A COMPREHENSIVE STUDY ON TRACHEOSTOMY IN A RURAL TERTIARY CARE CENTRE

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ABSTRACT

BACKGROUND
Tracheostomy is the procedure in which an opening is created on the anterior wall of the trachea, thereby creating a stoma between the trachea and cervical skin. It is a lifesaving procedure performed to maintain the patency of the patient’s airway. Establishing and maintaining patient’s upper airway is the most vital step in basic life support. Tracheostomy is one of the most frequently performed surgical procedures in intensive care unit patients.

MATERIALS AND METHODS
Our prospective study, conducted in 210 patients, over a period of one year, comprehensively analyses the indications, types, and complications of tracheostomy. The patients were followed up for a period of 6 months at ENT GP to assess the results and complications, if any.

RESULTS
Total no. of cases studied was 210, male patients were 142 and female patients were 68. Emergency tracheostomy was done for 125 patients and elective tracheostomy was done for 85 cases. Of the reasons, Tracheobronchial toileting, malignant tumours and poisoning were the important causes.

CONCLUSION
The commonest age group was between 21-30 years, more common in males than females. Tumours, poisoning and tracheobronchial toileting were the important cause contributing to 88.6% of total cases.

KEYWORDS
Tracheostomy, Decannulation, Weaning Methods and Procedures.


BACKGROUND
Tracheostomy is a lifesaving procedure done in upper airway to secure upper airway which may be compromised due to various reasons. There are various indications complications, incisions and procedural patterns.1

The term tracheostomy is derived from Greek word and was coined by Heister. Tracheostomy is widely acknowledged as one of the oldest documented surgical procedures. In recent years, more and more airway problems have been managed with either endotracheal intubation or tracheostomy. Since tracheostomy is frequently performed in intensive care unit, health care professional need to be familiar with problems associated with it.2

Aims and Objectives
- To study the indications of tracheostomy.
- To study the incidence of elective and emergency tracheostomy
- To study the post-Operative complications.

Indications
- Mechanical upper airway obstruction.
- Protection of the tracheobronchial tree in patient with risk of aspiration.
- Respiratory failure.
- Retention of bronchial secretions.
- Elective tracheostomy for major head and neck surgeries.2

Mechanical Upper Airway Obstruction
Congenital Causes:
- Laryngeal web
- Subglottic stenosis
- Laryngeal stenosis
- Valvular cyst
- Tracheo-oesophageal fistula
- Haemangioma of pharynx2
Infective Causes
- Acute epiglottitis
- Acute laryngotracheobronchitis
- Diphtheria
- Ludwig's angina
- Acute retropharyngeal abscess

Benign
- Multiple papilloma of larynx

Malignant
- Advanced tumours of larynx, pharynx and tongue

Trauma
- Gunshot and knife wounds to the neck
- Inhalation of steam and smoke
- Swallowing of corrosive fluid
- Maxillo-facial trauma
- Mandibular fracture, cervical haematoma

Vocal Cord Paralysis
- Post thyroidectomy
- Bulbar palsy
- Cardiothoracic and oesophageal surgery

Foreign Body
- Swallowed or inhaled object lodged in upper airway causing stridor

Angioneurotic Oedema

Neurological Disease:
- Polyneuritis
- Motor neuron disease
- Bulbar poliomyelitis
- Myasthenia gravis
- Brain stem stroke
- Coma-GCS scale less than 8

Respiratory Failure
- Chronic obstructive pulmonary disease
- Decreased consciousness
- Trauma to thoracic cage

Surgical Procedure
An elective tracheostomy is carried out in operation theatre under general anaesthesia. If intubation is not possible it can be done under local anaesthesia.

In emergency, it is possible to carry out the procedure at bedside under local anaesthesia.

Position
The patient should be positioned supine with a sand bag under the shoulders for extension. The position of the midline structures of neck must be maintained throughout the procedure.

Procedure
In an elective tracheostomy, a horizontal incision is made approximately 5 cm length midway between the lower border of cricoid cartilage and the suprasternal notch. During emergency, a vertical incision is made from the lower border of the cricoid cartilage to the suprasternal notch.

The skin and the subcutaneous tissues are divided, strap muscles separated by a blunt dissection in the midline. At this point the thyroid isthmus is identified and divided or retracted.

Following division of the isthmus the trachea is visible. Before trachea is opened, 0.5 ml of 4 % lignocaine should be injected into the lumen. A transverse incision is made in the intercartilagenous membrane below the second or the third ring and is converted into a circular opening. The endotracheal tube is withdrawn, and the tracheostomy tube should be fixed in position. The wound should be closed with loose sutures.

Excess secretion should be removed by suction. Humidifier is delivered by a mask or a tube applied to the tracheostomy tube.

Complications
Immediate
1. Anaesthetic complications
2. Haemorrhage from the veins or thyroid gland
3. Air embolism
4. Apnoea
5. Cardiac arrest
6. Local damage to the thyroid cartilage, cricoid cartilage, recurrent laryngeal nerve

Intermediate
1. Displacement of the tube
2. Surgical emphysema
3. Pneumothorax / Pneumomediastinum
4. Infection, perichondritis
5. Tube obstruction by secretion or crusts
6. Tracheal necrosis
7. Tracheo-arterial fistula

Long term
1. Stenosis
2. Decannulation problems
3. Tracheocutaneous fistula
4. Disfiguring scar

MATERIALS AND METHODS
a. All the cases who underwent tracheostomy in the institution during the study period were included.
b. Patients were categorized for every 10 years distribution.
c. Patients were categorized into male and female and also categorized based on specific aetiology.
d. Patients with stridor, Patients on prolonged intubation, Patients who ingested poison were included.
e. Patient were followed up for 6 months duration and studied.
Study Design
Prospective Analytical study.

A. Inclusion Criteria
1. All tracheostomy cases with age limit from 1-80 years were included
2. All tracheostomy cases, both males and females were included
3. All tracheostomy cases, emergency and elective were included
4. All tracheostomy cases, for all aetiologies were included

B. Exclusion Criteria
1. Neonatal and newborn cases were not included.
2. Patients with severe comorbid conditions were not included.
3. Patients with severe bleeding disorder and in whom surgery was contraindicated were not included.

RESULTS
Age Distribution

<table>
<thead>
<tr>
<th>Age in Years</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>11-20</td>
<td>6</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>21-30</td>
<td>18</td>
<td>30</td>
<td>48</td>
</tr>
<tr>
<td>31-40</td>
<td>26</td>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td>41-50</td>
<td>30</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td>51-60</td>
<td>33</td>
<td>5</td>
<td>38</td>
</tr>
<tr>
<td>61-70</td>
<td>17</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>71-80</td>
<td>70</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>142</td>
<td>68</td>
<td>210</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. of Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>142</td>
<td>67.6%</td>
</tr>
<tr>
<td>Female</td>
<td>68</td>
<td>32.4%</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1

Graph 1

Graph 2

Graph 3

Table 2

Graph 4

Table 3

Graph 5

Table 4
**DISCUSSION**

In our study, an attempt was made to have a prospective study on tracheostomy. Results were analysed in following manner.

In our study, tracheostomy was predominantly done in male population with a very high percentage as compared with other studies (males 67.6% and females 32.4%).

It was done at both extremes of age 21-30 and 51-60 yrs. In young age Trauma and Poisoning were the important causes and in old age Malignancy was the important cause.

Crofts et al reported total number of 28 patients; males-9, females-9, in years 59.4±18.3

Friedman et al reported the age of patients 53±7 with 17 males and 10 females.

Thatcher, Gentry w et al studied 15 patients in the age group 33-73 years.

Hazard et al reported from his study males 13 and females 11.7

Carr et al reported 142 patients 57% male and 43% female.8

**Indications of Tracheostomy**

In our study, the main indication for tracheostomy was Malignant growth at old age followed by Poisoning and Trauma Among younger age group. Among malignant growth, laryngeal growth constitutes the majority of which emergency tracheostomy was done more than the elective tracheostomy and cuffed non-metallic tubes were used in case ventilator is needed.

Gerald J, Ganoli et al reported the surgical indication were separated into three groups:

1. Upper airway obstruction - 43%
2. Prolonged mechanical ventilation - 52%
3. Requirement of another surgical procedure - 5%9

Holdgoard et al stated that one of the common indications for tracheostomy was trauma.10

Sidman, James at al in his study stated the common indication for tracheostomy were

Subglottic stenosis - 32%11
Craniofacial abnormality - 14%
Chronic ventilator dependency - 11%
Neurological disorder - 8%

Rove, Laslo et al in his study of 15 patients performed tracheostomy in patients with bilateral recurrent nerve paralysis after thyroid surgery.12

Stoeckli et al performed tracheostomy in patients with respiratory distress.13

Gray et al performed tracheostomy in 30 paediatric patients. The indications were

Airway obstruction or stridor in 20 patients9

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**Graph 6**

<table>
<thead>
<tr>
<th>Indications</th>
<th>No. of Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignant tumors</td>
<td>81</td>
<td>38.6</td>
</tr>
<tr>
<td>Tracheobronchial</td>
<td>42</td>
<td>20.0</td>
</tr>
<tr>
<td>Toileting</td>
<td>63</td>
<td>30.0</td>
</tr>
<tr>
<td>Poisoning</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Vocal Card Paraly</td>
<td>3</td>
<td>1.4</td>
</tr>
<tr>
<td>Laryngeal Papillma</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Infection</td>
<td>4</td>
<td>1.9</td>
</tr>
<tr>
<td>Cut throat injury</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Sub glottis stenosis</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 6**

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**Graph 7**

<table>
<thead>
<tr>
<th>Complications</th>
<th>No. of Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>16</td>
<td>7.5</td>
</tr>
<tr>
<td>Scabs and crust formation</td>
<td>16</td>
<td>7.5</td>
</tr>
<tr>
<td>Preoperative bleeding</td>
<td>12</td>
<td>6.0</td>
</tr>
<tr>
<td>Post-operative bleeding</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Tube dislodgement</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>False Passage</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Subcutaneous emphysema</td>
<td>5</td>
<td>2.4</td>
</tr>
</tbody>
</table>

**Table 7**
Ventilator support in 10 patients. Croffs et al reported from his study that 4% underwent tracheostomy due to trauma.\textsuperscript{5}

**Complications**

In our study, 61 patients had complications. Majority of them were minor. Peroperative bleeding, postoperative bleeding, scabs and crusting and wound infection were the main complications.

One case developed Bilateral Pneumothorax.

Two cases developed stomal stenosis with difficult management.

Friedman et al reported 15% Incidence of bleeding.\textsuperscript{5} But our study had 6% of per-operative and 1.1% post-operative bleeding.

Goldenberg et al in their study reported 3.7% Incidence of haemorrhage.\textsuperscript{14} Ravikumar et al reported mild bleeding occurred in 29.4%.

Kost, Karen et al reported the total complication rate after PDT was 9.2%.

Stoeckli, Sandro et al reported the incidence of peroperative bleeding to be 12.9% and wound infection 22%.

Michele MCarrin in his study reported 77% complications occurred overall.

Friedman et al reported 46% of the complications occurred after tracheostomy from his study.\textsuperscript{6}

Berouschot et al reported from his study severe complications were observed in a total of 6 cases 8%. Including intratracheal haemorrhage.

**Decannulation**

In our study of 210 patients, 113 patients had temporary tracheostomy. Decannulation was done for 23 patients. 2 patients developed difficulty in decannulation due to suprastomal collapse, rest of the patients were lost in follow up.

Duncan et al reported that 33% patient were decannulated.

Wound infection, scab and crust formation were one of the few important complications encountered.

Pus culture and sensitivity was taken from those wounds revealing Pseudomonas organism and it was properly managed.

We had one patient with false passage of tube which was found at the right moment and corrected immediately. Ravikumar et al from his study reported that out of 17 patients, 7 patients were decannulated.

Robert F Gray et al reported 30 decannulated from his study of 177 children.

**CONCLUSION**

In our study of tracheostomy, the following results were found, between the age limit of 21-30 years.

- Maximum incidence of tracheostomy was noted in age group between 20-60 years. Mean age 40.5 ± 5.

Majority were male 67.6% and females were 32.4%, showing more incidence of tracheostomy in male patients.

Indication for tracheostomy was mainly for malignant growth larynx (38.6%), other indications were poisoning (30%) and tracheobronchial toileting (20%).

Permanent tracheostomy was done in 97 cases and temporary in 113 cases.

Metal tube was used for 90 cases and non-metal tube was used for 120 cases, non-metallic tubes were mainly used for ventilator purpose and tracheobronchial toileting.

Post-operative complications were mainly wound infection (7.5%), scabs and crusting (7.5%), subcutaneous emphysema (2.4%), tube dislodgement (2.0%) and difficult decannulation (1%).

**REFERENCES**


