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Indications for Tracheostomy in a Tertiary Care Center: An Observational Prospective Study

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ABSTRACT
Tracheostomy is an utilitarian surgical procedure of access to the tracheobronchial tree. The trachea is a conduit between the upper airway and the lungs that delivers moist warm air and expels carbon dioxide and sputum. Failure or blockage at any point along that conduit can be most readily corrected with tracheostomy to provide access for mechanical ventilators and suction equipment. All the details were recorded in a proforma. Pre-operative work up and pre anaesthetic evaluation was done. Fitness for surgery was taken from the concerned specialties and the patients were taken up for the procedure in the operation theater. All the tracheotomies in this study were done by open surgical technique. Among the causes for Prolonged Intubation, most common were Trauma cases (56., 49%), followed by Infections (29., 25.4%), Cerebrovascular Accidents (12., 10.5%), Neurological Disorders (08., 7%) and so on.

INTRODUCTION

Tracheostomy is a surgical procedure used to create a stoma at the skin surface which leads in to the trachea. The etymology of the word tracheotomy comes from two Greek words: the root tom-(from Greek tuμn) meaning "to cut" and the word trachea[1]. The word tracheostomy, including the root stom-(from Greek) meaning "mouth", refers to the making of a semi-permanent or permanent opening in to the trachea and to the opening itself. Tracheostomy, which was performed in ancient Egypt, is one of the oldest surgical procedures[2] and is included in many ancient medical texts[3]. At the beginning of the twentieth century the principles of the operation were described by Chevalier Jackson[4] and these remain the principles of the operation to the present day. Tracheostomy is an utilitarian surgical procedure of access to the tracheobronchial tree. The trachea is a conduit between the upper airway and the lungs that delivers moist warm air and expels carbon dioxide and sputum. Failure or blockage at any point along that conduit can be most readily corrected with tracheostomy to provide access for mechanical ventilators and suction equipment. In the case of upper airway obstruction, tracheostomy provides a path of low resistance for air exchange. It is most often performed in patients who have had difficulty weaning off a ventilator, followed by those who have suffered trauma or a catastrophic neurologic insult[5]. The most common indications for tracheostomy are upper airway obstruction, prolonged mechanical ventilation, airway protection in the comatose and facilitation of tracheo-bronchial tilting. There is a changing trend in literature as regarding the indications and outcome of tracheostomy especially in children for the management of the airway. In the past, short term tracheostomy for obstructive airway disease secondary to acute inflammatory infection was the most common indication but in recent times prolonged mechanical ventilation in critically ill patients has become the commonest indication. These have been attributed to the changes in the epidemiology of infectious diseases due to early diagnosis, adequate use of antibiotics and the improvement in medical technology[6]. Tracheostomy can be performed through with an open surgical or per cutaneous delusional technique. The technique which is in wide practice is open surgical technique, however the use of per cutaneous tracheostomy has been increasing since its introduction in the 1980's. Although, many studies have been conducted on pediatric tracheotomies and on tracheotomies in ICU patients, there have been very few prospective studies conducted regarding the indications for tracheostomy in a tertiary care center, in an Indian set up. This study is aimed at describing the common indications and to establish the epidemiological implications of tracheostomy in a tertiary care center in an Indian scenario.

MATERIALS AND METHODS

Study Design: An observational prospective study.

Study Setting: Study was conducted at the department of ENT and Laryngology.

Study Population: All the patients who underwent surgery for tracheostomy in the hospital during the study period.

Inclusion Criteria: All the patients of any age and either sex who underwent tracheostomy by open surgical technique in the above center during the study period were included.

Exclusion Criteria: Those patients who underwent per cutaneous tracheostomy and those who underwent tracheostomy in other hospitals were excluded from the study.

Methods: Demographic data of all these patients was collected, detailed history was taken, thorough examination was carried out and relevant investigations like Flexible laryngoscope and CT Scan were done. All the details were recorded in a proforma. Pre-operative work up and pre anaesthetic evaluation was done. Fitness for surgery was taken from the concerned specialties and the patients were taken up for the procedure in the operation theater. All the tracheotomies in this study were done by open surgical technique. All were done under general anaesthesia except for two cases in whom intubation was difficult, it was done under local anaesthesia. In all the cases transverse skin crease incision was employed.

Consent and Ethics: A well-informed consent was taken from patients/relatives after explaining the procedure, its benefits, risks and associated complications. Valid approval was taken from the hospital ethical committee for conducting this study.

Statistical Analysis: All the data was collected using pre-defined proforma and was compiled using Microsoft Excel and analyzed using the statistical software SPSS version 16 (statistical package for social sciences). Cases were classified as per the indications and tabulated. Indications were rated in the decreasing order of frequency. The analyzed data is expressed in frequencies (n) and percentages (%). The numerical variables are expressed in mean+/-standard deviation.

RESULTS AND DISCUSSIONS

During this one year prospective study period, 151 patients underwent tracheostomy. Out of the 151 patients, 109 were males (72%) and females were 42 (28%) with a male to female ratio of 2.6 : 1. Their ages ranged from 1 month to 86 years with mean age 46

and standard deviation of 46+/-20.8. The majority of the patients were in 6th decade of life, 33(21.9%) followed by 5th decade 28 (18.5%) and 2nd decade 26(17.2%). Among them 9 (<12 years) belonged to the pediatric age group.

Table 1: Gender

Gender	Frequency	Percentage
Male	108	72.0
Female	42	28.0

Table 2: Age Group

Age	Frequency	Percentage
<=10	6	4.0
11-20	13	8.6
21-30	26	17.2
31-40	21	13.9
41-50	9	6.0
51-60	28	18.5
61-70	33	21.9
>70	15	9.9
Total (n)	151	100

The number of tracheotomies done per month during the one year varied from 6-19 cases and showed peak between April and July, with maximum number of cases during May, 19 (i.e. 12.7%). The average number of cases per month were 12.5.

Table 3: Monthly Trend

Month	Frequency	Percentage
January	16	10.7
February	14	9.3
March	6	4.0
April	15	10.0
May	19	12.7
June	13	8.7
July	18	12.0
August	12	8.0
September	13	8.7
October	8	5.3
November	7	4.7
December	9	6.0

Indications: Indications were grouped in to Prolonged Intubation, Upper Airway Obstruction, Airway Protection, Tracheobronchial Toileting, Adjunct to Head and Neck Surgeries and Difficult Intubation. They are tabulated as follows.

Table 4: Indications

Indications	Frequency	Percentage
Prolonged Intubation	**114**	**75.5**
Trauma	56	49.1
Infections	29	25.4
CVA	12	10.5
Neurological Disorders	8	7.0
Cardiac causes	7	6.1
Others	2	1.8
Upper Airway Obstruction	**23**	**15.2**
Laryngotracheal Stenosis	13	56.5
Neoplasm	6	26.1
Neurological disorder	2	8.7
Infection	1	4.3
Idiopathic	1	4.3
Airway Protection	**6**	**4.0**
Infections	3	50.0
CVA	1	16.7
BVCP-Congenital	1	16.7
Parapharyngeal cyst-Congenital	1	16.7
Tracheobronchial Toileting	**4**	**2.6**
Infections	4	100.0
Adjunct to Head and Neck Surgeries	**2**	**1.3**
Difficult Intubation	**2**	**1.3**

Among the causes for Prolonged Intubation, most common were Trauma cases (56., 49%), followed by Infections (29., 25.4%), Cerebrovascular Accidents (12., 10.5%), Neurological Disorders (08., 7%) and so on.

Table 5: Prolonged Intubation

	Frequency	Percentage
Prolonged Intubation	**114**	**75.5**
Trauma	56	49.1
Infections	29	25.4
CVA	12	10.5
Neurological Disorders	8	7.0
Cardiac causes	7	6.1
Others	2	1.8

Majority of the patients in this group were between 61-70 years, i.e. 25 (22%). Decannulation was possible in 53 out of 114 cases. 19 cases were discharged on request with the tracheostomy tube in-situ for various reasons. 16 cases are under follow-up, 4 cases had to be discharged against medical advice (DAMA) and 2 cases lost follow-up. There were 20 deaths in this group due to causes not related to tracheostomy. Time interval between intubation and tracheostomy in these patients ranged from 3-36 days, with a mean of 14 days.

During this one year observational prospective study, tracheostomy was performed on 151 patients in the study center. Among them males were 109 and females were 42, with a male to female ratio of 2.6:1, this is in accordance with the similar study conducted by Fazal-i-Wahid[7]. While the male preponderance was common in all the above-mentioned studies, there is a small variation in the sex ratios. Age of the patients ranged from 1 month-86 years with a mean of 46 years and a standard deviation of 46+/-20.8. Here the age range has increased by a decade compared to Fazal's study and so also the mean. This could be because of the advances and improvements in the management of the critically ill patients witnessed during the last decade. In this study maximum number of patients were in the 7th decade of life, i.e. 33 and as usual males (25) out numbered the females (08). This is unlike the Japhet M Gilyoma[8] study, where the majority of patients were in the 3rd decade of life. This bias could be due to more number of trauma cases in their study compared to this study (55% >37%). The number of tracheotomies done per month during the one year period varied from 6-19 cases and showed peak between April and July, with maximum number of cases during May, 19 (i.e. 12.7%). The average number of cases per month were 12.5. The most common indication for tracheostomy in this study was prolonged intubation (n=114., 75.5%) secondary to traumatic causes, which is in agreement with the study conducted by David Goldenberg[9] who has reported the commonest indication as prolonged mechanical ventilation in 76% of his cases. However, the second leading indication of upper airway obstruction due to laryngotracheal stenosis (LTS), which were mostly due to endotracheal intubation injuries, was at variance with the same study which reported second common indication as an adjunct to Head and Neck Surgeries. One of the reasons for more number of LTS cases in this study could be, referral of airway cases due to the availability of a dedicated Laryngologist in our center,

who exclusively deals with airway, voice and swallowing problems. The other studies reported upper airway obstruction due to trauma and carcinoma of the larynx as the most common indication for tracheostomy followed by prolonged ventilation and infections. These variations between series might be due to different patient populations and also to the changing trend in the indications[10].

CONCLUSION

The commonest indication for tracheostomy in this study was prolonged intubation (n=114., 75.5%) secondary to traumatic causes and the commonest etiology was severe head injury due to Road Traffic Accidents (89.3% of trauma cases). Only one was an emergency tracheostomy and all the others were elective tracheotomies.

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