stoma infection/inflammation were the most common intra procedural and late complications, respectively.

Outcome of tracheostomy was based on decanulation and mortality and in this study 98 patients were successfully decanulated over a varying length of time based on their underlying disease while 2 patients could not be decanulated, one being tracheal stenosis managed by tracheal dilatation and a patient of GBS because of absence of swallowing reflex for which patient was on permanent tracheostomy. No mortality was noted in this study secondary to tracheostomy. In study done by Perfeito et al. [17] on 73 patients, early complication was bleeding while late complication was wound infection in 2 patients each with no mortality relating to procedure and they concluded that performing tracheostomy in the ICU is safe.

In a recent study [18] out of 50 cases of tracheostomy (both elective and emergency) performed, 24 cases presented with complications. Intra operative bleeding was the commonest complication noted in 10 cases (20%), 5 cases (10%) had surgical emphysema, 4 cases (8%) had tubal occlusion, one case (2%) had wound infection. There were 2 deaths (4%) during emergency tracheostomy.

5. Conclusions

Tracheostomy in ICU is a safe life saving procedure in patients who needs prolonged endotracheal intubation. An Otolaryngologist should be familiar with the complications of tracheostomy and its management.

REFERENCES

- [1] Pracy P. Tracheostomy. In: Gleeson M et al eds Scott Browns Otolaryngology and Head-Neck Surgery, London: Hodder Arnold; 2008; Vol1: p-353.
- [2] Frost EAM. Tracing the tracheostomy. *Annals of Otolaryngology*. 1976; 85: 618–24.
- [3] Upadhyay A, Maurer J, Turner J, Tiszenvel H, Rosengart T. Elective bedside Tracheostomy in the intensive care unit. *J Am Coll Surg*. 1996; 183(1): 51-5.
- [4] Esteban A, Anzueto A, Alia I, Gordo F, Apezteguia C, Palizas F, et al.: How is mechanical ventilation employed in the intensive care unit? An international utilization review. *Am J Respir Crit Care Med* 2000; 161: 1450-1458.
- [5] 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): 1779-1787.
- [6] Nieszkowska A, Combes A, Luyt CE, Ksibi H, Trouillet JL, Gilbert C, Chastre J. Impact of tracheostomy on sedative administration, sedation level, and comfort of mechanically ventilated intensive care unit patients. *Crit Care Med* 2005; 33(11): 2527-2533.
- [7] 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.
- [8] Bary B, Bodenhan AR. Role of Tracheostomy in ICU, *Anaesthesia & Intensive care Medicine*. 2004; P-375.
- [9] McWhorter AJ. Tracheotomy: timing and techniques. *Curr Opin Otolaryngol Head Neck Surg* 2003; 11(6): 473-479.
- [10] Stock MC, Woodward CG, Shapiro BA.: Perioperative complications of elective tracheostomy in critically ill patients. *Crit Care Med* 1986; 14: 861-863.
- [11] Ciaglia P, Firsching R, Syniec C. Elective percutaneous dilatational tracheostomy. A new simple bedside procedure; preliminary report. *Chest* 1985; 87(6): 715-719.
- [12] Mahmud M, Hussain MA, Sarkar MZ, Hossain HSM, Islam MO, Ahmed MU. Tracheostomy in Intensive Care Unit:

- Indications, Benefits and Complications. *Bangladesh J Otorhinolaryngol* 2015; 21(1): 28-32.
- [13] Olton S, Hariharan S, Chen D. Outcome Evaluation of Patients Requiring Tracheostomy in an Intensive Care Unit in Trinidad. *West Indian Med J* 2009; 58 (2): 173.
- [14] Trottier SJ, Hazard PB, Sakabu SA, Levine JH, Troop BR, Thompson JA et al. Posterior tracheal wall perforation during percutaneous dilational tracheostomy. *Chest*. 1999; 115: 1383-9.
- [15] Choudhury AA, Sultana T, Joarder MAH, Tarafder KH. A comparative study of elective and emergency Tracheostomy. *Bangladesh J of Otorhinolaryngology* 2008; 14(2): 57-62.
- [16] Vargas M, Sutherasan Y, Antonelli M et al. Tracheostomy procedures in the intensive care unit: an international survey. *Critical Care* (2015) 19: 291.
- [17] Perfeito JAJ, Mata CAS, Forte V, Carnaghi M, Tamura N, Leão LEV et al. Tracheostomy in the ICU: Is it worthwhile? *J Bras Pneumol*. 2007; 33(6): 687-690.
- [18] Datta RK, Viswanatha B, Puneet PJ, Merin B, Kumari TLN. Tracheostomy: Our experience. *Research in Otolaryngology* 2015; 4(2): 29-33.