



TRACHEOSTOMY UPDATE-EPIDEMIOLOGY, INDICATIONS, COMPLICATIONS; 2 YEARS EXPERIENCE FROM A TERTIARY CARE HOSPITAL

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ABSTRACT

Conventional tracheostomy is an age old surgical procedure and one of the most commonly performed surgical procedure. The number of tracheostomies done is in the rise due to the changing lifestyle, increase in the incidence of head and neck carcinoma and road traffic accidents associated with complex maxillofacial trauma, which most often requires a tracheostomy to secure the airway. And like any other surgical procedure, tracheostomy is not free of complications. Our present study is a descriptive retrospective study which deals with the epidemiology, indications and complications after conventional tracheostomy. Although the technique has remained virtually unchanged over time, the introduction of new instruments, monitoring, and perioperative multidisciplinary care have made the surgery a safe option. A detailed review along with its respective literature are presented herewith.

KEYWORDS : Tracheostomy, Indications, Complications

INTRODUCTIONS

Tracheostomy is one of the most ancient surgical procedures. The oldest record of this life saving procedure can be traced to the Edwin Smith Papyrus, an ancient Egyptian medical text thought to date to around 1600 BC, which demonstrates a procedure thought to be a tracheostomy to provide an emergency airway in trauma.

Tracheostomy is the surgical creation of stoma at the skin surface that leads into the tracheal lumen. The indications of tracheostomy have been very well documented in various literatures since many decades with several recommendations and amendments. In a recent paper, Campisi et al. summarized some important additional indications for tracheostomy, including those for pediatric cases. [1]

This surgical procedure has its own drawbacks as it is associated with serious complications that can sometimes be fatal. In a large review, the overall complication rate ranged from 6.7 to 48 %, with a mortality rate of 1.6 % [2]. However, recent reviews like that of Zeitouni et al, as reported in 1994, in 281 consecutive cases of tracheostomy reported an overall complication rate of 24% with no mortality [3]

Aim of our study is to present an analysis of various indications and complications encountered in tracheostomized patients in our institution over a period of 2 years.

Methods

This retrospective study was conducted in the Department of ENT and Head & Neck Surgery, North Bengal medical college Hospital, Darjeeling from January 2018 to January 2020. The cases were recorded from ENT Department and also intensive care units of our institution. We included all the emergency, elective and prophylactic tracheostomies in this study. Most of the cases were performed under local anesthesia except prophylactic and preoperative tracheostomies. We preferred a vertical incision from thyroid notch to suprasternal notch in all cases. After reflecting skin and deep fascia, sternohyoid and sternothyroid and isthmus of thyroid were identified and either reflected or cut in midline and ligated. Trachea was identified and confirmed by aspiration with saline filled syringe checking for bubble formation. Trachea was opened by giving circular incision over it from below upwards in 4,3,2 rings. Using Trousseau's tracheal dilator, the opening was dilated and tube was inserted. Portex cuffed tracheostomy tubes of suitable size were used in all of the cases with the obturator. Obturator was then removed and air flow was confirmed with cotton wool or with back of hand. A suitable size sterile rubber catheter was then passed inside and suction done. The tube was then tied around the neck with tape, such that one finger can be passed between the tape and skin. The remaining wound was loosely closed with silk, a vaseline

gauze dressing of the stoma around the tube was done and then the patient was shifted for further observation and proper post operative management.

Inclusion Criteria:

All patients who underwent tracheostomy.(elective/emergency)and who consented to take part in the study.

Exclusion Criteria:

Patients not willing for the study and not available for follow up.

RESULTS

134 patients were included in our study, the following observations were made.

Age and sex distribution of patients

Out of the 134 patients, 106 were male patients and 28 were female patients. The male:female ratio was 3.78:1.(figure 1)

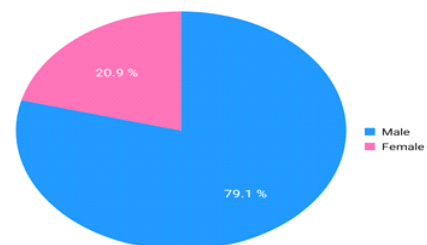


Figure 1: Gender Wise Distribution Of Patients.

The highest number of patients were in the group of 41-60 years comprising 47% of all tracheostomised patients with standard deviation of the population being 18.55. The mean age was 49 years.

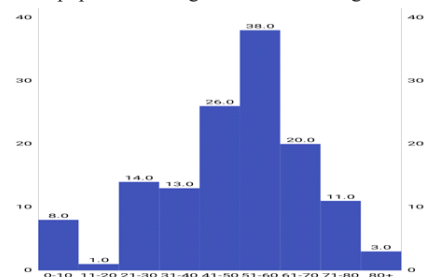
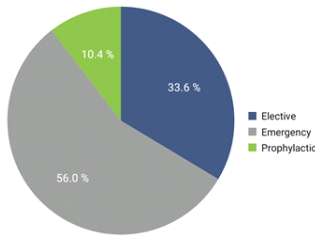


Figure 2: Age Wise Distribution Of Patients

In our study 75(56%) were emergency tracheostomy;45(33%) were elective tracheostomy,where remaining 14(10%) were done prophylactically prior to major surgeries of head and neck.



Indications Of Tracheostomy

95 (70.89%) tracheostomies were done for upper airway obstruction, followed by artificial ventilation done in 25 (18%) patients, tracheobronchial toilet done in 7 (5.2%) patients. The most common indication in our study was carcinoma seen in 60 (44.8%) patients. The most common patients were those with carcinoma larynx, carcinoma tongue and carcinoma buccal mucosa. The next most common indication for tracheostomy was in trauma(mostly comprising of RTA and cut throat injuries) done in 21 (15.67%) patients. Prolonged endotracheal intubation was the main reason for elective tracheostomy.

Table1: Distribution Of Patients According To Indications Of Tracheostomy

Indications		No of patients
Upper airway Obstruction N=95	Malignant tumors	60
	Trauma	21
	Infections	8
	Subglottic stenosis	3
	Bilateral abductor cord palsy	1
	angioedema	1
	Juvenile laryngeal papillomatosis	1
Artificial ventilation N=25	poisoning	10
	Guillain barre syndrome	5
	Meningitis	5
	Seizure disorder	2
	Snake bite	3
Tracheobronchial Toilet N=7	Head injury	4
	CVA	3
Anaesthesia N=7	Difficult Intubation	7
Total		134

Complications

The most common complication noted in our study was tracheostomy tube blockage which was seen in 17 (12.6%) cases followed by infection of stomal site;the most common cause of tubal obstruction was plugging of tracheostomy tube with a crust or mucous plug; chronic smoking and improper tracheostomy tube care being the contributing factors.

Total 6 patients died during hospital stay, making the mortality rate of 4.47%. 2 patients died of causes unrelated to tracheostomy (i.e. due to primary disease requiring tracheostomy). 4 deaths were related to tracheostomy, all 4 were due to sudden apnoea leading to cardiac arrest Thus in present study tracheostomy specific mortality rate was found to be 2.9%

Table 2: Distribution Of Patients According To Complications After Tracheostomy

Complications	No of patients
Surgical emphysema	3
hypocalcemia	1
Infection of tracheostomy site	7
Tube blockage	17
Persistent stoma	4
Difficult decanulation	1
Apnoea,cardiac arrest	4
Tracheal stenosis	2
Esophageal injury	1
TOTAL	40(29.85%)

DISCUSSION

Due to the high prevalence of head and neck carcinoma in north Bengal owing to the habit of smoking and betel nut chewing, tracheostomy is currently one of the most commonly performed surgery in our institution. Out of 134 patients included in our study, 106 were male patients and 28 were females. The male: female ratio was 3.78: 1. Costa et al, male female ratio 3.66:1 is almost equal to ours 3.78:1.[4] Rashid et al has shown male preponderance too[5]. Male preponderance in this age group may be due to their increased susceptibility to trauma and increased incidence of malignancy in males than females owing to their habits of smoking and alcohol consumption. 64 (48%) patients were in the age group of 41 to 60 years.. The mean age was 49 years. In our study 75(56%) tracheostomies were done on emergency basis;. 45 (33%) tracheostomies were done electively whereas rest 14 (10%) tracheostomies were done prophylactically prior to major surgeries of larynx and oral cavity. 95 (70.8%) tracheostomies were done for upper airway obstruction, followed by artificial ventilation done in 25 (18.65%) patient. The most common indication in our study was carcinoma seen in 60 (44.77%) patients. The next most common indication for tracheostomy was due to trauma as in head injury patients and cut throat patients , done in 21(15.67%) patients which is comparable with studies by few other workers.[7-9]

The most common complication in our study was tracheostomy tube blockage seen in 17 (12.68%) tracheostomies followed by infection of stomal site seen in 7 (5.22%) tracheostomies. Similar findings were observed by Goldenberg et al and Yellon in their studies.[9,10]. Instillation of sterile saline followed by tracheobronchial suctioning is helpful in cases of blockage. The inner cannula should be removed and cleaned out as often as necessary but at least four times daily.Careful monitoring and tracheostomy tube care of the patient in whom a properly sized and shaped tube has been placed is the best way to prevent this complication. We prefer a short tube approximately 80% the diameter of the tracheal lumen. The tracheostomy tube should be tied in place snugly but allow for the insertion of one finger between the tie and the neck [12].

If the obstruction is due to Granulomas, they should be removed surgically with cautery of its base.

Local infection at tracheostomy site was fairly common and tracheitis occurred to some degree in every patient having tracheostomy. Tracheitis occurs most commonly at the stoma, the tip of the tube and the area of the cuff. Ischaemia secondary to cuff pressure or the tube predisposes to infection as well as chemical tracheitis secondary to cleansing a tube in a strong antiseptic and reinserting without rinsing. Tracheitis can be lessened by meticulous asepsis, frequent irrigation and suctioning.

One patient in our study developed hypocalcemia on day 0 of tracheostomy,it was secondary to co2 washout leading to respiratory alkalosis; the low level of h+ ion due to alkalosis is compensated by ca2+ which bind to plasma protein instead ,leading to hypocalcemia.

Esophageal perforation is an iatrogenic complication occurring in fewer than 1% of cases, and should be treated immediately, with suturing in two planes, in addition to diversion of food intake with nasogastric feeding. Late diagnosis of this complication significantly worsens the prognosis, based on the risk of mediastinitis [13,14].

In our study 4 patients developed sudden apnoea leading to cardiac arrest. This was the main cause of mortality in our study. All cases were of laryngeal carcinoma who presented lately to our emergency department and were taken for emergency tracheostomy Apnoea, severe hypotension and cardiac arrhythmia can be very serious problems and may result in sudden death after tracheostomy. On correction of the anoxia by tracheostomy which leads to co2 washout, the respiratory drive diminishes or ceases. Several factors can result in cardiorespiratory arrest during the performance of a tracheostomy: delay in airway clearance, cardiac arrhythmia, vagal stimulation, hypertensive pneumothorax, postobstruction pulmonary edema, and excessive inhalation of oxygen in patients with chronic hypercarbia [13, 15].Prior cardiac evaluation, arterial blood gas analysis and pre oxygenation before surgery can minimize this complication. Further complications can be minimized by avoidance of emergency tracheostomy by endotracheal intubation or cricothyroidotomy, correct surgical technique and meticulous post operative care[9]

CONCLUSION

Tracheostomy have been considered as one of the oldest surgical procedure, which also happens to be one of the most common emergency surgical procedure till date. The number of tracheostomy done is in the rise due to the changing life style, ever growing cases of carcinoma of head neck region and road traffic accidents associated with complex maxillofacial trauma, which most of the time requires a tracheostomy to secure the airway. Hence an explicit knowledge of the indications and complications of tracheostomy is not only needed for the otorhinolaryngologists but also for all the practitioners who are dealing with critical care. We hope that our study, though constrained by its limited number of study populations and lack of matched control group to eliminate bias, may act as the template of future bigger and better constructed study to understand various aspects of the age old but the most time relevant surgical procedure which has saved, is saving and will save numerous critically ill patients with upper airway compromise.

REFERENCES

1. Campisi P, Forte V. Pediatric tracheostomy. *Semin Pediatr Surg.* 2016;25(3):191–5.
2. Chew JY, Cantrell RW. Tracheostomy: complications and their management. *Arch Otolaryngol.* 1972;96:538–45. doi: 10.1001/archoto.1972.00770090816008. [PubMed][CrossRef][Google Scholar]
3. Zeitouni AG, Kost KM. Tracheostomy: a retrospective review of 281 cases. *J Otolaryngol.* 1994;23:61–6. [PubMed][Google Scholar]
4. Costa L, Matos R. Urgent tracheostomy: fosur year experience in a tertiary hospital. *World J Emerg Med.* 2016;7(3):227-30.
5. Rashid MH, Taous A. Comparative study on complications of emergency and elective tracheostomy. *Bangladesh J Otorhinolaryngol.* 2015;21(2):69-75
6. Chandrika A, Somaraj S, Karat A: A descriptive study on complications of tracheostomy. *J Evid Based Med Healthc.* 2016;3(99):5451-7.
7. Cohen D, Gurvitz Y, Friedman P, Raveh D, Perez R. Self-retaining T-incision for difficult tracheostomy. *J Laryngol Otol.* 2007;121(7):664-7.
8. Crysalde WS, Fieldman RI, Natio K. Tracheostomies: 10 year experience in 319 children. *Ann Otol Rhinol Laryngol.* 1988;97:439-43.
9. Goldenberg D, Ari EG, Golz A, Danino J, Netzer A, Joachims HZ. Tracheostomy complications: A retrospective study of 1130 cases. *Otolaryngol Head Neck Surg.* 2000;123(4):495-500.
10. Yellon RF. Totally obstructing tracheostomy associated suprastomal granulation tissue. *Int Jour Pead Otorhinolaryngol.* 2000;53(1):49-55.
11. Gupta A, Gupta P, Mahajan V, Jamwal PS. Tracheostomy in a tertiary care hospital: epidemiology, indications and complications. *Int J Otorhinolaryngol Head Neck Surg* 2020;6:826-9.
12. Glass AM. Clinical Analysis of tracheostomy complications. *Journal of Royal Soc Med.* 1983;76:928–932. [Google Scholar]
13. Myers EM, Stool SE, Thonson JT. Complications of tracheostomy. In: Myers EM, Stool SE, Thonson JT, editors. *Tracheotomy.* New York: Churchill Livingstone; 1985. p. 147–69. 4.
14. Barlow DW, Weymuller EA Jr, Wood DE. Tracheotomy and the role of postoperative chest radiography in adult patients. *Ann Otol Rhinol Laryngol.* 1994;103(9):665–8.
15. Christopher KL. Tracheostomy decannulation. *Respir Care.* 2005;50(4):538–41.