

# Role of Tracheostomy in the Management in Dyspnoea Patients

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## ABSTRACT

**Introduction:** Tracheostomy is a medical procedure where an opening is created in the neck to place a tube into the trachea to aid in breathing. It is used when patients require prolonged respiratory support or in cases of airway obstruction. The efficacy of tracheostomy for respiratory management depends on several factors, including the underlying condition, timing of the procedure, and patient-specific factors. **Objectives:** The aim of the study was to evaluate the efficacy of tracheostomy for respiratory management in patients. **Methods & Materials:** This cross-sectional study was carried out in the Department of Medicine, Mymensingh medical college hospital, Mymensingh, Bangladesh during July 2022 to June 2023. A total of 150 patients were participated in the study. Statistical analyses of the results were obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-24). **Results:** In this study, the study population's age distribution, 2(1.33%) children were between the ages of 0-10, whereas 41 (27.33%) people were between the ages of 61 and 70. According to sex distribution, the majority 70% was male and 30% was female. Socioeconomic status of the study population, 45 (30%) of the patients are from the low class and 37 (24.66%) are from the high-class family. Based on duration of hospital stay, it was observed that, 68(45.33%) patients were stays in hospital within 3 days and 43(28.66%) were >3 days. **Conclusion:** Tracheostomies were more typically performed in young people, with a higher incidence among males. Tracheostomies are typically performed for assisted ventilation in adults and children, with

the most common consequences being subcutaneous emphysema and peristomal infections. The majority of the problems were addressed conservatively.

**Keywords:** Tracheostomy, Respiratory, airway obstruction, Subcutaneous emphysema, Peristomal infections

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## INTRODUCTION

Tracheostomy is one of the most popular surgical techniques used in the treatment of acute respiratory insufficiency<sup>[1]</sup>. Although only a small percentage of people require breathing support, tracheostomy patients exert a major strain on ventilator, intensive care unit (ICU), hospital, and post-hospitalization services<sup>[2]</sup>. Financial expenses for tracheostomy patients are among the highest of any diagnostic or procedure category<sup>[3]</sup>. Efforts to improve tracheostomy practice have the potential to impact both the quality of care delivered to this sector of the critically ill population and the resources used to deliver that care<sup>[4]</sup>.

The grounds for a tracheostomy are numerous, but its major goal is to ensure safe control of the upper airway and improve respiration by securing it. Tracheostomy allows for safe

airway management and is commonly utilized by various surgeons. However, the best approach of airway care following cancer surgery is still debated, and tracheostomy does not always result in success. A tracheostomy can impair the patient's laryngeal function, prevent correct humidification, and frequently result in consequences such as coughing, excessive secretion, and pulmonary concerns<sup>[5]</sup>. Complications of tracheostomy include infection, hemorrhage, tracheomalacia, tracheoesophageal fistula (TEF), tracheo-innominate artery fistula, tube obstruction, etc.<sup>[6]</sup>. As a result, tracheostomy is not always required in head and neck cancer surgeries, and it should only be used when absolutely essential. However, identifying when it is absolutely necessary frequently rests on the surgeon's subjective assessment, and various clinical trials have been done to establish a more objective foundation for decision-making.

A tracheostomy may improve mouth hygiene and pulmonary toilet, increase patient comfort, give airway security, and enable oral nourishment and speaking<sup>[7]</sup>. Additionally, the existence of a tracheostomy has been proposed to assist weaning off mechanical ventilation for a variety of reasons<sup>[8]</sup>. The resistance to airflow in an artificial airway is related to air turbulence, tube diameter, and length. Extrinsic compression and secretions cause an increase in air turbulence<sup>[9]</sup>. Because of their robust design, shorter length, and removable inner cannula (for secretion evacuation), tracheostomies should have lower airflow resistance and related work of breathing than endotracheal tubes. However, this impact has not been consistently demonstrated in tracheostomy patients<sup>[10]</sup>. Furthermore, the existence of a tracheostomy may enable clinicians to be more active in weaning attempts. If a patient with a tracheostomy cannot tolerate being removed from mechanical ventilation, he or she may be reconnected to the ventilator circuit. In contrast, if a translaryngeally intubated patient is unable to endure extubation, he or she must be sedated and reintubated. Concern about extubation failure may be a barrier to extubation in patients with a questionable pulmonary condition<sup>[11]</sup>. Because many of the advantages of tracheostomy over extended translaryngeal intubation are either unproven or subjective, clear criteria for selecting patients for tracheostomy are missing.

The benefits of tracheostomy do not come without risks and difficulties. The increased usage of tracheostomy in recent decades has resulted in a corresponding increase in difficulties; also, insufficient focus is placed in medical and nursing teaching on post-operative treatment to reduce complications. The post-tracheostomy care of the patient requires a large number of highly trained professionals, expensive machinery, and a significant investment of time and money. Paediatric patients face a variety of issues, including food difficulties, communication development, and schooling. The timing of tracheostomy is critical. If the tracheostomy can be performed before severe anoxia and irreversible lung damage have occurred, it greatly simplifies post-operative care and helps to reduce the likelihood of future complications; in fact, the best time to perform a tracheostomy is when the attending physician first considers it in a specific case<sup>[12]</sup>.

**METHODOLOGY**

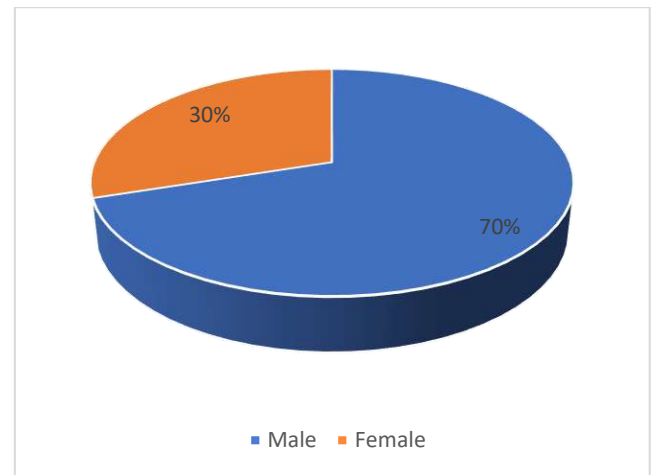
This cross-sectional study was carried out in the Department of ENT, Mymensingh Medical College Hospital, Mymensingh, Bangladesh, during July 2022 to June 2023. A total of 150 patients were participated in the study and both patients were male and female. After taking consent and matching eligibility criteria, data were collected from patients on variables of interest using the predesigned structured questionnaire by interview, observation. Statistical analyses of the results were be obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-24).

**RESULTS**

**Table – I: Age distribution of the study population (n=150)**

Age (years)	n=150	%
0-10	2	1.33
11-20	3	2
21-30	4	2.66
31-40	11	7.33
41-50	25	16.66
51-60	36	24
61-70	41	27.33
71-80	12	8
81-90	16	10.66

Table I shows age distribution of the study population, it was observed that 2(1.33%) children were belonged to age 0-10 years. Besides, 11(7.33) patients were belonged to age 31-40 years and 41(27.33%) adults were belonged to age 61-70 years respectively.



**Figure – 1: Sex distribution of the study population (n=150)**

Figure 1 shows sex distribution of the study population, it was observed that majority 105(70%) patients were male and 45(30%) patients were female.

**Table – II: Socio-economic condition of study population (n=150)**

Socio-economic condition	n=150	%
Low	45	30
Middle	68	45.33
High	37	24.66

Table II shows socio-economic status of the study population, it was observed that 45(30%) of the patients come from low class, 68(45.33%) of the patients come from middle class and 37(24.66%) of the patients come from high class family respectively.

**Table - III: Distribution of indications of tracheostomy of study population (n=150)**

Indications	n=150	%
<b>Upper airway obstruction</b>	65	43.33
Traumatic	24	16
Severe head and neck injuries	14	9.33
Maxillofacial injuries	9	6
Foreign body aspiration	1	0.66
Neoplastic Malignancy	32	21.33
Supraglottic	13	8.66
Glottic	9	6
Oral cavity	1	0.66
Oropharynx	3	2
Pyriiform fossa	3	2
postcricoid	2	1.33
Thyroid	1	0.66
Infections	9	6
Ac Epiglottitis	3	2
Ludwig's angina	1	0.66
Parapharyngeal abscess	2	1.33

Tetanus	3	2
<b>Mechanical ventilation/ Tracheobronchial toileting</b>	21	14
Prolonged ventilation	21	14
<b>Adjunct to head and neck surgeries</b>	8	5.33
Anticipated difficult intubation	8	5.33
<b>Others</b>	6	4
Burns	1	0.66
Failed intubation	2	1.33
Post intubation tracheal stenosis	2	1.33
Guillian Barre Syndrome	1	0.66

Table III shows indications of tracheostomy of study population, it was observed that, according to upper airway obstruction 14(9.33%) of the patients had Severe head and neck injuries, 32(21.33%) of the patients had Neoplastic Malignancy and 9(36%) of the patients had Infections respectively. According to Mechanical ventilation, 21(14%) had Prolonged ventilation. And based on Adjunct to head and neck surgeries, 8(5.33) had Anticipated difficult intubation.

**Table - IV: Distribution of complications of tracheostomy of study population (n=150)**

Period	Type of complications	n=150	%
Intraoperative	Cardiopulmonary arrest	1	0.66
Early	Bleeding	3	2
	Apnoea	1	0.66
	Subcutaneous emphysema	2	1.33
Intermediate	Tube block	3	2
	Accidental decannulation	2	1.33
	Aspiration pneumonia	3	2
	Bleeding	2	1.33
Late	Suprastomal granulation	3	2
	Stomal infection	10	6.66
	Tracheoesophageal fistula	1	0.66
	Persistent tracheocutaneous fistula	2	1.33
	Hypertrophic scar	1	0.66

Table IV shows complications of tracheostomy of study population, it was observed that, according to Intraoperative period 1(0.66%) of the patients had Cardiopulmonary arrest. According to Intermediate period, 3(2%) patients had Tube block, 2(1.33%) patients had Accidental decannulation and 3(2%) patients had Aspiration pneumonia. And based on late period, 3(2%) patients had Suprastomal granulation and 10(6.66%) patients had Stomal infection.

**Table - V: Population of the study according to duration of hospital stay (n=50)**

Hospital stays	n=150	%
Within 3 days	68	45.33
> 3 days	43	28.66

Table V shows distribution of the study population according to duration of hospital stay, it was observed that, 68(45.33%) patients were stays in hospital within 3 days and 43(28.66%) were >3 days. And 39 patients died during hospital stay.

## DISCUSSION

This cross-sectional study was carried out in the Department of Medicine, Mymensingh medical college hospital, Mymensingh, Bangladesh, Dhaka. During 1 year of study period (July 2022 to June 2023), total 150 samples were included in this study. In this present study, according to the study population's age distribution, 2(1.33%) children were between the ages of 0-10. Furthermore, 11(7.33%) patients were between the ages of 31 and 40, whereas 41(27.33%) people were between the ages of 61 and 70. According to sex distribution, 105 patients (70%) were male and 45(30%) were female. And the socioeconomic status of the study population, 45(30%) of the patients are from the low class, 68(45.33%) are from the middle class, and 37(24.66%) are from the high-class family.

Tracheostomy is one of the oldest medical treatments known; it has been used consistently since the mid-nineteenth century, when Armand Trousseau improved the technique to treat diphtheria patients with dyspnea<sup>[13,14]</sup>. The procedure's indications are rising by the day. Initially, all tracheostomies were performed solely to relieve upper airway obstruction;

however, their indications steadily expanded, and they are now frequently employed as a temporary surgery for airway access, particularly for anesthetic purposes and artificial breathing. Similarly, the indications for long-term or permanent tracheostomy, such as severe respiratory distress, sleep apnea syndrome, and terminal malignant tumor, are increasing<sup>[15]</sup>.

The benefits of tracheostomy do not come without risks and difficulties. The increased usage of tracheostomies in recent decades has resulted in a corresponding increase in problems; also, insufficient focus is placed in medical and nursing teaching on postoperative management to reduce complications. The post-tracheostomy care of the patient requires a large number of highly trained professionals, expensive machinery, and a significant investment of time and money. Paediatric patients face a variety of issues, including food difficulties, communication development, and schooling. The timing of tracheostomy is critical. If the tracheostomy can be performed before severe anoxia and irreversible lung damage have occurred, it greatly simplifies post-operative care and helps to reduce the likelihood of future complications; in fact, the best time to perform a tracheostomy is when the attending physician first considers it in a specific case<sup>[16]</sup>.

Our study observed that, according to the indications for tracheostomy in the study population, 14(9.33%) of the patients had severe head and neck traumas, 32(21.33%) had neoplastic malignancy, and 9(36%) had infections. According to mechanical ventilation, 21 (14%) had prolonged ventilation. And, based on adjunctive head and neck procedures, 8(5.33) anticipated problematic intubation. And the duration of hospital stay was observed to be: 68 (45.33%) patients were in the hospital for less than three days and 43 (28.66%) for more than three days. Additionally, 39 people died during their hospital stay.

Mehta and Chamyal found problems in 48% of the 100 cases they studied<sup>[17]</sup>. Early and mild problems were prevalent. Complications in emergency instances were twice as common as in scheduled cases. No tracheostomy-related deaths were reported. Zeitouni and Kost investigated 281 cases of tracheostomy and discovered a 24% total complication rate. There was a statistically significant increase in the risk of complications in both emergency situations and ICU patients<sup>[18]</sup>. Haemorrhage was the most common intraoperative consequence (2.8%). Infection was a prevalent post-operative consequence (7.8%). No tracheostomy-related deaths were reported. Goldenberg et al examined 1130 tracheostomy cases and discovered significant problems in 49(4.3%) and 8 tracheostomy-related deaths (0.7%).<sup>19</sup> The most prevalent problems were tracheal stenosis (21 instances), severe bleeding (9 cases), tracheo-cutaneous fistula (6 cases), infection (5 cases), and tracheo-oesophageal fistula (1 case). He added that difficulties can be reduced by avoiding emergency tracheostomy through endotracheal intubation or cricothyroidotomy, using proper surgical technique, and providing attentive postoperative care.

In this study, the study population's tracheostomy complications revealed that one (0.66%) of the patients experienced cardiopulmonary arrest during the intraoperative period. According to the Intermediate period, three (2%) patients suffered tube block, two (1.33%) had accidental decannulation, and three (2%) had aspiration pneumonia. In the late period, 3 (2%) patients experienced suprastomal granulation, whereas 10(6.66%) had stomal infection.

Tracheostomies are effective for patients who need long-term mechanical ventilation. They reduce the work of breathing and allow patients to wean off ventilators more easily than with endotracheal intubation. Tracheostomy facilitates suctioning and the removal of secretions, which is essential in patients with compromised cough reflex or excessive secretions. Prolonged intubation with an endotracheal tube can lead to complications like vocal cord injury, tracheal stenosis, and discomfort. Tracheostomy is generally better tolerated for extended periods of respiratory support. Tracheostomy patients typically report greater comfort compared to endotracheal intubation, especially for long-term respiratory management. It allows patients to communicate more effectively and may even facilitate oral feeding in some cases, enhancing quality of life. Patients with tracheostomies often require less sedation compared to those with endotracheal tubes because the tube causes less discomfort. This contributes to earlier mobilization and rehabilitation, which can improve overall outcomes. Tracheostomies reduce the risk of complications like ventilator-associated pneumonia (VAP) when compared to prolonged endotracheal intubation. The reduction in VAP rates contributes to better outcomes and lower mortality in critically ill patients. For patients with chronic respiratory failure, such as those with neuromuscular diseases, tracheostomy is an effective means of long-term respiratory support and can prolong survival. While tracheostomy is generally considered safe, it carries risks such as bleeding, infection, and tracheal injury. The decision to perform a tracheostomy must balance the potential benefits with these risks.

#### Limitations of the study

The present study was conducted in a very short period due to time constraints. The small sample size was also a limitation of the present study.

#### CONCLUSION

Tracheostomy is highly effective for respiratory management in patients who need prolonged mechanical ventilation, those at risk of airway obstruction, or those with conditions that compromise normal respiratory function. It enhances comfort, facilitates weaning from ventilation, and reduces complications like VAP. However, it is a surgical procedure with its own risks, so the decision to perform it should be carefully individualized based on patient-specific factors.

#### RECOMMENDATION

This study can serve as a pilot to much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for

future use and emphasize points to ensure better management and adherence.

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The wide range of disciplines involved in Efficacy of tracheostomy for respiratory management in patients research means that editors need much assistance from references in the evaluation of papers submitted for publication. I would also like to be grateful to my colleagues and family who supported me and offered deep insight into the study.

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