INDICATIONS AND OUTCOMES OF TRACHEOSTOMY IN NORTHERN GHANA

Adjeso T[1, 2], Damah MC[1], Anyomih T [3]
[1]Ear, Nose and Throat Unit, Tamale Teaching Hospital; [2]Department of Eye, Ear, Nose and Throat, School of Medicine and Health Sciences, University for Development Studies, Tamale, Ghana;
[3]Department of Surgery, Tamale Teaching Hospital, Tamale, Ghana.

Abstract

Objective: Tracheostomy is a common surgical procedure done to maintain a patent airway. We conducted a review of patients managed with tracheostomy at the Ear, Nose and Throat (ENT) Department of Tamale Teaching Hospital (TTH), Tamale, Ghana.

***Materials and Methods*:** This was a descriptive retrospective study of all patients managed with tracheostomy at the ENT Unit, TTH from January 2013 to June 2018. The data collected included the age, sex, indication for tracheostomy, primary diagnosis, type of tracheostomy and outcome of management. Statistical analysis was done with SPSS version 20.

Results: Fifty-four patients were managed with tracheostomies made up of 36 males and 18 females with a ratio of 2:1. The age ranged from 17 months to 79 years with a mean age of 41.6 years. Four-tracheostomies were performed as emergencies on account of upper airway obstruction. The most common underlying cause for the emergency tracheostomies were laryngeal cancers 17 (31.5%), deep neck space abscesses 15 (27.8%) and head and neck trauma 7 (13). Elective tracheostomies were performed for prolonged intubation for mechanical ventilation and as prophylaxis for oro-maxillofacial surgery.

Conclusion: The most common indications for tracheostomy in Northern Ghana were upper airway obstruction secondary to laryngeal cancers and complicated deep neck space abscesses.

Key Words: *Tracheostomy, Indications, Northern, Ghana*

Introduction

The art of making an incision in the wind pipe to relieve airway obstruction has been described centuries ago with several books and ancient tablets referencing tracheotomy[1,2].

Tracheostomy is an important surgical procedure in maintaining a patent airway in the patient requiring an alternate airway. It involves a deliberate surgical opening of the anterior wall of the trachea and maintaining this with a tracheostomy tube[3,4]. It remains one of the most important procedure for airway emergency management, particularly in developing countries when patient's present late with acute airway obstruction[4–6]. Despite the availability of other airway interventions such as endotracheal intubation, percutaneous dilatational tracheostomy (PDT) or cricothyroidotomy, the decision to perform a surgical tracheostomy must not be unduly delayed[6–8].

Indication for the placement of a tracheostomy tube falls in 2 main categories; for upper airway obstruction and long-term airway support in place of endotracheal tube as it provides improved comfort and mobility[9].

Corresponding Author: **Theophilus Adjeso**
Ear, Nose and Throat Unit, Tamale Teaching Hospital, Tamale, Ghana.
P. O. Box 16, Tamale, Ghana.
Tel: 00233-206300769
Email Address: tadjeso@uds.edu.gh
Conflict of Interest: None Declared

Other indications exist including airway protection, weaning failure and bronchopulmonary toileting. Traditionally, however, upper airway obstruction, trachea-bronchial toileting, airway protection and prolonged mechanical ventilation have been known to be the four main indications for tracheostomy[5,8,10].

Recent publications, however, have shown a drastic change in the trends with trauma and prolonged intubation replacing upper airway obstruction due to acute infections as the most common indications for tracheostomy[4–6,8–12]). The reason for this is the changes in epidemiology of infectious diseases due to early diagnosis, adequate use of antibiotics and the improvement in medical care[13].

Complication rate following tracheostomy vary and are most common in emergency compared to elective procedures with reported mortality rate less than 2%[4].

Even though tracheostomies are commonly performed in our center, there are no published studies on tracheostomy. This study is to highlight our own experiences with tracheostomy, outlining the common indications and outcomes of patients with tracheostomy and compare our results with other centers.

Methods

A retrospective review of the medical and surgical records of all patients who had tracheostomy performed at the ENT Department, Tamale Teaching Hospital during a five- and half-year period from January 2013 to June 2018.

The Tamale Teaching Hospital is the only tertiary health facility in the Northern part of Ghana with a current bed capacity of 495 and provides specialist care for a population of approximately 4.3 million. It is also a teaching hospital affiliated to the School of Medicine and Health Sciences, University for Development Studies.

Patients requiring specific airway management were admitted for care via the Accident and Emergency Department, Paediatric Emergency Unit, General Out Patient Department (OPD) as well as the ENT OPD clinic. The medical records of patients who underwent tracheostomy were retrieved from theatre records book. Data on age, sex, indication for tracheostomy, primary diagnosis, type of tracheostomy and outcome of management were obtained and analysed. Patients who had incomplete or missing records were excluded from the study.

All the procedures were performed by consultant ENT surgeons with a transverse skin crease incision used in all the patients. A plastic cuff tracheostomy tube was placed in all the cases with the cuff deflated in the immediate postoperative period when patients were fully conscious. A suction machine was kept at the patient's bedside and humidification provided via a wet gauze over the tracheostoma.

Postoperative care was done by ENT specialist nurses on the ward. Tracheostomy decannulation was done depending on the resolution of the etiology and satisfactory maintenance of the airway. All decannulation were done in the clinic or on the ward and the patients were observed for at least 24 hours before discharge home. Patient follow-ups were achieved through weekly or monthly reviews at the outpatient clinic for a minimum of six months, depending on the patient's condition.

Ethical approval for this study was obtained from the Ethical Review Board of TTH. Statistical analysis was done with SPSS software version 20 (Chicago, IBM 2010).

Results

Patients

A total of fifty-four patients who underwent tracheostomies during the study period had complete data for analysis. The age range was 17 months to 79 years with a mean age of 41.6 years with the peak age incidence occurring within the fourth decade of life. There were 36 (66.7%) males and 18 (33.3%) females with a male to female ratio of 2:1 (Table 1).

Procedure

All tracheostomies were done exclusively by open procedures. Forty-nine (90.7%) tracheostomies were carried out as emergencies while the remaining five (9.3%) were elective procedures.

Table 1: Age distribution of patients with tracheostomy

Age Group (in years)	Frequency	Percentage (%)
0-10	**7**	13.0
11-20	0	0.0
21-30	9	16.7
31-40	14	25.9
41-50	6	11.1
51-60	5	9.3
61-70	6	11.1
71-80	7	13.0
Total	**54**	**100**

Table 2: Primary diagnosis and indications of tracheostomized patients

Diagnosis	Frequency	Percentage
UPPER AIRWAY OBSTRUCTION **A. Infections:**		
Acute epiglottitis	2	3.7
Deep Neck Space Abscesses	15	27.8
Total	**17**	**31.5**
B. Neoplasm		
Laryngeal cancers	17	31.5
Nasopharyngeal tumour	1	1.9
Neck mass	1	1.9
Palatal tumour	1	1.9
Submandibular tumour (advanced)	1	1.9
Thyroid cancer	1	1.9
Total	**22**	**40.7**
C. Neurological		
Vocal cord paralysis	3	5.6
Total	**3**	**5.6**
D. Trauma		
Cut throat	2	3.7
Extensive facial trauma	1	1.9
Foreign body aspiration	1	1.9
Laryngeal edema (battery ingestion)	1	1.9
Laryngotracheal injury	2	3.7
Total	**7**	**13.0**
PROLONGED INTUBATION		
For mechanical ventilation	3	5.6
Total	**3**	**5.6**
ROUTE FOR ANAESTHESIA		
Mandibulectomy for Ameloblastoma	2	3.7
Total	**2**	**3.7**
Grand total	**54**	**100**

Indication

The primary diagnosis of tracheostomized patients are highlighted in Table 2.

The indications for tracheostomy in decreasing order of frequency in our study were upper airway obstruction 49 (90.7%), prolonged intubation 3 (5.6%) and route for anaesthesia ventilation 2(3.7%) (Figure 1).

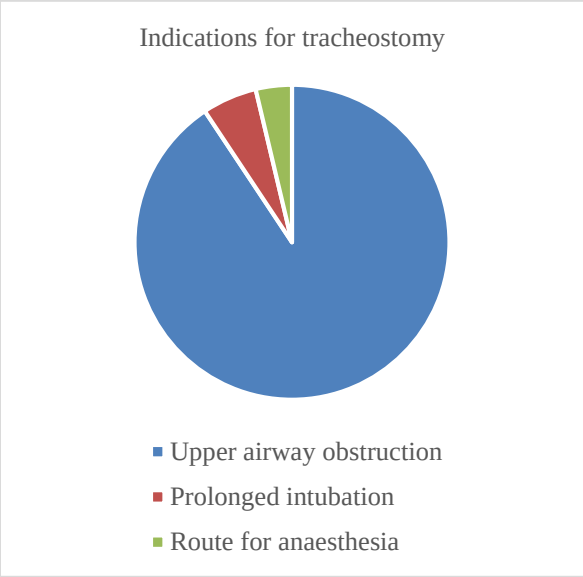

Fig 1: Indications for tracheostomy

Table 2 shows that, among the different causes of upper airway obstruction requiring tracheostomy, neoplasm represented the majority (40.7%) followed closely by infections (31.5%). Neurological cause of upper airway obstruction was the least class of indications for tracheostomy secondary to upper airway obstruction. With regards to specific conditions, 17 (31.5%) patients with laryngeal cancers received the most tracheostomies followed by patients with deep neck space abscesses 15 (27.8%). Trauma represented 13% of cases.

Complications

The main complication occurring post-procedure was hemorrhage accounting for 4 (7.4%) patients. We recorded one (1.9%) death during the entire study period.

Discussion

As ancient as it is, tracheostomy remains one of the most important and standard procedures for emergency airway management especially in developing countries where late presentations are encountered[6].

In this study, majority of the patients were males and the peak incidence was in the fourth decade, which is similar in comparison to other studies despite varying backgrounds of the studies[6,7,11,13–15]. The peak incidence, however had some disparities; it was similar to studies in developing countries like Nigeria and Tanzania[7,14]; where peak incidences were between the 3rd and 5th decades) but varied with findings in other studies elsewhere[5,6,11,13]. The latter variation may probably be due to the different sociocultural backgrounds of the study populations.

Tracheostomies are performed as either emergency or elective procedures. The former is usually on account of acute upper airway obstruction whilst the latter is usually carried out as an alternative to endotracheal tubing for long-term airway management or used to provide route for anaesthesia ventilation in major head and neck surgeries[5,6,9].

In our study, majority (94.4%) of the tracheostomies were carried out as emergencies secondary to acute upper airway obstruction. This was consistent with several other studies[7,15–17].

There are other series that had higher cases of elective tracheostomies but the study population of these studies were mainly patients in the intensive care unit (ICU) or paediatric intensive care unit (PICU) who needed long-term intubation[14,18].

Indications for tracheostomies recorded in literature has varied over the years. Upper airway obstruction has been shown by several studies to be the leading indication for tracheostomy[7,15–17]. This finding is similar to what we found (90.7%) in our retrospective study.

Early studies also reported acute airway obstruction due to acute infections as the main indication for tracheostomies but this has seen a decline in incidence due to early presentation, antibiotic use, proper management of infections and vaccination that curb these infections in the first place[19–25].

In this study, head and neck tumours (especially laryngeal tumors) were the leading causes of upper airway obstruction (40.7% of patients) needing tracheostomy. This finding is consistent with other studies in the last decade[6,7,26].

Deep neck space infections were the second highest (27.8%) cause of upper airway obstruction followed by trauma (13.0%) similar to a study published in Portugal[26]. Other studies showed a higher incidence of traumatic indications[6,7]. This trend observed in our setting may be due to the health seeking behavior of the population of study; most patients try using herbal medications to treat throat and dental infections at home and therefore present late to the hospital with complications. Secondly there is a strong cultural belief in the study population that any abscess treated by surgical drainage would lead to the death of the patient and so most patients only present when they start experiencing complications of acute upper airway obstruction.

Early presentation of these patients could have led to the avoidance of tracheostomy. This calls for a change in the health-seeking behaviors of the people which could be achieved via increase in public awareness, health education and advocacy campaigns. Also access to improved dental care in the community would reduce the incidence of deep neck space infections.

Although airway obstruction is reported as the main indication for tracheostomy, the incidence of tracheostomy for prolonged ventilation, especially in the paediatric population has increased over the years in many high income countries[21,24,25]. This rise,

particularly in the paediatric patients, may be due to advances in critical care management of preterm babies and younger children. The same is not the case for low-middle income countries (LMICs) and this is apparent from our study, where only three (3) patients underwent tracheostomy on account of long-term ventilation. This trend seen in LMICs could be due to the lack of resources for long-term airway management in these settings.

Haemorrhage was mainly the complication following tracheostomy in this study and were managed with either cauterization or a tie. The complication rate of this current study was found to be lower compared to other studies[7,8] within the West African region. The death recorded in this study was due severe sepsis from complicated deep neck space abscess and not directly related to the tracheostomy procedure.

Our study carries the disadvantages similar to retrospective studies where we did not evaluate the duration of the tracheostomy tubes nor decannulation rate of the tubes due to poor documentation.

Conclusion

Majority of the tracheostomy patients were males with peak incidence occurring within the fourth decade of life. Tracheostomies were performed as an emergency procedure in majority of the patients with upper airway obstruction secondary to laryngeal cancers and deep neck spaces abscesses being the most common indications.

References

1. Yarmus L. Percutaneous Tracheostomy. In: Ernst A, Herth F, editors. Principles and practice of interventional pulmonology. New York: S*pringer*; 2013. p. 683–695.
2. Bolton CF, Chen R, Wijdicks E et al. Neurology of Breathing. Philadelphia: Elsevier; 2014.
3. Paul P. Tracheostomy. In: Michael G, George GB, Martin JB RC, Hibbert J, Jones NS et al, editors. Scott-Brown's Otolaryngology, *Head and Neck Surgery*. 7th ed. London: Hodder Arnold Ltd; 2008. p. 2292–2304.
4. Cheung NH, Napolitano LM. Tracheostomy : Epidemiology, Indications, Timing, Technique, and Outcomes. *Respir Care*. 2014; 895–919.
5. Gilyoma JM, Balumuka DD, Chalya PL. Ten-year experiences with Tracheostomy at a University teaching hospital in Northwestern Tanzania : A retrospective review of 214 cases. *World J Emerg Surg.* 2011; 6:1–7.
6. Adedeji TO, Tobih JE, Olaosun AO, Idowu J. Indications and outcomes of tracheostomy : An experience in a resource - limited environment. *J Heal Res Rev*. 2014; 1:40–43.
7. Adetinuola EJ, Bola AY, Olanrewaju MI, Oyedotun A, Timothy OO, Alani AS. Tracheostomy in south western Nigeria : Any change in pattern ? *J Med Med Sci.* 2011; 2: 997–1002.
8. Amusa YB, Akinpelu VO, Fadiora SO, Agbakwuru EA. Tracheostomy in surgical practice: Experience in a Nigerian Tertiary Hospital. *WAJM*. 2004; 32:32–34.
9. Lerner AD, Yarmus L. Percutaneous Dilational Tracheostomy. Clinics in Chest Medicine. 2018.
10. Waheed M, Nofal EAA, Maaty A, Omar A. Tracheostomy in the Intensive Care Unit : a University Hospital in a Developing Country Study. *Int Arch Otorhinolaryngol*. 2017; 21:33–37.
11. Santosh UP, Patil BS, Bhat V, Pai S. Elective open tracheostomy for patients under prolonged mechanical ventilation — a study. 2009; 61(Suppl 1):44–46.
12. Adoga AA, Ma ND. Indications and outcome of pediatric tracheostomy : results from a Nigerian tertiary hospital. *BMC Surg*. 2010; 10:2008–2011.
13. Schweiger C, Manica D, Fischer C, Santos L, Abreu P, Manzini M, et al. Tracheostomy in children: a ten-year experience from a tertiary center in southern Brazil. *Braz J Otorhinolaryngol* [Internet]. 2016. Available from: http://dx.doi.org/10.1016/j.bjorl.2016.08.002
14. Charles N, Mukara KB. Indications and Immediate Outcomes of Tracheostomy in Rwanda. *Ann African Surg*. 2018; 15:52–56.
15. Ogilvie LN, Kozak JK, Chiu S, Adderley RJ, Kozak FK. Changes in pediatric tracheostomy 1982 – 2011 : a Canadian tertiary children's hospital review. *J Pediatr Surg* [Internet]. 2014; 49:1549–1553. Available from: http://dx.doi.org/10.1016/j.jpedsurg.2014.04.014
16. Zenk J, Fyrmpas G, Zimmermann T, Koch M, Constantinidis J, Iro H. Tracheostomy in young patients: Indications and long-term outcome. *Eur Arch Oto-Rhino-Laryngology*. 2009; 266:705-711.
17. Nassif C, Zielinski M, Francois M, Abbeele T Van Den. Tracheotomy in children: A series of 57 consecutive cases. *Eur Ann Otorhinolaryngol Head Neck Dis* [Internet]. 2015; 132:321–325. Available from: http://dx.doi.org/10.1016/j.anorl.2015.08.035
18. Douglas CM, Poole-cowley J, Morrissey S, Kubba H, Clement WA, Wynne D. International Journal of Pediatric Otorhinolaryngology Paediatric tracheostomy — An 11 year experience at a Scottish paediatric tertiary referral centre. *Int J Pediatr Otorhinolaryngol* [Internet]. 2015; 79:1673–1676. Available from: http://dx.doi.org/10.1016/j.ijporl.2015.07.022
19. Gergin O, Adil EA, Kawai K, Watters K, Moritz E, Rahbar R. International Journal of Pediatric Otorhinolaryngology Indications of pediatric tracheostomy over the last 30 years : Has anything changed ? *Int J Pediatr Otorhinolaryngol* [Internet]. 2016; 87:144–147. Available from: http://dx.doi.org/10.1016/j.ijporl.2016.06.018
20. Carron JD, Derkay CS, Strope GL, Nosonchuk JE DD. Pediatric tracheotomies: changing indications

and outcomes. *Laryngoscope*. 2000; 110:1099–1104.
21. Lawrason A KK. Pediatric tracheotomy: are indications changing. *Int J Pediatr Otorhinolaryngol*. 2013; 77:922–925.
22. Ozmen S, Ozmen O. A. UO. Pediatric tracheotomies: a 37-year experience in 282 children. *Int J Pediatr Otorhinolaryngol*. 2009; 73:959–961.
23. Yaneza MMC, James HP, Davies P, Harrison S, McAlorum L, Clement WA, et al. Changing indications for paediatric tracheostomy and the role of a multidisciplinary tracheostomy clinic. *J Laryngol Otol*. 2015; 129:882-886
24. Ang AH, Chua DY, Pang KP TH. Pediatric tracheotomies in an Asian population: the Singapore experience. *Otolaryngol Head Neck Surg*. 2005; 133:246–255.
25. Butnaru CS CM. Tracheostomy in children: evolution in indications. *Int J Pediatr Otorhinolaryngol*. 2006; 70:115–119.
26. Costa L, Matos R, Júlio S, Vales F, Santos M. Urgent tracheostomy : four-year experience in a tertiary hospital. *World J Emerg Med*. 2016; 7:227–230.