

A Study of Various Indications of Tracheostomy in a Tertiary Care Centre

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Abstract: ***Introduction:** The indications for tracheotomy have evolved and developed during the course of time. Tracheotomy, which was originally almost solely performed to bypass upper airway blockage, is today a very common elective therapeutic technique used mostly to assist prolonged intubation and ventilation of critically sick patients. **Material and Methods:** It is a prospective study of various indications of tracheostomy patients treated at the ENT Department of our hospital between June 2021 and May 2022. **Results:** In our study majority of cases were male accountings for 73% of cases. Common age group belongs to 41 - 50 years. The most common indication for tracheostomy was prolonged ventilation and respiratory toileting, followed by upper airway obstruction and cut throat injuries. **Conclusion:** With the advancement in the knowledge of anatomical and physiological aspect of the trachea, the indications of tracheostomy have progressed from airway bypass to assisted ventilation.*

Keywords: Tracheostomy; ventilation; airway obstruction; stridor; intubation

1. Introduction

Tracheostomy is a procedure which has been practised since biblical times to relieve basically upper airway obstruction in an emergency situation. Asclepiades described it as early as BC 100. In olden times it was seen as a last resort in hopeless cases and was mainly done to relieve airway obstruction. It was considered extremely dangerous and was rarely done. Until the end of the 19th century and the introduction of asepsis, together with the development of safe anesthetic techniques, the procedure was extremely hazardous. Chevalier Quixote Jackson established the principles of the operation at the beginning of the 20th century and these remain in place today.^[1, 2]

Apart from its role of relieving airway obstruction, the indications for the procedure expanded from removal of tracheal secretions to delivering anesthesia as a part of different surgical procedures.^[1, 2]

During the twentieth century, the indications for tracheotomy have evolved and developed. Tracheotomy, which was originally almost solely performed to bypass upper airway blockage, is today a very common elective therapeutic technique used mostly to assist prolonged intubation and ventilation of critically sick patients.^[3]

A tracheostomy has several advantages. It relieves mechanical obstruction of the airway, reduces breathing effort, reduces anatomical dead space and aids in tracheobronchial toileting.^[4]

The disadvantages of tracheostomy include the loss of normal speech and the loss of heat and moisture exchange performed in the upper respiratory system.^[5]

In the current study, two types of tracheostomies were performed:

a) Emergency tracheostomy: in patients presenting with

stridor due to malignant growth of larynx, cut throat injuries, unconscious patients with stridor etc.

b) Elective tracheostomy: in patients on prolonged ventilation, major oropharyngeal surgeries with failed intubation.

The objective of this study is to outline the various indications of tracheostomy carried out in the ENT Department of Jorhat Medical College and Hospital during the period from June 2021 to May 2022.

2. Materials and Method

Study design: Hospital based prospective study

Study period: June 2021 to May 2022

Sample size: 30

Source of data: All patients requiring tracheostomy from outpatient and inpatient wards of the departments of ENT, medicine and neurosurgery ICU, Jorhat Medical College and Hospital, Jorhat during the period of study as per inclusion and exclusion criteria. The cases were selected comprising of various age groups with different indications.

Inclusion criteria:

- Malignant laryngeal growth presenting with stridor
- Cut throat cases
- Laryngeal trauma
- Ventilation - assisted patients in ICU

Exclusion criteria:

- Foreign body in the larynx and lower airways
- Tracheostomy done for intubation failure cases for undergoing anaesthesia
- New - born cases

Method of Collection of data:

A detailed history of patients fulfilling the inclusion criteria were taken from both the attendant and patient. In case of children, history was taken from the mother and guardian. A

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complete general, systemic and ENT examination of the patients was undertaken. All patients were duly informed about the study and proper consent was taken before performing the procedure.

Indications of tracheostomy: [1, 6]

There are four basic indications for placement of tracheostomy tube:

- 1) Obstruction of upper airway
- 2) Prolonged ventilation
- 3) Removal of pulmonary secretions
- 4) As a part of another procedure

1) Upper airway obstruction can be due to:

- a) Congenital:
 - Laryngeal web
 - Tracheoesophageal fistula
 - Congenital Laryngeal stenosis
- b) Traumatic:
 - Inhalation of fumes
 - Ingestion of corrosives
 - Cut - neck injury
 - Trauma to the larynx
 - Strangulation injury
- c) Foreign body in the larynx or the trachea requires a tracheostomy to:
 - by - pass the airway obstruction
 - avoid additional foreign body aspiration in the lower respiratory tract
- d) Infective:
 - Laryngeal diphtheria
 - Acute epiglottitis
 - Croup
 - Ludwig's angina
 - Retropharyngeal abscess
 - Parapharyngeal abscess
- e) Neoplastic:
 - Laryngeal papilloma
 - Malignancies of oropharynx, larynx
- f) Neurological:
 - Bilateral vocal cord paralysis
 - Myasthenia gravis
 - Tetanus
 - Poliomyelitis

2) Prolonged ventilation:

- a) Unconscious or comatose patients due to head trauma, encephalitis, stroke etc
- b) Depression of the respiratory system caused by bulbar palsy, barbiturate overdose and other factors
- c) Poliomyelitis, polyneuritis, myasthenia gravis and other diseases that damage the anterior horn cells and nerves that regulate the muscles used for respiration
- d) Pathology affecting the myoneural junction, such as tetanus
- e) Multiple rib fractures, flail chest and other conditions of the chest wall
- f) Lung conditions like fibrosis, collapse, emphysema etc.
- g) burns over face, neck and chest

- 3) Pulmonary toileting: removal of secretions from the lower respiratory tract in diseases such as COPD (emphysema, bronchiectasis)
- 4) Part of another procedure as in major surgical procedures like lingual cyst, dermoid, hemimandibulectomy etc

Types of tracheostomy: [6]

- **Emergency tracheostomy:** performed in a case of acute respiratory distress
- **Elective tracheostomy:** performed whenever respiratory distress or upper respiratory obstruction is anticipated, e. g., prior to Hemi - mandibulectomy
- **Permanent tracheostomy:** performed if the causative factor cannot be removed or cured, e. g., crush injuries of larynx, laryngectomy
- **Temporary tracheostomy:** done when the causative factor can be treated or removed, e. g. edema and foreign body of the larynx

Other types:

- **Percutaneous dilatational tracheostomy:** [7]

It involves inserting a needle into the trachea through a j - tipped guide wire. The needle is removed followed by guiding catheter over the j - wire. The tracheostomy tube is inserted after adequate blunt dilatation of the aperture over the j - wire.

- **Mini tracheostomy (cricothyroidotomy):** [8]

It is a simple percutaneous procedure involving insertion of a small - bore tube through the cricothyroid membrane. It provides efficient tracheobronchial toilet and preserves the glottic function.

3. Results and observations:

Table 1: Age distribution

Age of patient (years)	Number of cases	Percentage
11 - 20	4	13
21 - 30	5	17
31 - 40	5	17
41 - 50	7	23
51 - 60	5	17
61 - 70	3	10
71 - 80	1	3
>80	0	0
Total	30	100

Out of 30 cases, maximum numbers of patients were seen in the age group of 41 - 50 years (23%) followed by the age group of 31 - 40 years (17%). Least common cases were seen in population of extreme age group, i. e., 71 - 80 years.

Table 2: Sex distribution

Gender	Number of cases	Percentage
Male	22	73
Female	8	27
Total	30	100

In the present study, out of 30 tracheostomies performed, 22 cases (73%) were male and 8 cases (27%) were female.

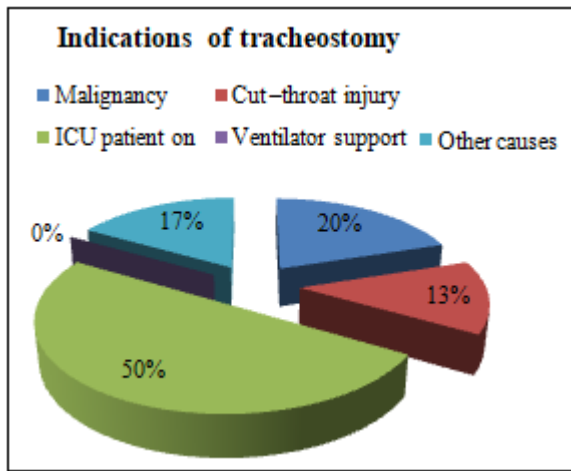


Figure 1: Pie chart showing indications of tracheostomy

In the present study, the most common indication of tracheostomy was prolonged ventilation (50%), followed by malignancies causing upper airway obstruction (20%). Other indications comprised of cut throat injury, facio - maxillary injuries following road traffic accidents, elective surgeries etc.

Photographs:



Figure 2: Intra - operative picture of a patient requiring elective tracheostomy in a case of ameloblastoma of mandible



Figure 3: Post - operative picture of ameloblastoma of mandible



Figure 4: Intra - operative picture of a patient requiring elective tracheostomy??



Figure 5: Suicidal cut neck injury as an indication of tracheostomy



Figure 6: Post - operative case of craniotomy requiring prolonged ventilation as an indication of tracheostomy



Figure 7: Supraglottic growth causing upper airway obstruction

4. Discussion

Muhammad Shafi et al. in their study found that the age group of 41 to 50 years was the most prevalent accounting for 25.2% of cases. Men outnumbered women by 57.9% to 42.1%.^[9]

During the course of the study conducted by *Japhet M Gilyoma et. al.*, 214 patients underwent tracheostomies. The majority of patients (36.7%) were in their third decade of life with a male to female ratio of 3.1: 1. The median and mean ages were 36 and 38.34 ± 12.26 years, respectively, and their ages ranged from 1 year to 76 years.^[10]

B. S. Alabi, et. alin their study found the male to female ratio to be 1.6: 1 with majority in third to fifth decade of life.^[11]

In the present study the age distribution of patients ranged from 12 - 74 years. The most commonly involved age group was 41 - 50 years (23%) followed by 51 - 60 years (17%). The results were similar to above studies. Out of 30 cases of tracheostomies, 73% cases were males and 27% were females. It was in accordance with other studies.

Alirezaalidat et. al in their study, documented altered mental status (19.1%) and respiratory diseases (14.1%) as the main indications. The indications were tumors (10.5%), cardiac problems (9.7%), laryngeal problems (9.5) and brain injury (7%). Depressed mental status leads to intubation which if prolonged necessitates tracheostomy. Subglottic stenosis, dysplasia, pulmonary diseases, asthma, pneumonia, croup, angina and abscess were respiratory diseases requiring tracheostomy. Neoplasms of the larynx, thyroid, trachea and esophagus were the third common etiology.^[12]

Johannes zenk et. al in their study found the indications for tracheostomy to be airway obstruction (27%), craniofacial syndromes (3.5%), long - term mechanical ventilation (22.3%), neurological deficit (25.9%), trauma and sequelae (16.5%) and bilateral vocal cord paralysis (4.7%). The total mortality rate was 18.8%. Among the patients 50.6% were successfully decannulated. The total mortality rate was found to be 18.8% while the tracheostomy related mortality

rate was 0%. Life threatening complications were seen in 7% of the patients.^[13]

Sameer Rana et. al in their study found prolonged ventilation as most common indication of tracheostomy. After failure of weaning from artificial ventilation for 14 to 21 days, a tracheostomy is typically contemplated. An early tracheostomy may be beneficial for patients who are not improving and who are anticipated to need continuous breathing support, according to a recent clinical investigation.^[14]

In the present study, the most common indication for tracheostomy was prolonged ventilation (50%), followed by malignancies causing upper airway obstruction (20%) and cut throat injury (13%). Other (17%) indications comprised of post faciomaxillary injuries following road traffic accidents, cardio vascular accidents, elective tracheostomy in ameloblastoma of mandible, lipoma of tongue, sublingual cyst on undersurface of tongue.

During our study tracheostomy was done both under local anesthesia (83%), general anesthesia (10%) and sedation (7%).

It was observed during the study that all six malignant cases required an emergency tracheostomy, thereby indicating that patients presented late with malignant pathology in our hospital.

It was also observed that cut throat cases showed excellent healing.

5. Conclusion

In our study the most common indication for tracheostomy was prolonged ventilation and respiratory toileting, followed by upper airway obstruction and cut throat injuries.

The indications of tracheostomy have developed from airway bypass to assisted ventilation as knowledge of the anatomical and physiological aspects of the trachea has advanced.

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