

# Improving Outcome in Tracheostomy: Our Study

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## Research Article

**Abstract:** Tracheostomy is most valuable and life saving operation in which a surgical airway in the cervical trachea is created. Timing of tracheostomy is most important before anoxic damage results. The aim of study is to study various indications and management of the tracheostomy. If managed efficiently during postoperative period, morbidity and mortality can be reduced in the tracheostomy.

**Keywords:** Tracheostomy, Flail chest, Tracheostomy tube, Percutaneous.

### Introduction:

Tracheostomy is most obliging and one of the oldest operations in the history of surgery. It is most valuable and life saving operation in which a surgical airway in the cervical trachea is created. Tracheostomy can be done on the surgeon's clinical judgment with or without help of the investigations.

Timing of tracheostomy is most important before anoxic damage results. When surgeon feels; then he should go for tracheostomy.

The aim of study is to study various indications and management of the tracheostomy & improving outcome of surgery. Another aim of the study is to show that this is a life saving measure, if carried out before irreversible anoxic damage results and managed efficiently postoperatively & to deduct the morbidity and mortality.

The incidence of tracheostomy is studied in 50 cases of Government Medical College, Latur and is compared with the study of other workers in this field.

### Aims and Objectives:

1. To study the indications of tracheostomy with respect to age, sex, disease and physiological alterations.
2. To study the clinical presentations, in which Tracheostomy is helpful
3. To study the types and technique of Tracheostomy
4. To study the management of Tracheostomy
5. To study the complications of Tracheostomy
6. To study the morbidity & mortality.

### Material and Methods:

The present study of 50 cases of Tracheostomy was carried out in Department of Otorhinolaryngology, Government Medical College, Latur from January 2010 to July 2012.

Patients in whom tracheostomy was performed in this study were studied in following proforma:

Bio data of the patients: Name, Age, Sex.

Chief complaints: Cough, Fever, Pain in throat, Breathlessness, Change in voice, Difficulty in swallowing, Stridor.

History of present illness:

Onset- Acute/Subacute/Chronic

H/o Fever, cough, heart disease

H/o foreign body aspiration

H/o difficulty in deglutition –Periodic/Recurrent

H/o Regurgitation/ Aspiration

H/o Haemoptysis

H/o Retraction of chest/Abdomen

H/o Coryza/Drugs/Poisoning

H/o swelling over neck

H/o Convulsion

H/o altered consciousness

H/o Surgery/Accidents/Injury

Respiratory System:

- Movements of chest
- Retraction of chest, epigastrium, suprasternal
- Utilisation of accessory muscles of respiration
- Breath sounds
- Adventitious sounds

Indications for Tracheostomy:

1. To relieve upper respiratory tract obstruction
2. Operative –Pre/peri/post
3. To improve respiratory function
4. Respiratory Paralysis

Type of tracheostomy: Emergency/Elective

Type of tube used and its No.

Complications during the operation:

Clinical examination after the operation: Respiratory, cyanosis, stridor, general condition, chest movements, breathe sounds

Postoperative complications:

Number of days required for decanulation

Results-Tracheostomy-temporary/permanent,  
If death, cause of death.

**Results:**

The present study of 50 cases of Tracheostomy was carried out in Department of Otorhinolaryngology, Government Medical College, Latur from January 2010 to July 2012.

Observations following this study are

**1. Incidence-**

- Maximum number of tracheostomies (36%) were done in the age group 60-69 years; commonest cause being attributed for this is Carcinoma of larynx. Second commonest incidence was in the age group of 0-9 due to common incidence of infective, inflammatory diseases, neurological and foreign body aspiration in children.
- In this study 68% tracheostomies were performed in male patients while remaining 32% in female patients.

**2. Type of Tracheostomy-**

- Emergency operation was done in 54% of cases due to upper respiratory tract obstruction, head injuries, hanging and a few by respiratory paralysis.
- Elective procedure was done in 44% cases, which were contributed by post operative Tracheostomy, for example in foreign body removal and in the patients of malignancy of larynx where chronic respiratory tract obstruction is seen

**3. Clinical Symptoms-**

- Symptom-wise analysis of the study reveals that the most common presenting complaint(%) in a patient subsequently required tracheostomy as follows-

**Symptom percentage**

Breathlessness -	76
Altered consciousness-	24
Change in voice-	40
Cough-	64
Convulsions-	12
Fever -	36

**4. Indication of Tracheostomy-**

- Tracheostomies were performed to relieve upper respiratory tract obstruction in 34% cases

**5. Tracheostomy in various diseases-**

Disease	No of cases	Percentage
Head injury	4	8
Carcinoma larynx	10	20
Diseases of nervous system	11	22
Respiratory	2	4
Inflammatory conditions	10	20
Foreign body aspiration	5	10
Other injuries	4	8
Burns	2	4
Prophylactic	2	4
<b>Total-</b>	<b>50</b>	<b>100</b>

**6. Tracheostomy Tube –**

In 11 cases metallic (Jacksons) tracheostomy tube was used whereas Portex tube was used in 39 cases which includes snake bite with respiratory paralysis, OP poisoning, tetanus, hanging and burn patients.

**7. Removal of Tracheostomy tube-**

43 patients were successfully decanulated. Of the 7 permanent tracheostomy patients, 6 were of carcinoma of larynx and one was of bilateral abductor paralysis.

**8. Complications-**

Complications	No. Of cases	Percentage
Bleeding	2	4
Surgical emphysema	2	4
Stomal Infection	2	4
Tracheitis and bronchitis	3	6
Tracheo-oesophageal fistula	1	2
Secretions	4	8
Tracheal Stenosis	-	-
<b>Total</b>	<b>14</b>	<b>28</b>

Thus complications were observed in 28% cases. In some of the patients in this series the complication of tracheal stenosis was observed.

**Discussion**

**Table 1: Comparison of Findings of Preset Series with Different Authors**

Series	No. of cases	Emergency	Elective
Davis (1953)	155	89	66
Glass et al (1962)	80	19	61
McClelland (1965)	389	89	300
Polpschi(1965)	76	45	31
Present series	50	27	23

**Indications for tracheostomy:**

They are studied in heads as given in Bailey and Loves:

- To relieve obstruction of the upper air passages. The various causes are:
  - Foreign body impaction in trachea.
  - Acute infections: Croup syndrome, Diphtheria.
  - Oedema of the glottis
  - Bilateral abductor paralysis.
  - Tumours: Carcinoma of larynx
  - Stenosis: Tuberculosis, Scalding, post-intubation.

- Congenital webs or atresia
  - Cut throat.
  - Hanging
- To improve respiratory function, by reducing the anatomical dead space and also enabling effective aspiration of bronchial secretions.
    - Fulminating bronchopneumonia.
    - O.P. Poisoning.
    - Chronic bronchitis with severe emphysema.
    - Chest injuries: 'Flail chest'
  - Respiratory paralysis in which it allows I.P.P.R. to be performed. Also secretions or inhaled foreign material (e.g. Vomitus) can be aspirated.
    - Unconsciousness associated with head injuries, fascio- maxillary injuries.
    - Coma persisting for more than few hours.
    - Tetanus
  - As a preliminary to certain operations, particularly extirpation of larynx.

**Table2: Indications of Tracheostomy**

Symptom	Davis (1953)	Nelson (1957)	Boston (1961)	Dugan (1963)	McClelland	Present series
Head Injuries	9	32	-	-	110	4
Carcinoma of larynx	35	54	145	39	-	10
Diseases of nervous system	70	86	132	68	133	11
Respiratory diseases	-	-	38	88	76	2
Inflammatory conditions	22	15	-	27	-	10
Foreign body	-	-	-	8	-	5
Other injuries	-	77	-	64	42	4
Burns	-	41	-	-	-	2
Prophylactic	-	-	54	143	-	2
<b>Total</b>	<b>136</b>	<b>305</b>	<b>368</b>	<b>437</b>	<b>361</b>	<b>50</b>

**5. Table 3: Comparison of observation for indications of tracheostomy in head injuries of present series with other authors:**

Author	Total cases	No. of head injury cases	Percentage
Davis (1953)	155	9	5.8
Nelson (1957)	310	32	1.3
McClelland	389	110	28.3
Present series	50	4	8

The above table shows that the present series is comparable to Davis (1953).

**6. Table 4: Comparison of Observation for Indications of Tracheostomy in Cases with Nervous System Diseases of Present Series with other Authors :**

Author	Total cases	Cases with nervous system diseases	Percentage
Davis (1953)	155	70	45.2
Nelson (1957)	310	86	27.7
Boston(1961)	462	132	28.5
Dugan(1963)	461	68	14.7
McClelland(1965)	389	133	34.2
Present series	50	11	22

The above table shows that the present series is comparable to Dugan (1963). The indications in the present series are snake bite, O.P. poisoning, tetanus, CVA.

7. **Table 5: Comparison of observation for indications of tracheostomy for carcinoma larynx of Present series with other authors:**

Author	Total tracheostomy	Tracheostomy for carcinoma larynx	Percentage
Davis (1953)	155	35	22.6
Nelson (1957)	310	54	17.4
Boston(1961)	462	145	31.4
Dugan(1963)	461	39	8.4
Present series	50	10	20

In all cases permanent tracheostomy tube was kept and found vital to maintain respiration by passing the organic obstruction caused by tumour to airway.

8. **Table 6: Comparison of observation for indications of tracheostomy in respiratory diseases of present series with other authors :**

Author	Total tracheostomy	Tracheostomy done in respiratory diseases	Percentage
Davis (1953)	462	38	8.2
Dugan(1963)	461	88	19.1
McClelland(1965)	389	76	19.5
Present series	50	2	4.0

In the present study only 2 tracheostomies were performed in respiratory diseases. One of them was done in a patient of bilateral pulmonary tuberculosis with tuberculosis laryngitis and another in patients of bilateral pulmonary tuberculosis with surgical emphysema. Of the two, one is succumbed to death and other is recovered completely.

9. **Table 7: Comparison of observation for indications of tracheostomy in inflammatory conditions of present series with other authors:**

Author	Total tracheostomy	Tracheostomy done in inflammatory conditions	Percentage
Davis (1953)	155	22	13.8
Nelson (1957)	310	15	4.8
Dugan (1963)	461	27	5.8
Present series	50	10	20.0

The highest incidence (10 out of 50) is observed in the tracheostomies performed in inflammatory conditions, mainly attributed to lack of immunization, poverty, malnutrition and lack of health education. One of the cases was diphtheria and rest are the inflammatory conditions due to viral and bacterial (non-specific) infections.

10. To our experience, we had 5 tracheostomies performed in a patient of **foreign body** in trachea-bronchial tree. Advantages of tracheostomy in such cases are-
- An easy administration of anaesthesia.
  - Easy access for bronchial toileting and foreign body removal.
  - Prophylactically to avoid the risk of laryngeal oedema due to endoscopy, injury by foreign body during its removal.

11. **TABLE 8: Comparison of observation for indications of tracheostomy in other injuries of present series with other authors:**

Author	Total tracheostomy	Tracheostomy done in inflammatory conditions	Percentage
Nelson (1957)	310	77	24.8
Dugan (1963)	461	64	13.8
McClelland (1965)	389	42	10.8
Present series	50	14	8

Other injuries include chest injuries, soft tissue injuries to neck, faciomaxillary injuries and fracture of mandible. The present series is comparable to McClelland's (1965) observation.

**Surgical Technique:**

- A transverse incision is made in the midline of neck in lower third between cricoid cartilage and sternal notch.
- Skin, subcutaneous tissue, strap muscles & pretracheal fascia are dissected in the midline. Dilated veins are displaced. Trachea identified and confirmed by air bubbles in syringe.
- Few drops of 4% lignocaine are injected into trachea to suppress cough reflex.
- Trachea opened with vertical incision and opening is made cruciate.
- Tracheostomy tube of appropriate size is inserted and secured by tapes and dressing.
- Air entry confirmed equal on both sides and post procedure chest x- ray is advised.

**Post-operative Care:**

- Constant supervision to check for respiratory distress due to bleeding, displacement or blocking of tube.
- Frequent suctioning depending upon the amount of secretions, every half hourly or so.

- Prevention of crusting and tracheitis by humidification and mucolytic agent like acetylcystines solution.
- Care of tracheostomy tube- cleaning of inner tube as and when required for first 3 days. Cuff should be periodically deflated.
- Chest physiotherapy.

**Removal of tracheostomy tube**

The criterion description by Timmis in 1973 for the decanulation were strictly observed while the removal of tracheostomy tube.

Trial of closure was given by plugging the tracheostomy tube either with tube pilot or a cotton wool. If the patient is comfortable after 2 hours of closure of tracheostomy tube then only the decision of the removal of tracheostomy tube is undertaken. During trial of closure period the patients observed carefully for signs of respiratory insufficiency. Average decanulation period observed in present series is 7.33 days. Earliest and longest decanulation period noticed during the study were 1 and 50 in days respectively, later period took for a case of 38% burns.

**Complications:**

**Table 9: Comparison of complications of tracheostomy of present series with other authors.**

Complications	Davis 1953	Nelson 1957	Head 1961	Meade 1961	Dugan 1963	McClelland 1965	No. of cases
Bleeding	13	10	25	7	14	13	2
Surgical emphysema	5	-	4	3	7	16	2
Pneumothorax	8	7	4	2	6	-	-
Infection of stoma	8	2	80	5	3	-	2
Tracheitis	17	-	-	15	-	35	3
Obstructed tube	11	10	52	-	-	21	-
Secretion and crusts	-	-	-	-	9	11	4
Total tracheal stenosis	-	-	2	1	1	-	-
T.O. Fistula	-	-	-	-	-	-	1
Mediastinal emphysema	8	1	4	-	-	-	-
Retained tube	8	7	-	12	-	14	-
Miscellaneous	-	12	35	26	7	142	-
Total	78	54	206	71	47	252	14
<b>Total No of cases studied</b>	<b>155</b>	<b>310</b>	<b>462</b>	<b>212</b>	<b>461</b>	<b>389</b>	<b>50</b>

The table gives following observations:

- 1 The present study revealed bleeding as a complication during operation in 2 patients (4%) which resembles with McClelland (1965), Meade (1961), Nelson (1957) and Head (1961).
- 2 Surgical emphysema noted in 2 patients in our study (4%) as compared to 0.86% in Head(1961)
- 3 Infection of stoma is found in 2 patients (4%) which resembles with Davis (1953). It is managed appropriate antibiotic coverage.
- 4 Secretions as a complication were seen in 4 cases (8%). These include patients of tetanus,

head injury, CVA and carcinoma of stomach. Out of these 3 were succumbed to death.

- 5 Tracheitis occurred in 3 patients (6%), resembling observations of Meade (1961) and McClelland (1965).
- 6 T.O. Fistula was seen only in a single patient in our study of carcinoma of larynx.

### Mortality :

**Table 10: Comparison of mortality of present series with other authors**

Series	Mortality Percentage
Meade (1961)	2.8
Glass (1962)	1.2
Dugan (1963)	1.08
McClelland (1965)	3.3
Present study	14

The above table depicts higher mortality compared to other standard series. This can be largely attributed to the significant difference in the facts like the indications for which tracheostomy was performed, stage of the disease at which patient sought the treatment and the facilities available.

**Percutaneous tracheostomy** is now a well established technique used in the critical care setting. In general it is an elective procedure.

Although the technique may be performed blind, whenever possible the trachea should be visualised via fiberoptic laryngoscope passed down the tracheal tube. Two operators are required for the procedure, one performing the tracheostomy, and one at the head of the patient looking after the airway, anaesthesia and bronchoscopy. The most popular technique today is the percutaneous dilatational tracheostomy described by Ciaglia in 1985. This technique uses serial dilators over a guide wire and is usually done at the bedside in the intensive care unit under bronchoscopic guidance. The procedure is avoided in patients who are obese, have a neck mass, difficult to intubate, difficult to extend neck or have uncorrectable coagulopathies.

Main advantage of percutaneous tracheostomy is ease of performance and a lower incidence of peristomal bleeding and postoperative infections; although another meta-analysis study reveals more perioperative complications like surgical emphysema, cardiorespiratory arrest and perioperative death.

### Summery and Conclusion:

The present study of 50 cases of Tracheotomy was carried out in Department of Otorhinolaryngology, Government Medical College, Latur from January 2010 to July 2012.

1. Age incidence study revealed highest incidence in 60-69 age group due to carcinoma of larynx. Second highest incidence were in children in the age group of 0-9 years, this is because of the increased susceptibility to the infectious diseases, lack of immunization, unawareness of health education and increased chances of accidents like foreign body aspiration in them. The youngest patient was of 7 months age and the oldest of 75 years age.
2. Sex incidence study revealed preponderance of males over their counterpart. This is because of increase occurrence of fatal traumas and some of the diseases like carcinoma larynx.
3. Diseases in which Tracheostomy was performed comprised of foreign body aspiration, inflammatory conditions, carcinoma of larynx, head injury, nervous system diseases, traumatic injuries, burns, respiratory diseases and prophylactic, in that order of frequency.
4. The physiological alterations for which tracheostomy was performed included; to relieve respiratory obstruction (34%), as a preliminary to certain operations (32%), respiratory paralysis (22%) and to improve respiratory function (12%).
5. The patients were mainly presented with breathlessness, cough, retraction of chest, fever inspiratory stridor, changes in voice, cyanosis, H/o foreign body aspiration, altered consciousness and convulsions.
6. Classical technique described by Watts (1963) was carried out for all tracheostomies and was found easy, safe, and efficient. Of total, 43 patients (86%) needed temporary, while 7 patients (14%) needed permanent tracheostomy. The later was comprised of 6 patients (12%) of carcinoma of larynx and a single (2%) of bilateral abductor paralysis of cords.
7. Management of all the cases was carried out as described by Timmis (1963) and was found most serving. Sterile catheters were used for aspiration to avoid the infections, so also daily dressing of the stoma to maintain hygiene of the wound. Average duration required for decanulation was 7.33 days, with minimum one day and maximum 50 days. After successful trial closers, the stoma was strapped with adhesive tapes. This was required for 6-7

days for sealing of the air leak and wound healing.

8. Total 14 (28%) patients develop complications which include Secretions in 4 cases (8%), tracheitis in 3 (6%), bleeding in 2 (4%) surgical emphysema in 2 (4%) and tracheo oesophageal fistula in 1 (2%). Neither other complications occurred; nor was any specific management required for those, which occurred.
9. Mortality was observed in 7% (14%) cases. All of them succumbed to the fatal primary pathology and none due to the Tracheostomy per se or its complications.

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