International Journal of Otorhinolaryngology and Head and Neck Surgery
Yadav M et al. Int J Otorhinolaryngol Head Neck Surg. 2022 Feb;8(2):100-104
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937
DOI: https://dx.doi.org/10.18203/issn.2454-5929.ijohns20220010

Original Research Article

Indications and complications of paediatric tracheostomies at a tertiary care centre in rural Haryana: a retrospective study

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Received: 14 December 2021
Revised: 28 December 2021
Accepted: 29 December 2021

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ABSTRACT

Background: The indications for paediatric tracheostomies have had a significant change world over during last few decades. Emergency management of paediatric airway by tracheostomy has its own share of complications which need fair amount of expertise to manage.
Methods: We carried out a retrospective study at a tertiary care centre in rural area of Haryana and analysed the available data of last 5 years (2017-2021) for determining various indications of paediatric tracheostomies and complications encountered during or after the surgery.
Results: The study included 65 paediatric patients (<14 years of age) who underwent tracheostomy at our tertiary care institute between January 2017 and December 2021. Out of them 38 (60.3%) were males, 35 (55.17%) patients were in 0-5 years age group. Most frequent indication for paediatric tracheostomy turned out to be upper airway obstruction due to a vaccine preventable disease diphtheria (n=56, i.e., 86.15%), other less common causes were need of prolonged ventilation, subglottic stenosis, congenital airway anomalies, retropharyngeal abscess, laryngeal papilloma. Complications were observed in 30 cases (46.15%). Mortality in tracheostomized children was nearly 29.2%, which was mainly attributed to the underlying cause which turned out to be diphtheria in most of the cases.
Conclusions: High number of paediatric tracheostomies and sheer presence of diphtheria in this rural area of Haryana suggests that there is dire need of proper immunisation coverage and an active participation at community level.

Keywords: Paediatric tracheostomy, Indications, Complications

INTRODUCTION

Tracheostomy is considered to be one of the most common and routinely performed life saving surgeries in ENT emergency. There are a wide variety of indications to perform this surgery with a common aim to provide a safe and secure airway.[1,2] Paediatric tracheostomies are considered to be somewhat more challenging to perform as well as to provide post operative care in view of narrower and collapsible airways. The indications of paediatric tracheostomies have seen a significant change world over during last few decades.[3]

Earlier the most common indication for paediatric tracheostomy used to be upper airway obstruction secondary to acute inflammatory conditions.[4] After widespread immunisation programmes and immense vaccination coverage of the population, the acute inflammatory conditions caused by pathogens like *Corynebacterium diphtheriae* and *H. influenzae* have registered a significant decline in many countries. This decline has resulted in reduced emergency tracheostomies in those countries.[3,5-7] Now a days prolonged ventilation and upper airway obstruction secondary to craniofacial dysmorphism and subglottic stenosis are becoming more common indications for paediatric tracheostomies in developed and various developing countries.[3,8,9]

The Mewat (Nuh) region of Haryana state is ranked as the most backward district of India in the NITI aayog's report in 2018. There are still some practices lingering in the community that are responsible for still prevalent vaccine preventable diseases in the paediatric population here culminating in emergency tracheostomies. The objective of present study is to determine the indications and complications of paediatric tracheostomies in Mewat region as there is no available literature regarding the same and our tertiary care institute catering this area has been routinely performing paediatric tracheostomies for various indications.

METHODS

A retrospective analysis of the data was conducted for paediatric patients (<14 years of age) who underwent tracheostomy in ENT department of our tertiary care hospital (SHKM govt. medical college and associated hospital) in Mewat (Nuh) district of Haryana. Data was collected from ENT emergency registers and case records from the medical records department of the hospital for years 2017 to 2021.

Inclusion criteria

Records of patients of age group 0 to 14 years who underwent tracheostomy were included in the study.

Exclusion criteria

Patients having incomplete medical records were excluded from the study.

Sample size was calculated using Cochran's formula. A total of 65 paediatric patients were found to have undergone tracheostomy during above mentioned period. Proportions were compared using Chi square or Fisher's exact test, depending on their applicability. Analyses were conducted using SPSS statistics (version 22.0).

Following data was collected from the records for further analysis

Table 1: Patient data.

S. no.	Patient data
1	Name
2	Age (years)
3	Sex
4	Date of tracheostomy
5	Indication for tracheostomy
6	Complications related to tracheostomy
7	Final outcome, (Discharge/ death)

RESULTS

Data was abstracted from the records of ENT department and medical records section of our tertiary care hospital for the year 2017 to 2021. A total of 65 paediatric patients (age less than 14 years) were tracheostomized during the above-mentioned period. Out of these 65 paediatric patients 38 (58.46%) were males and 27 (41.54%) were females (Figure 1).

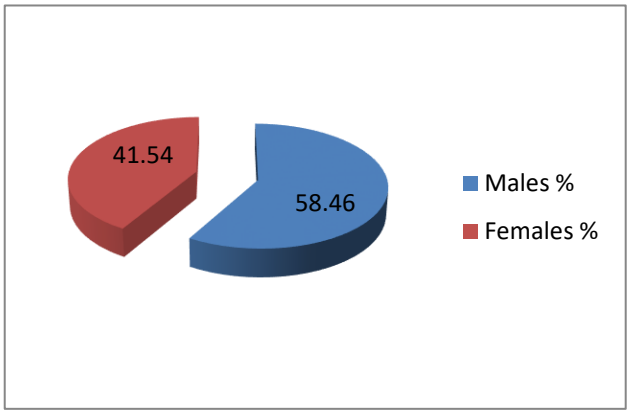

Figure 1: Sex distribution.

All the patients were segregated according to their respective age and we found that the most common age group that underwent tracheostomies was 1 to 2 years age group (n=12, 18.46%), followed by 6 to 7 years and 7 to 8 years age groups (n=8 in both groups, i.e., 12.3% each) (Figure 2).

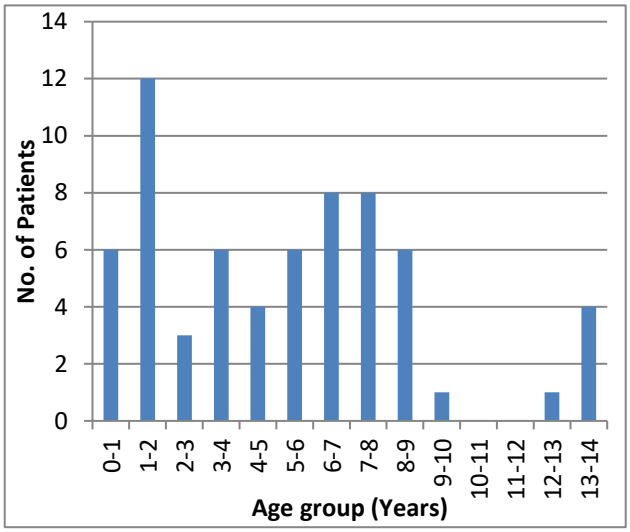

Figure 2: Number of patients in different age groups.

Interestingly all the patients in 0 to 1 year age group (n=6) were found to be males.

There was no patient in the 10 to 12 years age group.

A total of 19 patients out of the 65 tracheostomized children died during the treatment resulting in mortality rate of nearly 29%.

Among the indications of tracheostomy, the most conspicuous was upper airway obstruction secondary to a

vaccine preventable disease diphtheria, which was accountable for 56 tracheostomies out of the total 65. Next most common cause for paediatric tracheostomies turned out to be a need for prolonged mechanical ventilation (PMV) secondary to head and neck trauma and central nervous system involvement, (n=4). Other indications for the tracheostomies were subglottic stenosis, congenital airway anomalies, retropharyngeal abscess, laryngeal papilloma (Figure 3).

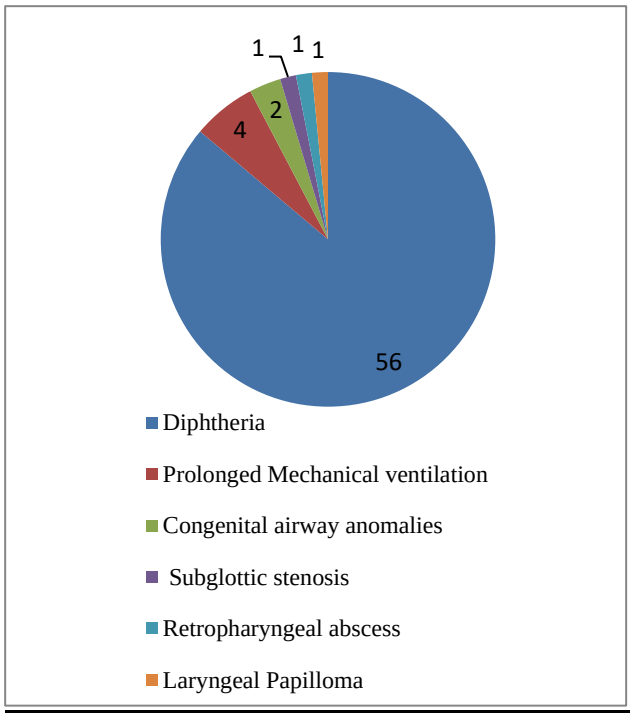

Figure 3: Indication for pediatrics tracheostomies.

The most common complication related to tracheostomy was blockage of tracheostomy tube (n=16, 24.6%) followed by haemorrhage (n=8), accidental decannulation (n=3), infection of the stomal region (n=2) and subcutaneous emphysema (n=1) (Figure 4).

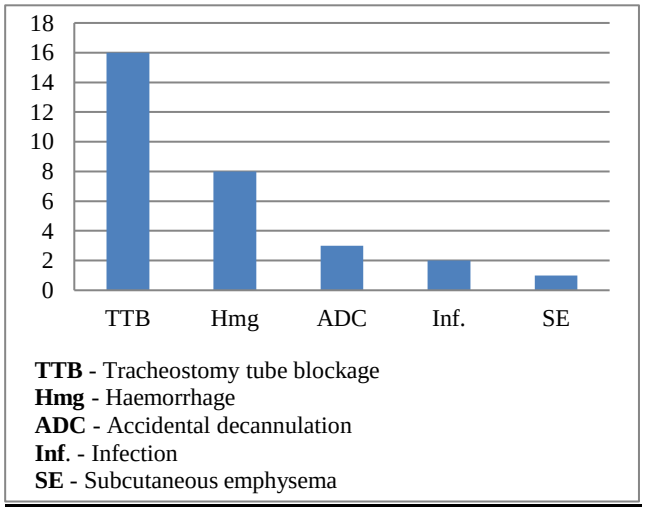

Figure 4: Complications of tracheostomy.

The reason for blockage of tube, being the most common complication is quite evident because most of the tracheostomies were due to Diphtheria which is known to form a pseudomembrane in the oropharynx and airway that not only impedes the normal air passage but also frequently blocks the tracheostomy tubes. In fact, the only complication that resulted in mortality of 3 patients was tracheostomy tube blockage. Rest of other deaths were the result of underlying disease only (n=16).

Out of 65 tracheostomized children successful decannulation was achieved in 28 patients before the planned discharge. 19 patients died before any attempt of decannulation, 18 patients were discharged with tracheostomy tube *in situ*.

DISCUSSION

Paediatric tracheostomy remains a challenging procedure for the surgeons to manage during and after the surgery. The smaller lumens and delicate, collapsible tracheal walls render the paediatric airway management a clinically and technically demanding task. A few decades back the main indication for paediatric tracheostomy in developed countries used to be upper airway obstruction due to acute inflammatory conditions, but now a days the paediatric tracheostomy is in fact being used more as a planned procedure for chronic disorders rather than an emergency procedure for airway emergencies. Corbett et al confirmed the above findings after analysing a series of 122 children between 1987 to 2003.[6]

Whereas in some developing countries like India, upper airway obstruction due to vaccine preventable diseases like diphtheria, are still playing dominant role in deciding the need of tracheostomy in paediatric population. Our study validated above finding but was in complete variance with the study conducted by Lele et al in an urban area of India, they noticed a similar changing trend for the indications of paediatric tracheostomies as noticed by other authors in developed countries.[10] Several studies have shown that number of paediatric tracheostomies are declining in smaller hospitals which may be attributed to the amount of expertise required in management of these patients along with the need of multidisciplinary approach.[6,8,11,12]

Regarding most common age group involved, a prominent study found two peaks as <1 year (32%) and 15-18 years (10.3%).[13] Our study showed involvement of age group 1-2 years as the most commonly involved followed by 6-7-and 7-8-years age groups.

Our study showed a male preponderance for the paediatric tracheostomies as there were 38 male patients compared to 27 female patients (i.e. M:F=1.4:1). Many earlier studies also showed similar finding.[13-15]

After diphtheria, the second most common indication for paediatric tracheostomies in our study was need for

prolonged mechanical ventilation (PMV) (n=4), although most other studies found it to be the most common indication.[11,12,14,16] Other less common indications in our as well as other earlier studies were subglottic stenosis, congenital airway anomalies, recurrent respiratory papillomatosis etc.[17,18]

In our study a total of 30 patients experienced some sort of complication during or after surgery. The high complication rates, ranging from 51-77%, were also seen in various other paediatric series.[15,18,19]

The most common complication we came across was tracheostomy tube blockage (n=16), it was indeed the only complication which resulted in tracheostomy related mortalities (n=3). Similarly, a study by Ruiz et al also found the tube blockage to be the most common complication of paediatric tracheostomy.[20] High number of tracheostomy tube blockage may be attributed to the pseudomembrane forming property of diphtheria which was responsible for most of the tracheostomies in our series.

Other complications we encountered were haemorrhage (n=8), infection of stomal region (n=4), accidental decannulation (n=3), subcutaneous emphysema (n=1). Interestingly none of our patients developed other significant complications like pneumothorax, tracheo-arterial fistula, stomal granulations etc. Although stomal infection was found to be main complication in some series, our study had lesser rate of infection (n=4).[14,19,21]

The mortality rate in our study was found to be nearly 29% (n=19), there was a great deal of variation in other studies where mortality was within range of 6.9% to 39.2% depending upon the underlying diseases.[3,6,11,14,18,22] The high mortality rate in our study is attributed to diphtheria which is still a cause of concern in various developing countries.

Successful decannulation also needs proper timing and planning and the treating doctor should be vigilant enough to avert any untoward incidences which can occur due to hurried and unplanned decannulation. We had a total of 28 patients (43.07%) who were successfully decannulated before discharge from the hospital, this finding was in accordance with some earlier studies, where they reported decannulation in 29-52.7% patients.[12,14,19,23]

We regret about not including follow up data of non-decannulated children because of their random follow up visits. The follow up data could have shed more light on the course of the underlying disease and the post-surgical outcomes. In wake of our findings, we strongly recommend aggressive immunisation coverage of the deprived areas and proper rehabilitation protocols to be thought upon for the tracheostomized children which must be followed up world over.

The limitations to our study are its retrospective nature, the small sample size, and inability to include follow-up results of the patients. Further studies with larger sample size including the follow-up results of tracheostomised patients are required to throw more light on the cited subject.

CONCLUSION

Paediatric tracheostomy is a procedure which requires adequate surgical expertise and clinical care for patients with need of airway management. Our study included the paediatric patients who underwent tracheostomy in our tertiary care institute and we reached at a conclusion that in spite of enormous efforts by the government and authorities some vaccine preventable diseases like diphtheria are still the cause of concern among the population. Majority of tracheostomy in our study were found to be due to diphtheria only. There is a dire need to upstage the immunisation programme in the areas where these diseases are still endemic and there is also a need to manage the paediatric tracheostomies by multi-disciplinary approach including departments like ENT, paediatrics, neurosurgery. A proper post operative follow up is also necessary so as to avoid morbidity and mortality due to some late complications of tracheostomy and to plan for earliest possible decannulation.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Yadav M, Yadav G, Monga J, Hussain RT, Naik SM. Indications and complications of paediatric tracheostomies at a tertiary care centre in rural Haryana: a retrospective study. Int J Otorhinolaryngol Head Neck Surg 2022;8:100-4.